Part 2: Policy Options

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“Parents should be able to comfort their children and say ‘everything will be all right… it’s not the end of the world, and we are doing the best we can’ but I don’t think you can say that anymore.”

Severn Suzuki, aged 12, addressing UNCED, Rio de Janeiro, June, 1992

“The best way to use hard facts as a motivator is to partner scary information with options for action: ‘What can we do? Let’s find a way to fix it.’ The young, particularly, can handle bad news if there’s an avenue for change.”

Severn Suzuki, aged 32, Perspectives on Rio+20

CHAPTER 9

Africa



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Main Messages

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.

Embarking on mutually reinforcing policies works to Africa's advantage. 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. For example, sustainable land management policies support positive outcomes in diverse environmental domains including marine ecosystems, biodiversity and freshwater. This will, however, require the harmonization of policies between the local, national, regional and global levels to avoid adverse environmental and social impacts. For example, global policies – such as those for food, biofuels and climate mitigation – should not undercut local livelihoods and adaptive capacity.

Transboundary natural resource policies strengthen the integrated management of shared terrestrial and marine ecosystems. The popularity of this approach in Africa underscores its validity as a useful strategy with wide applicability.

Networks of marine managed areas rather than individual, strictly protected marine areas provide more opportunity for comprehensive management of marine resources. Benefits include fisheries recovery, improved migratory species conservation, reduced land- and sea-based pollution, and enhanced social and ecological resilience to climate change.

The recognition and up-scaling of human rights, including the rights of indigenous people and women, support improved human and environmental well-being, as demonstrated by the recognition of the right to water at national levels and by the African Commission on Human and Peoples' Rights.

Adequate capacity is critical for effective natural resource management and governance. Needs differ across levels, making capacity assessment at multiple scales necessary to identify solutions. Innovative institutional arrangements for pooling knowledge, capacity and financial resources help build long-term collaboration to achieve environmental goals, as approaches for pollution management demonstrate.

Management that considers the whole ecosystem, including people, is more likely to be effective in maintaining environmental goods and services and human well-being, as sustainable land management and integrated coastal zone management show. Africa's extensive use of community-based environmental management has helped poor rural communities generate revenues from wildlife-based enterprises and enabled nations to improve their conservation of large mammals and related ecosystems. The success of this approach hinges on the extent to which governments have devolved authority and rights over natural resources.

Strong accountability with secure participation, access to information and consent ensure that decisions are environmentally and socially sustainable. Africa's growing reliance on extractive resource use makes securing accountability important to avoid special-interest decisions. Monitoring government performance and tracking environmental trends supports effective and timely response to ongoing environmental change, including extreme natural events, and sets the basis for further policy development.

INTRODUCTION

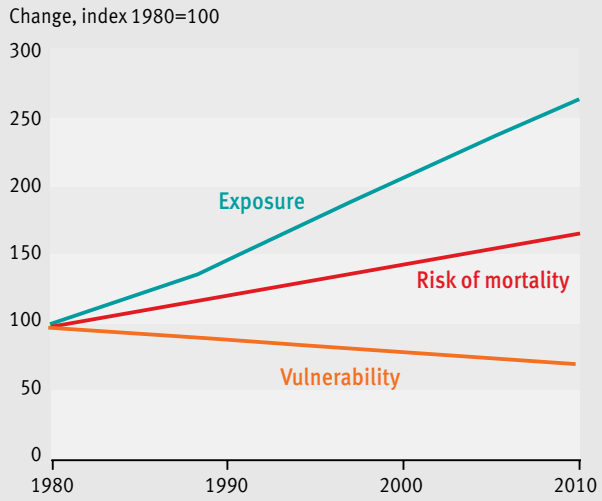
Over the last generation, Africa has built a substantial record of responding to environmental challenges while addressing human well-being, and this provides a point of departure for strengthening policy and implementation. This chapter considers 12 promising policy options identified as contributing to achieving a set of regionally selected international goals (Table 9.1) (see Introduction to *GEO-5* for methodology).

As the policy appraisal shows, innovation by and partnerships between African people and their governments have underpinned this success, while 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.

Despite tremendous progress, significant challenges remain, including population growth, rapid urbanization, climate change, unsustainable development choices and weak governance.

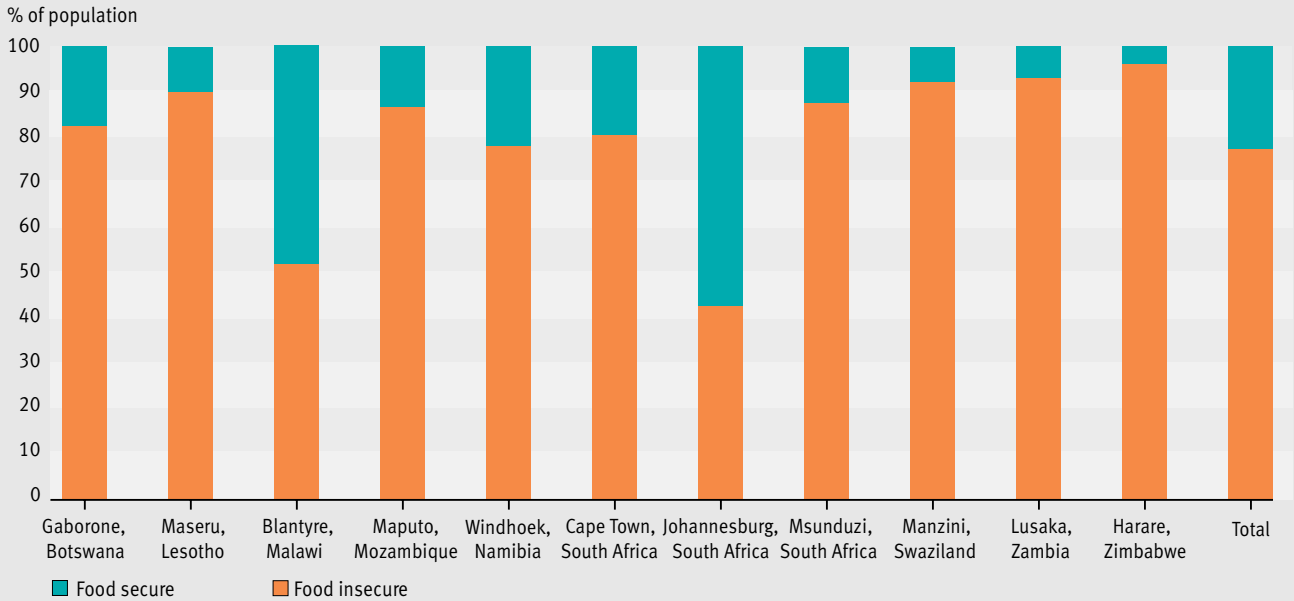
Africa's population – 1 billion in 2009 – is growing at close to 2.15 per cent per year (UN 2011), placing increasing demand on environmental resources. In 2010, some 395 million people, or 40 per cent of the total population, lived in urban areas. By 2040, the urban population is likely to be 1 billion and by 2050, 1.23 billion – 60 per cent of the total (UN-Habitat 2010). In Africa's cities – characterized by extremes of prosperous centres and poor, informal settlements – many governments struggle to provide social services including access to water, to achieve food and energy security, and to manage environmental risks (Figures 9.1 and 9.2). Climate change and other adverse environmental change may increase urbanization

Figure 9.1 Exposure and vulnerability to floods in sub-Saharan Africa, 1980–2010



Source: UNISDR 2011

Figure 9.2 Food insecurity in selected Southern African cities, 2008–2009



The 1996 World Food Summit in Rome agreed that "food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO 1996). This relies on food availability, accessibility, reliability and quality, as well as acknowledging preference (Frayne et al. 2010; Sen 1981).

Source: Frayne *et al.* 2010

(UN-Habitat 2010) and further strain governments' ability to cope, leading to greater instability (Mohamed-Katerere 2009).

Climate change – by exerting extreme pressure on ecological systems – is likely to increase the stress of vulnerable populations in urban and rural areas (Boko *et al.* 2007). More intense rainfall events contribute to more run-off and floods, threatening food security and settlements, while longer periods between rains and changing seasonal patterns contribute to crop loss. Sea level rise is likely to have significant impacts on coastal settlements, given the high population in potentially hazardous areas (Nicholls 2004), including Akpakpa in Benin and Lagos in Nigeria, making climate-sensitive policies critical for conservation and adaptation. However, most existing policy lacks the framework to address the complex challenges of human vulnerability to climate change (Madzwamuse 2010). The adoption of risk reduction strategies, improved well-being, and better preparedness can result in reduced vulnerability even in these circumstances. Prospects are, however, currently limited; Figure 9.1 shows that exposure to flood and the risk of mortality are outpacing reductions in vulnerability (UNISDR 2011).

Policies and practices that originate outside the region can contribute to environmental change. External investments in

Table 9.1 Regionally selected policy goals

Climate change	
United Nations Framework Convention on Climate Change (UNFCCC 1992) Article 3 Paragraphs 1–3	In their actions to achieve the objective of the Convention and to implement its provisions, the Parties shall be guided, *inter alia*, by the following: 1. The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof. 2. The specific needs and special circumstances of developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change, and of those Parties, especially developing country Parties, that would have to bear a disproportionate or abnormal burden under the Convention, should be given full consideration. 3. The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost. To achieve this, such policies and measures should take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors. Efforts to address climate change may be carried out cooperatively by interested Parties.
Land	
Johannesburg Plan of Implementation (JPOI) (WSSD 2002) Paragraph 40b	Develop and implement integrated land management and water-use plans that are based on sustainable use of renewable resources and on integrated assessments of socio-economic and environmental potentials and strengthen the capacity of Governments, local authorities and communities to monitor and manage the quantity and quality of land and water resources.
Biodiversity	
Convention on Biological Diversity (CBD 1992) Article 10: Sustainable Use of Components of Biological Diversity	Each Contracting Party shall, as far as possible and as appropriate: (a) integrate consideration of the conservation and sustainable use of biological resources into national decision-making; (b) adopt measures relating to the use of biological resources to avoid or minimize adverse impacts on biological diversity; (c) protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements; (d) support local populations to develop and implement remedial action in degraded areas where biological diversity has been reduced; and (e) encourage cooperation between its governmental authorities and its private sector in developing methods for sustainable use of biological resources.
Freshwater	
Johannesburg Plan of Implementation (JPOI) (WSSD 2002) Paragraph 26c	Improve the efficient use of water resources and promote their allocation among competing uses in a way that gives priority to the satisfaction of basic human needs and balances the requirement of preserving or restoring ecosystems and their functions, in particular in fragile environments, with human domestic, industrial and agriculture needs, including safeguarding drinking water quality.
Oceans and seas	
Jakarta Mandate on Marine and Coastal Biodiversity of the CBD (CBD 1997)	Promote the conservation and sustainable use of coastal and marine ecosystems as well as their natural resources.



A woman carries firewood across a stream in southern Sudan where floodwaters washed away the bridge. *© Tim McKulka/UN Photo*

land deals have increased rapidly as global demands for food and biofuels have risen – some 45 million hectares of such land investments, 70 per cent of the global total, are in Africa (Deininger *et al.* 2009). Frequently, these investments have adverse impacts on land resources and livelihoods (Cotula 2008). Other examples of external drivers include climate change and waste disposal practices that have adverse impacts on land and water quality, and consequently on human health and food security. This makes the harmonization of policies between different countries as well as different regions a priority.

Over the last ten years, Africa's development approach has focused on securing growth through resource extraction, especially in the oil and mining sectors, and expansion of infrastructure. In the absence of strategic and integrated environmental assessment and robust accountability systems, this has led to environmental degradation. For example, weak accountability in decision-making systems has contributed to forest loss (FAO 2010).

While governance and institutional arrangements vary, some challenges are of regional significance given the similarities across nations. Conflicting laws, values and interests in and between countries adversely affect the ability to develop the collaborative institutional systems that are essential for managing ecosystems and responding to common challenges such as drought (Mohamed-Katerere 2001). At times, this disparity has resulted in resource conflicts, including over the fair allocation of land and water (Mohamed-Katerere 2009; Ashton 2000). Inequitable sharing of the benefits and losses of natural resource management also reduces social-ecological resilience, often creating conflict as deteriorating conditions in one sphere affect another (Mohamed-Katerere 2009). Weak land tenure, insufficient accountability and poor transparency compound this adverse reality. Sectoral planning that treats the environment as a set of separate resources rather than as a composite system further undermines environmental management. In this complex and unsatisfactory governance context, it is often vulnerable groups that suffer most (Jäger *et al.* 2007).

POLICY APPRAISAL

This section appraises the selected policy options and shows that they are often mutually reinforcing, with positive impacts in more than one thematic domain. For example, developing more effective accountability measures or strategies for collaboration are shown to have positive outcomes in diverse policies, including for marine managed areas and natural solutions for adaptation and mitigation. Further, the policy options address a common set of drivers and pressures, as identified in the section above. Table 9.2 provides insight into these links and also shows benefits in social, ecological and economic domains. For African nations under increasing strain and faced with limited resources, maximizing benefits and synergies among these domains while reducing trade-offs can help place environmental and development choices on a path of sustainability.

The appraisal provides broad indicative lessons about conditions for replication and achieving the policy goals. Simple attribution of positive outcomes to any one policy is problematic as multiple factors contribute to success. Weak systems for monitoring and tracking policy outcomes in social, environmental, economic and political domains mean that the appraisal relies primarily on qualitative analysis from peer-reviewed literature and documented project experience. Some of the identified policy options are in the early stages of implementation and consequently show limited impact; nevertheless, current results suggest potential for up-scaling and replication.

Table 9.2 Mutually reinforcing outcomes through effective implementation of selected policy options

	Policy themes and goals				
Policy options	**Biodiversity** Convention on Biological Diversity (CBD 1992) Article 10	**Freshwater** Johannesburg Plan of Implementation (JPOI) (WSSD 2002) Paragraph 26c	**Land** Johannesburg Plan of Implementation (JPOI) (WSSD 2002) Paragraph 40b	**Oceans and seas** Jakarta Mandate of the CBD (CBD 1997)	**Climate change** United Nations Framework Convention on Climate Change (UNFCCC 1992) Paragraphs 1–3
Transboundary natural resource management	Improved conservation through pooling of management, financial and human resources; management improved by harmonizing approaches	Equitable sharing of water resources is ensured, reducing resource conflict	Livelihood and economic benefits reduce reliance on use options that degrade or deplete resources	Harmonized cross-sector regimes secure fisheries while maintaining conservation	Conservation creates new mitigation opportunities and greater availability of environmental resources for adaptation
Marine managed areas	Improved regulation of use regimes; marine networks support joint management			Protected breeding grounds improve fish stocks; multiple needs are reconciled with conservation	Improved ecosystem services and goods support adaptation and mitigation
Regional approaches for marine pollution management	Improved ecosystem quality and resilience enhance biodiversity			Ecosystem restoration helps maintain social and environmental benefits	The reduction of pollution secures livelihood resources that support adaptation
Payment for ecosystem services and biodiversity offsets	Improved local incomes while strengthening conservation perspectives; conservation of offset sites	Better valuation of water resources leading to incentives to protect wetlands and water catchments	Improved social, ecological and economic benefits; diversified income opportunities reduce land pressures	Recognition of the value of the ocean as a carbon sink and for its tourism value helps protect coastal ecosystems	Diverse carbon sinks are secured; enhanced ecosystem services support adaptation and disaster risk reduction
Reducing Emissions from Deforestation and Forest Degradation (REDD+)	Enhanced biodiversity conservation as forest ecosystems are restored and maintained	Water catchments are protected; water quality is maintained or improved	Diverse income opportunities reduce pressure on land	An extended REDD+ (mangroves and seagrass beds) leads to fisheries recovery	Increased earnings and improved ecosystem services support adaptation; mitigation is enhanced
Integrated coastal zone management	Improved conservation is achieved	Saltwater intrusion is reduced	Saltwater intrusion is reduced	Fisheries improve as coastal ecosystems are restored	Increased availability of ecosystem goods and services for adaptation
Sustainable land management	Biodiversity outside protected areas is used sustainably	Available water is more efficiently used; water sources are protected and quality is enhanced	Land productivity is improved through input-use efficiency and rainfall-use efficiency	Coastal systems are restored as agricultural pollutants are reduced	The conservation of natural systems and more efficient land/water use secures valuable resources for adaptation
Human rights	Opportunities are enhanced for resource custodians to protect valuable ecosystems from pollution and non-sustainable use	Water security is improved, providing a fairer distribution mechanism	Tenure and other rights support improved livelihoods	Citizens protect marine resources through action against polluters	Local resilience and adaptation are enhanced by securing access to resources
Local, inclusive and participatory approaches	Local and indigenous knowledge supports restoration and conservation; improved social benefits encourage long-term perspectives		Additional livelihood resources are available, reducing land pressure; long-term perspectives inform local decisions	Coastal resources are more effectively used to support local livelihoods	Adaptation is strengthened as local knowledge and perspectives help define solutions
Water harvesting	The rehabilitation of water catchments supports ecosystem and habitat recovery	Water security is enhanced as supply is improved	Land productivity and food security is improved		Coping capacity is enhanced through improved access to water; flood risk is reduced as run-off is captured
Natural solutions for adaptation to and mitigation of climate change	Restored ecosystems support biodiversity recovery, including of wild crops	Reduced saltwater intrusion from mangrove restoration secures freshwater	Grassland restoration provides pasture and crop biodiversity and reduces likelihood of conversion	Mangrove restoration leads to recovery of coastal systems and fisheries	Crop biodiversity, pasture, fisheries and other ecosystem goods support adaptation; risk is reduced as ecosystems are more secure
Stakeholder pollution management	Biodiversity recovers as pollution is reduced	Improved human health; river integrity is restored; water resources are better valued by users		Coastal and marine systems recover as pollutants are reduced	Reduced flood risk and improved human health contribute to resilience and capacity to cope with climate change

Transboundary natural resource management

Transboundary approaches to environmental and natural resource management contribute to achieving the agreed goals (Table 9.1) in all thematic areas (Table 9.2). There are many examples of successful transboundary initiatives throughout Africa (Huggins *et al.* 2006; Jones and Chonguiça 2001; Wilkie *et al.* 2001), although there are significant variations in their focus, structure, delivery and scope.

These approaches demonstrate success in minimizing biodiversity loss, supporting integrated land and water management, improving local benefits, contributing to fairer and more equitable resource sharing including of ground- and surface water, and improving climate mitigation and the availability of resources for adaptation (Boxes 9.1 and 9.2) (Dudley *et al.* 2010). Importantly, transboundary approaches often enhance cooperation and reduce conflict by facilitating dialogue, establishing networks – including of marine protected areas – and encouraging learning and knowledge sharing (Abdulla *et al.* 2009; Huggins *et al.* 2006; Mohamed-Katerere 2001; Rodgers *et al.* 2001). This helps create the political stability needed for economic and development cooperation. There are, however, many challenges.

Transboundary approaches are inherently complex processes involving many actors, issues and agendas. Strengthening dialogue can contribute to achieving consensus (Box 9.2) (Conca and Dabelko 2002), but reaching it is nonetheless challenging (Ervin *et al.* 2010). Efforts to bring different countries and sectors of society together can create rifts and alienate some communities (Muboko 2011), and scaled-up management may marginalize local users from decision making and reduce access to valuable livelihood resources (Whande 2010). Implementation can also be impeded by ill-defined rights to land and resources, weak governance processes, and conflicting interests and goals (Katerere *et al.* 2001). Consequently, the development and harmonization of laws and policy are essential (Mohamed-Katerere 2001).

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. For example, given that 75 per cent of African countries are coastal and that 70 per cent of river basins are shared by two or more countries, collaborative governance is essential for sustainable approaches.

Box 9.1 The Sangha Tri-National Landscape

The Sangha Tri-National Landscape (TNS) consists of three national parks – Lobéké (Cameroon), Nouabalé-Ndoki (Congo) and Dzanga-Ndoki (Central African Republic) – covering 4.52 million hectares. This area includes logging concessions, community use zones and hunting areas.

The TNS economy is based on the extractive use of timber, bushmeat, palm wine and fish, which provide support to indigenous communities. The goal is to ensure that all use is sustainable. However, the actual impact of this extractive economy on the socio-economic conditions of local people is not easy to quantify because communities are somewhat diffuse.

Biological surveys show healthy populations of endangered wild species, notably elephants and great apes. The TNS also helps maintain the integrity of species' migratory patterns. Experience to date indicates that harmonization is required in transnational legislation for forestry, indigenous land use and hunting. True and just compensation for the area's indigenous communities needs greater attention and analysis.

Source: Usongo 2010; Breuer 2009

Box 9.2 Collaborative water management: Organization for the Development of the Senegal River Basin

In 1974, the Organization for the Development of the Senegal River Basin (OMVS) was established by Mali, Mauritania and Senegal as a supra-national authority to agree water allocation and dam management principles (Varis *et al.* 2006). Water entitlements of riparian countries are made on the basis of demand from three sectors – navigation, energy and irrigation – as negotiated by the parties, and not on the basis of volume demand.

Successes include irrigation of some 375 000 hectares in Senegal, Mali and Mauritania, the provision of 200 megawatts of electricity to the three countries (Madamombe 2005), and securing year-round navigation of a 900-km stretch of the river from Kayes to Saint-Louis, supporting livelihoods for many. A saltwater prevention barrage near the estuary, the Diama Dam, and flood control measures provide support for farmers practising flood-recession agriculture near the dam. In addition, the OMVS has contributed to political and regional cooperation, reducing the potential for conflict and increasing investment in basin resource management.

Despite this success, the complicated institutional set-up of OMVS has not always been able to deal effectively with conflicts (Varis *et al.* 2006). Furthermore, lack of harmonization of OMVS and national action presents challenges for basin management.

Marine managed areas

Marine managed areas are part of a suite of approaches applied in Africa that contribute directly to achieving the oceans and seas goal, and also to the biodiversity and climate change goals by securing coastal ecosystems and environmental services.

The objectives of marine managed areas – which often include strictly protected no-take zones or other marine protected



Fish drying. The successful implementation of policies that enhance fish stocks improves the food security of millions of Africans who rely on fish for protein. *© Jacoline Schoonees*

areas in addition to multi-use areas – complement a broad range of national development and economic goals other than biodiversity conservation. These goals include improved food security, better livelihoods, effective governance and sustained economic growth. Managed areas complement other regulatory policies such as fisheries and water quality management. For example, five-year rotational harvesting in managed areas off the east coast of South Africa contributes to the rapid recovery of oyster populations during fallow years (de Bruyn *et al.* 2009).

Although the establishment of marine protected areas has often been relied on to improve marine conservation, they face multiple challenges. Disparities in governance, institutional capacities, wealth distribution, social capital and availability of ecological data can affect both their establishment and their effectiveness (Abdulla *et al.* 2009, 2008). In some cases, marine protected areas face opposition from adversely impacted sectors of society. For example, tourism operators resisted the establishment of marine protected areas in Kenya because they could not afford the licensing fees, protective clothing, insurance and equipment required by new regulations (Weru 2004). Local fishers who are excluded from their previous fishing zones may also oppose protected area development (Apostolaki *et al.* 2002). In addition, many countries cannot afford comprehensive research on all marine habitats within their jurisdiction, making the identification and development of marine protected areas challenging. Consequently they are often smaller and wider apart than is ecologically viable (Abdulla *et al.* 2009).

Establishing managed marine areas can be an effective alternative, as they include multiple management zones and protected no-take zones. The information required for the design of such no-take zones can be obtained through rigorous quantitative research in a few representative sites combined with comprehensive surveys of traditional knowledge (Johannes 1998). Once designated, many managed marine areas face a lack of adequate resources for proper enforcement of regulations. However, alternative enforcement approaches can be used, including local community guards (Andrews 1998). An added advantage of managed marine areas is that they can control any unsustainable use that is displaced by fully protected no-take zones. Individually, however, countries may be unable to address this as use may occur in areas beyond their legislative jurisdiction, such as the high seas, all of which suggests a need for more collaborative and transboundary approaches. For example, Africa's widest network of managed marine areas, which stretches over 23 sites in six countries of Western Africa – Cape Verde, the Gambia, Guinea, Guinea Bissau, Mauritania and Senegal – has had considerable success in ensuring that fisheries, tourism, and oil and gas development do not adversely affect the marine ecosystem and its biological resources (Karibuhoye 2008).

Africa's 45 649-km coastline (Vafeidis *et al.* 2005), which encompasses 33 of the region's 48 mainland countries and

Box 9.3 A network of managers in the Mediterranean

The establishment of an ecological network of effective marine managed areas requires a multidisciplinary and multi-level approach, with strong commitment from governmental and non-governmental organizations as well as the scientific community. Although governance and legal challenges have halted the implementation of transboundary environmental policies in Northern Africa (Abdulla *et al.* 2008), international cooperation platforms provide a significant opportunity to achieve ecosystem conservation targets. In the Mediterranean, UNEP and the conservation organization WWF partnered to create MedPAN, a network of marine protected area managers that connects more than 40 marine managed areas and supports them to work on a number of coordinated and common initiatives (MedPAN 2011). The network is a tool and a neutral platform for non-governmental and local governmental agencies to deliver services in an efficient way. The partnership has proved successful for the transfer of knowledge, and improved management capacity, data collection, and monitoring and evaluation. This ultimately supports a bottom-up approach, which contributes to building a constituency of practitioners able to influence decision makers on the conservation of marine resources.

six island nations, illustrates the importance of strengthening marine management. Up-scaling managed areas and establishing a network is a step beyond the more traditional approach of establishing them opportunistically as single independent entities. Through interconnections and interdependencies, the individual elements of the network contribute positively to each other's integrity by decreasing overall vulnerability. Marine food webs extend beyond the boundaries of individual areas, and fishers are dependent on different species and geographic regions at different times of the year. Tourism revenues from an accessible managed area with charismatic species can help subsidize the maintenance costs of more remote places with no other values that can be easily captured through current market mechanisms. Many biophysical and socio-economic connections overlap national boundaries, and regional cooperation can promote national interests. Currently unmanaged areas merit priority attention within a larger managed area framework (Abdulla *et al.* 2009). As part of a regional marine conservation agenda, the formation of managed networks in those areas where coverage is minimal and urgently needed – including Northern Africa (Mediterranean Sea), northeast Africa (the Red Sea), the Gulf of Guinea and Southern Africa – has seen some initial successes (Box 9.3).

Regional approaches to marine pollution management

Regional approaches that include a mix of self-regulated, state-enforced and collaborative management are effective in addressing the multiple drivers and diverse scales of marine pollution, and hence in achieving the selected goal for oceans and seas. A reduction in marine pollution also contributes to the biodiversity and climate change goals (Table 9.2).

Coastal urban growth contributes to residential effluent, industrial discharges, storm-water run-off, agricultural and mining leaching, contaminated groundwater seepage, and industrial and vehicle exhaust fumes that enter the marine environment. The coastal cities of Accra in Ghana, Douala in Cameroon, Lagos and Port Harcourt in Nigeria and Luanda in Angola, for example, are all adversely affected by industrial pollutants (Ibe and Sherman 2002). Oil spillage and discharge from marine transport present major management and regulatory challenges, especially for oil-producing countries such as Libya and Nigeria, where problems are severe (Golik *et al.* 1988). Offshore exploration, especially for oil (GEF *et al.* 2006), contributes to pollution from dumping at sea, accidental and intentional oil spills, engine leaks and noise (Abdulla and Linden 2008).

Comprehensive regional marine pollution conventions govern the four major African coastal regions. The Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region (Abidjan Convention) and the Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (Jeddah Convention), and their associated protocols, provide important regulatory mechanisms for high-use areas and employ a self-regulatory approach. The benefit of self-regulation is that it is quick to respond, flexible, and sensitive to market circumstances (Osborn and Datta 2006). The primary drawback is that the responsibility falls on the industry to control pollution (Buckley 1994), and the incentives to do so may be insufficient. Waste exchange programmes, initiated under the Guinea Current Large Marine Ecosystem programme, have effectively supported waste reduction and ecosystem recovery (Ukwe and Ibe 2010). In Ghana, this has focused on using the waste from one industry as raw material for another.

Action plans to increase the capacity of port waste reception facilities have been developed regionally, although on-the-ground progress has been limited. For example, the Benguela Current Large Marine Ecosystem programme has promoted the sharing of facilities between ports in the Benguela and Guinea Current regions through assessment of reception facilities, technical training needs and regional capacity requirements as related to the International Convention for the Prevention of Pollution from Ships 1973, as modified by its 1978 Protocol (MARPOL 73/78) (Awad 2008). This process has increased the involvement of key regional stakeholders and advanced some key operational areas of the convention. The Port Management Association of West and Central Africa incorporates marine pollution compliance and requires further investment from ports and industry partners. The need to address the shortage of technical management capacity has been tackled by the International Ocean Institute–Southern Africa through targeted regional training for countries of Western Africa. The existing network of large marine ecosystem programmes, port management associations and regional conventions provides further opportunity for replication of this model. Tax-based policies can complement this approach by extending a company's liability for environmental damage, although a common argument against tax-based policies is that they give the right to pollute if they are not punitive enough. When citizens have standing in the courts they can serve as an important check on industrial practice, as the Niger Delta Ogoni case demonstrates, a case that is also pertinent to the policy option on human rights. This in turn provides an incentive for improved environmental performance.

Although the regional conventions and their protocols are relatively comprehensive in addressing the various marine pollution issues, significant risks remain due to the lack of implementation of these regimes in some countries. But successes exist – as demonstrated by developments under the Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region (Nairobi Convention) (Box 9.4).

With a network consisting of existing regional International Maritime Organization (IMO) offices in Western and Eastern Africa, various regional conventions, and the regional seas and large marine ecosystem programmes, it is clear that the appropriate policy platforms are in place to combat marine pollution. However, there is a paucity of capacity for management in terms of equipment, technical training and institutional support, as well as for implementing existing policies, making investment in these areas a priority.

Box 9.4 Successful pollution management in the Western Indian Ocean

The Nairobi Convention (UNEP 1985) has been instrumental in developing and implementing marine pollution management projects in the Western Indian Ocean, which includes Eastern Africa and the region's island countries.

An operational platform provided by the convention – which brought global investment for the development of policy and management frameworks – was the key strength that led to successful policy initiation and implementation. Other critical features are the IMO regional office in Nairobi and the Agulhas and Somali Currents Large Marine Ecosystem project, which provide additional technical support, including assistance in developing national contingency and action plans.

Project development and implementation underpin the convention's success. For example, the World Bank/GEF-funded Western Indian Ocean Highway Development and Coastal Marine Contamination Prevention Project, implemented through the Indian Ocean Commission and the South African Maritime Safety Authority, has the following goals:

- development of an electronically supported marine highway system for ship guidance and monitoring within the region;
- further extension and implementation of the Indian Ocean Memorandum of Understanding on Port State Control; and
- building capacity for coastal sensitivity mapping and oil-spill response.

Current project success includes the development of a joint draft regional contingency plan. A Regional Coordination Centre for Marine Pollution Preparedness and Response is envisaged to develop a secretariat that would implement the plan.

Source: Jackson 2011

Box 9.5 The Ambatovy Business and Biodiversity Offsets Programme (BBOP), Madagascar

Biodiversity offsets – conservation activities designed to deliver biodiversity benefits in compensation for losses, in a measurable way – are included in the Madagascar Action Plan 2007–2012 as priority projects.

In 2004, the Ambatovy Mining Project adopted the BBOP project, which includes an off-site offset area of 11 600 hectares of endangered forest, 4 900 hectares of on-site conservation zones and a forest corridor to ensure connectivity with remaining eastern rainforests. Support is also given to an adjacent Ramsar wetland and reforestation. The BBOP process led to the integration of the project into local, regional and national plans. Support for capacity building has increased the potential for successful replication.

The project has, however, faced multiple challenges. Since 2006, agreements with the local communities not to expand agriculture and environmentally degrading activities have been breached. This demonstrates the difficulty of achieving consensus when livelihood opportunities are lost. Developing a third-party mechanism to verify claims could ensure fairness and equity in making trade-offs. Other barriers to success relate to difficulties in identifying sites with similar environmental characteristics and comparable biological diversity as offset sites.

Source: Ambatovy Project 2009; Republic of Madagascar 2006

Payment for ecosystem services and biodiversity offsets

Innovative mechanisms such as payment for ecosystem services and biodiversity offsets contribute to achieving all the identified goals (Table 9.1) by encouraging, compensating and rewarding environmental custodians for maintaining or restoring valued environmental services (Swallow *et al.* 2009).

A growing portfolio of payment for ecosystem services in Africa demonstrates benefits for both nature and people, including for watershed services in Eastern and Southern Africa (Stanton *et al.* 2010). Biodiversity offset programmes have been adopted in Ghana, Guinea, Madagascar and South Africa (Madsen *et al.* 2010). Payment for ecosystem services and offset approaches have also been used to support eco-labelling and community tourism, to protect fragile and valued habitats including forests, mangroves and coral reefs (Box 9.5) (Swallow *et al.* 2009), and to sequester carbon (REDD+).

Despite some positive outcomes from these approaches, barriers to success remain (Wunder 2008; Landell-Mills and Porras 2002). Opportunities for local communities continue to be limited: for example, large landowners or companies supply most biodiversity offsets (Box 9.5) even though low-income communities could be competitive suppliers of biodiversity compensation (Milder *et al.* 2010). The weak negotiating capacity of communities makes it difficult for them to participate and secure livelihood benefits that exceed their opportunity costs (Swallow *et al.* 2009; Wunder 2005).

There is considerable potential for expanding payment for ecosystem services in Africa (Table 9.3), as the region lags behind others in developing such approaches (Dillaha *et al.* 2007). In the global carbon offset market for 2011, for example, Africa accounted for less than 3 per cent of emission reduction projects, albeit the region has seen a strong growth trend in the past few years (UNEP Risoe Centre 2011). Enabling factors include agreeing to a set of principles; strengthening the legal framework including certification and capacity building of buyers

Table 9.3 Estimated numbers of low-income households likely to benefit from payment for ecosystem services in developing countries within the next two decades

Ecosystem service	Buyer				
	Public sector	Private, regulated	Private, voluntary	Consumers of eco-certified products	Total number of beneficiaries
Biodiversity conservation	Hundreds of thousands	Millions	Hundreds of thousands	Millions	10–15 million
Watershed protection	Tens of millions	Hundreds of thousands	Hundreds of thousands	Fewer than 100 000	80–100 million
Carbon sequestration	Fewer than 100 000	Tens of millions	Millions	Fewer than 100 000	25–50 million
Landscape beauty or recreation	Hundreds of thousands	Only a few	Millions	Fewer than 100 000	5–8 million

Source: Milder *et al.* 2010

and sellers; encouraging participation by small-scale players by granting them land title or use, access or co-management rights; focusing on long-term livelihood assets rather than on short-term benefits; reducing corruption and "rent-seeking"; creating a more transparent business framework; and facilitating bi- and multilateral knowledge-sharing initiatives (Milder *et al.* 2010; Swallow *et al.* 2009; Wunder 2005).

Reducing Emissions from Deforestation and Forest Degradation

Reducing Emissions from Deforestation and Forest Degradation (REDD+), including the role of conservation, sustainable management of forests and enhancement of forest carbon stocks, is a payment for ecosystem services mechanism currently being negotiated under the United Nations Framework Convention on Climate Change (UNFCCC). Various multilateral processes are underway to support countries in preparing for REDD+ implementation.

With the right safeguards in place, REDD+ could support climate mitigation through carbon sequestration – the climate change goal – and could also address important social and environmental dimensions that could lead to improved livelihoods. Depending on design, REDD+ initiatives may also offer new incentives for addressing the biodiversity and freshwater goals by enhancing forests and the land goal by reducing economic reliance on land-degrading activities. If the current focus is extended beyond terrestrial forests to include mangroves (Crooks *et al.* 2011), REDD+ equivalents could also support realization of the oceans and seas and land goals (Table 9.2).

Although REDD+ is in its preparatory phase, there are some readiness activities, pilot projects and bi-lateral initiatives as well as carbon sequestration projects from which lessons can be garnered. Preliminary evidence suggests benefits for climate mitigation and the environment as well as for people, primarily through supplementary income (Box 9.6) (Bond *et al.* 2010; Madeira 2009).

Early lessons from carbon sequestration projects suggest that unless several challenges facing REDD+ are resolved, market-based approaches could fail to achieve positive outcomes, or might even increase global emissions (Davis 2011; Horta 2009).

Box 9.6 Mozambique: A pilot project in the voluntary carbon market

A voluntary carbon credit project established in 2003 in Sofala Province of Mozambique has helped reduce poverty in the region, which is still suffering from the impacts of the civil war.

By late 2009, the project included 1 510 farmers who rely on subsistence farming, wood gathering and hunting. Between 2003 and 2009, carbon credits totalling US$1.3 million were sold, corresponding to 156 000 tonnes of carbon dioxide (CO_2) at an average price of US$9.0 per tonne. Farmers received a third of the income, the initiating company received a third and its local non-profit subsidiary received a third for project monitoring and evaluation. The project increased rural employment from 8.6 per cent to 32 per cent, whilst 73 per cent of households raised commercial crops compared with 23 per cent previously. There was a measurable increase in literacy and the development of a business ethos and skills.

The main difficulties revolved around measuring and evaluating carbon sequestration, including establishing a baseline and assessing increases in stocks. Existing satellite data were found to be insufficient, and community management and governance presented further challenges. Earnings were reduced by the relatively high costs of carbon sequestration, at US$3.4 per tonne of CO_2, and by the inability to sell all the credits.

Source: Grace *et al.* 2010



Africa's dryland forests are still poorly incorporated in REDD+. *© Yemi Katerere*

For success, REDD+ needs to address the enabling factors identified under the payment for ecosystem services policy option, and must also ensure that:

- earnings exceed opportunities foregone from agriculture and the fuelwood market (Bond *et al.* 2010);
- secure carbon rights that encourage equitable benefit distribution, reduce the potential for conflict, and discourage forest conversion are adopted (Makhado *et al.* 2011);
- enforceable social and environmental safeguards, such as free, prior and informed consent measures, are effective in reducing adverse impacts;
- systems for accurate measurement, monitoring and reporting of emissions (Makhado *et al.* 2011) are implemented;
- reduced implementation costs are achieved;
- effective intersectoral cooperation is established.

A potentially important limitation of REDD+ is that the current UNFCCC forest definition excludes vast areas of open forests, generally in the dry tropics, and therefore overlooks important carbon stocks, for example in much of Eastern and Southern Africa where significant deforestation is taking place (FAO 2011). The inclusion of these dry forests and woodlands would expand the relevance and impact of a post-Kyoto REDD+ mechanism (Hansen *et al.* 2010).

As significant carbon stocks are held in coastal systems (Crooks *et al.* 2011) and soils, carbon credit schemes could be built into the design of new marine protected areas as public-private partnerships to enhance management and financing. Addressing the specific circumstances of communities and organizations running these REDD+ initiatives is also important, as in coastal zones their investments may be at risk from natural disasters. A further challenge for REDD+ is that climate mitigation activities are poorly integrated with adaptation and development. This is particularly problematic given Africa's high levels of poverty and vulnerability to climate change.

Integrated coastal zone management

Integrated coastal zone management provides a management framework that takes into account complex, non-linear interactions between and within human and ecological systems and across temporal and spatial domains, and consequently takes a significant step towards coherent management of entire ecosystems. It prioritizes the land-sea interface with the objective of balancing economic development and environmental protection, consequently contributing to all five selected goals (Tables 9.1 and 9.2).

The number of African coastal countries adopting integrated coastal zone management increased from five in 1993 to 13 in 2000 (Gustavson *et al.* 2008); this is supported by specific commitments to integrated management in regional agreements (Table 9.4).

As a cross-sectoral approach, integrated coastal zone management involves all levels of governance and encourages the involvement of all stakeholders (Hewawasam 2000; Post and Lundin 1996). This is well illustrated for Eastern Africa's coastal countries in the operation of the Secretariat for Eastern Africa

Table 9.4 Selected regional approaches

Agreement	Africa region	Significant feature
Integrated coastal zone management protocol of the Barcelona Convention (UNEP 1976)	Northern Africa	Parties committed to introducing integrated coastal zone management in national and regional policies and adopting regional and national action plans
Nairobi Convention (UNEP 1985)	Eastern Africa and Indian Ocean island countries	National approaches ensure economic growth amongst coastal communities through the sustainable use of coastal resources (World Bank 2011; Gustavson *et al.* 2008)
Regional Coastal Management Programme of the Indian Ocean countries (ReCoMaP)	Eastern Africa and Indian Ocean island countries	Provides assistance to seven countries in applying integrated management principles to national policies and practice, reducing poverty amongst the coastal population (ReCoMaP 2011)
Accra Declaration (1998)	Southern and Western Africa	Water pollution control and biodiversity conservation policies integrated into the Gulf of Guinea Large Marine Ecosystem project

Source: Milder *et al.* 2010

Box 9.7 Action and commitment at regional and national levels

Although action and commitment to integrated coastal management is growing, multiple institutional challenges persist. The Toliary region of southwestern Madagascar suffers from a range of human-induced environmental problems. While these have been reduced using integrated coastal zone management, greater success has been hindered by a lack of regional coordination (Billè and Rochette 2010; Billè 2008). Specific challenges relate to the lack of clearly defined work programmes, procedures and regular coordination meetings.

On the other hand, the Coastal Area Management Programme (CAMP) in the Mediterranean, which includes projects in Algeria, Egypt, Morocco and Tunisia, applies integrated management principles at multiple scales. This includes engagement at the local level, integration in policies and strategies at national and regional levels, and engaging at wider international and Mediterranean basin levels through cooperation and exchange with the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention). Challenges include the lack of continuous financial commitment that has resulted in many projects being halted, inadequate public participation, poor visibility of the projects and an absence of appropriate national legal frameworks (Gonzàlez-Riancho *et al.* 2009; SMAP III 2009).

Coastal Area Management and in South Africa (DEAT 2011; MCM/DEAT 2000). Success requires action and commitment at regional and national levels (Box 9.7).

Experience demonstrates that the integrated coastal zone management protocol of the Barcelona Convention could be strengthened substantially through the use of spatial planning tools. Although these have been used terrestrially for decades, the broader marine community has only recently adopted them. New technologies, including remote sensing, geographic information systems (GIS) and spatial modelling, provide vastly improved capacity to replicate the spatial structure of nature in models of human-environment interactions, and support a strategic decision-making process that creates a blueprint for ocean use. A key strength of these technologies is that they explicitly recognize that there are valid competing demands on natural resources and that ecosystem-based management solutions must work within the capacity of the local communities. As a result, these tools encourage the development of equitable and viable solutions to the conservation of socio-ecological systems (Bode *et al.* 2008).

Sustainable land management

Sustainable land management can strengthen the management of water and land while incorporating social and economic values. Consequently, it supports achievement of the land and freshwater goals and contributes to the biodiversity, oceans and seas, and climate change goals (Tables 9.1 and 9.2).

An example of this approach is the TerrAfrica initiative. This multi-partner platform for consultation and action includes intergovernmental and civil society organizations. In partnership

Box 9.8 Sustainable land management in Burkina Faso and Ethiopia

Experience in Burkina Faso and Ethiopia under the Global Mechanism of the United Nations Convention to Combat Desertification (UNCCD) suggests that small-scale investments and improved farm and community practices can form the basis for scaled-up national sustainable land management programmes.

In Burkina Faso, the *Gestion des Terroirs* approach involves community-based land management, creates awareness of environmental degradation and land conservation, supports development by local government of new regulations for natural resource management, and encourages the adoption of sustainable land management. This includes soil fertility management, mixed farming, the use of organic manure and other agricultural inputs, and water and soil conservation techniques. Traditional approaches for soil restoration and fertilization include, respectively, the use of stone cordons (*diguettes*) and organic farming methods. The data show that the use of agricultural inputs such as fertilizers without investment in sustainable management is often inefficient and uneconomical, suggesting that stronger links need to be made between agricultural production and sustainable land management.

The Ethiopia Strategic Investment Framework for sustainable land management presents a strategy for scaling-up such activities based on best practice. The National Sustainable Land Management Platform has been established and will be replicated at regional level. The programme will cover 177 watersheds in eight regions over five years, based on the model of participatory watershed management. Local involvement in design and priority setting, along with improvements in water availability and food production, can catalyse the spread of existing sustainable land management technologies as farmers learn from each other.

Source: UNCCD/FAO 2010, 2009; TerrAfrica 2009

with the governments of Burkina Faso, Ghana, Namibia and Uganda, TerrAfrica supports country-level approaches. Dialogue on sustainable land management has been initiated in several countries including Eritrea, the Gambia, Malawi, Mali, Niger, Nigeria and Senegal. The success of TerrAfrica, including in Burkina Faso, Ethiopia, Ghana, Mozambique and Uganda, suggests a high potential for integrated and participatory land management approaches to be replicated in other countries (Box 9.8).

Recognizing that addressing climate change as part of sustainable land management is essential to ensure adaptation and address climate-related land changes (Pender *et al.* 2009), TerrAfrica established climate change as a core priority in 2009. Adaptation policies should complement farmers' responses to climate change, including water harvesting and natural solutions such as ecosystem restoration (Table 9.2) (Below *et al.* 2010).

Sustainable land management approaches appear to be most successful where there is high-level political support and when they build upon local knowledge and practice. This contributes to creating effective stakeholder coalitions and platforms, improving the development, management and dissemination of knowledge, and more effectively leveraging the investments required for sustainable management activities.

An on-going challenge in establishing sustainable management is land tenure insecurity. Many governments are rectifying this through land tenure reform: for example, Niger's Rural Code establishes a framework for protecting and revitalizing pastoralism, where previous policies favoured crop farmers (Jamart 2011). It has promoted the preservation of pastoral areas and protected herders' rights to collective use since 1993, including rights to move their livestock in search of water and pasture (Jamart 2011). In 2010 the Rural Code was modified to address outstanding ambiguities. For example, although the code established land commissions as representative organs in which all stakeholders participate, people still turn to religious and customary leaders first to resolve any land issue. A remaining challenge is to stop the encroachment of pastoral areas by croplands as farmers migrate north under demographic pressure.

Mozambique's experience (Box 9.9) demonstrates that in replicating sustainable land management and land tenure, greater attention must be given to community empowerment and the capacity of state implementing agencies. Given the similarity in land-use systems across Africa, these approaches could be replicated in other countries.

Box 9.9 The land rights challenge in Mozambique

Mozambique's 1997 Land Law recognizes individual and collective tenure rights and embraces customary African law. Local authorities have control over the delimitation and allocation of land-use rights, the resolution of disputes and resource management (Kanji *et al.* 2006; Burr 2005). The law also protects various human rights including women's rights, customary land claims to uncultivated fields and rights of way, and the rights of internally displaced people – all consistent with rights in international law. The Land Law also expands consultation and the bargaining power of communities. Outside investors, for example, are required to negotiate with customary rights holders to obtain leases within the customary area (CTC 2003; Norfolk and Liversage 2001). Such arrangements, however, are not easy for communities to negotiate and tend to be manipulated by politicians and other influential people (Brown 2003; Hanlon 2002). In some instances, communities are not fully aware of the provisions of the Land Law. An added challenge is that government officials responsible for implementing the law often have little awareness either of the rights or of the procedures for securing them (Serra and Tanner 2008).

Human rights

Policy approaches that incorporate human rights contribute to the selected freshwater goal (Box 9.10), the land goal through better recognition of local tenure (Box 9.9), and the biodiversity and oceans and seas goals by holding decision makers accountable for decisions that adversely affect the environment. Importantly, these approaches support the achievement of the Millennium Development Goals (MDGs) at the same time as delivering benefits to the environment (Campese *et al.* 2009). Conversely, a lack of rights is often synonymous with high levels of vulnerability (ICHRP 2008; Jäger *et al.* 2007), as experience with external investments in land deals in Africa illustrates (Cotula 2011; Locher 2011).

Human rights are important for protecting people and the environment when there are strong incentives for natural resource exploitation (Bond and Dugard 2007), as is the case in much of Africa. Governance rights, including participation and free prior informed consent, help ensure that local people's rights are taken into account. Human rights provide a benchmark for making sustainable choices and encouraging equitable and non-discriminatory outcomes (ICHRP 2008). Once decisions have been made, litigation can provide a basis for their evaluation. In Nigeria, communities have used human rights law to oppose oil exploration that has adversely affected agricultural land and biodiversity, including for example in the court case *Kenule Beeson Saro-Wiwa, President of the Movement for the Survival of the Ogoni People (MOSOP) and Eight Others,* unreported 1995 (Frynas 1999; Idowu 1999). In 2002, the African Commission on Human and People's rights found that under the African Charter the Nigerian government has an obligation to protect the well-being of the Ogoni People (*Social and Economic Rights Centre v Nigeria).* Giving effect to this decision would limit the way in which oil exploration takes place and ensure protection of the environment, health and livelihoods.

Governance based on human rights may appear to be cumbersome, but it encourages rigour in decision making and ensures that multiple issues and values are taken into account.

Box 9.10 Recognizing a human right to water can promote fairer access

The South African constitution provides a right of access to sufficient water, implemented through the Free Basic Water Policy 42/2001. Many impoverished households benefit from secure access (within 200 metres of the household) to at least 25 litres of water per person per day for domestic use (Mehta 2005). This is equivalent to 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, and less need to resort to unprotected water sources, thus reducing vulnerability to water-borne disease (Mehta 2005). In addition, citizens attribute such policies directly to good governance, and this in turn can support long-term political stability.

A major challenge for the policy is to strike a balance between the human benefits and the cost implications (DWAF 2002a). However, improvements in human well-being are seen as outweighing the associated costs (Stalk 2004). Decentralization of the responsibility for water provisioning to the district level has encouraged the municipalities to become more innovative (Stalk 2004), although some find it costly (DWAF 2002b).

Failure to provide the legally guaranteed quantity has resulted in citizens instituting litigation. In the 2009 Constitutional Court case *Mazibuko v City of Johannesburg*, the court found that the state is required to take reasonable legislative and other measures, within available resources, to achieve the right to water (Larson 2010). Given cost and other barriers, the policy is still to be implemented in rural areas.

Other institutional and organizational challenges include the lack of community access to information and capacity. This case study demonstrates that critical enabling factors include:

- addressing the principle of cost recovery;
- identifying target groups;
- ensuring financing;
- managing demand;
- building capacity;
- improving access to information; and
- facilitating the expansion of infrastructure.

In the long term, human rights approaches encourage political stability and good social relations. However, they can be severely limited by costs (Box 9.10) (Larson 2010), and the capacity of rights holders to claim, protect and enjoy their rights is adversely affected by lack of access to information and knowledge, of access to justice and of capacity.

Notwithstanding these and other challenges, there is potential for replication. Human rights perspectives are increasingly recognized in conservation and governance (Boxes 9.9 and 9.10). The United Nations recognized a right to water in 2010 (UNGA 2010). The African Commission on Human and People's Rights found that failing to provide basic services such as water is a violation of the environmental right in the African Charter. Several African countries including the Democratic Republic of the Congo, South Africa and Uganda now recognize this right in their constitutions (Winkler 2008). For many African nations, the fast pace of urbanization and climate change will increase the challenge of supplying water, making water rights a part of the solution. The extension of a rights-based approach to other resources, such as land (Box 9.9), can support other environmental goals.

Strengthening existing regional institutions could encourage replication and better utilization of these approaches. The work of the African Commission on Human and Peoples' Rights – Africa's main human rights monitoring body – has been limited by state reluctance to give effect to its decisions (Wachira 2008). The African Court on Human and People's Rights, established in 1998, was designed to complement this role but is poorly utilized. For many, the lack of rights of individuals, groups, and non-governmental organizations to initiate legal action is a critical limitation on the effective use of the court by the public. Mali and Burkina Faso have granted individuals and non-governmental organizations direct access to the court (Wachira 2008).



In Sao Tomé, securing access to water is a policy priority. *© Andrew Mohamed*

Local, inclusive and participatory approaches

Policies that reinforce local rights to participate in environmental management help to strengthen stewardship, contributing to the biodiversity, land, water, oceans and seas, and climate change goals (Tables 9.1 and 9.2). These approaches can be incorporated across different conservation policies, such as sustainable land management, integrated coastal zone management, and natural solutions for adaptation to and mitigation of climate change. They broaden the livelihood base for millions of people, for example through transboundary natural resource management, marine managed areas and REDD+ (Box 9.11), strengthen local resilience, including through policies on water harvesting and natural solutions, and encourage learning across levels (Box 9.12).

Since the 1990s, there has been a rise in the number of countries using local, inclusive and participatory approaches, and growth in the extent of land under this type of management (Koech *et al.* 2009; Roe *et al.* 2009). For example, the percentage of forests under community tenure in Africa's ten most forested countries increased during 2002–2008 from 1.2 million hectares to 6.1 million hectares (Sunderlin *et al.* 2008). Several countries including Cameroon, Ethiopia, Ghana, Kenya and Senegal have policies that recognize sacred sites (Dudley *et al.* 2005; Lee and Schaaf 2003). Sites conserved by indigenous peoples and local communities can be successful in strengthening ecosystem management and restoring and maintaining biodiversity, and complement state protected areas (Lee and Schaaf 2003).

A key challenge in sustaining these approaches has been the relatively low level of earnings from environmental management relative to agriculture (Murombedzi 2010). Nevertheless, earnings are improving. In Namibia, conservancies' revenues from wildlife-based enterprises increased from US$73 600 in 1999 to US$4.3 million in 2009, while the Namibian economy earned more than US$32.5 million from community-based natural resource management (NASCO 2010). Other benefits associated with community-based approaches include inclusive governance, infrastructural development and reduced natural resource conflicts (Nelson 2010).



Community-based sustainable wildlife management areas maintain buffalo herds in Zimbabwe's national parks. *© Jennifer Mohamed-Katerere*

Box 9.11 Butterfly farming in Arabuko Forest Reserve

Kenya's 42 000-hectare Arabuko forest is home to the *Kipepeo* (Swahili for butterfly) community-based project, which has earned more than US$80 000 annually from the export of farmed butterfly pupae, thereby decreasing the use of wild biodiversity.

This project demonstrates the tangible link between conservation and sustainable livelihoods. By shifting livelihood strategies from unsustainable use of wood products (firewood, charcoal and timber) to the commercial farming of forest insects, sustainability has been enhanced. This initiative has increased the awareness of communities and national institutions of the ecological and economic importance of insects and their forest habitats. Potential for replication of this kind of project is high, with butterfly farming now being practised in three other areas in Kenya and in the Usambara Forest of the United Republic of Tanzania.

Source: Gordon and Ayiemba 2003

Assessing the overall effectiveness of community-based approaches is challenging, as there has been little empirical monitoring of the impacts on natural resources (Jones 2008). Where there has been monitoring, as in the Democratic Republic of the Congo, Namibia and South Africa, increases in wildlife populations have been recorded (Mehlman *et al.* 2006; Child 2004; Jones 2004). In the Tayna Community Reserve in the Democratic Republic of the Congo there has been a tenfold increase in the elephant encounter rate, a threefold increase in the chimpanzee encounter rate and a twofold increase in the gorilla encounter rate, while during the same period signs of poaching activities decreased sevenfold (Mehlman *et al.* 2006). The West Africa Pilot Community-Based Natural Resource and Wildlife Management Project in Côte d'Ivoire and Burkina Faso reported a reduction in agricultural encroachment within the conservation zones (World Bank 2008). Strengthened community security over the local forest commons has made these landholdings less vulnerable to appropriation by others or to conversion – leading to improved community earnings, biodiversity gains and enhanced forest condition (Sunderlin *et al.* 2008; Banana and Ssembaijwe 2000). These successes suggest a strong basis for replicating this approach.

Box 9.12 Mapping landscapes in southern Cameroon

The Forest Land Oriented Resources Envisioning System (FLORES) is a participatory mapping initiative in eight communities in Akok near Ebolowa, the capital of Cameroon's South Region. Geographic information system (GIS) methods were used in conjunction with focus groups and individual discussions with women, elders and men to explain social realities, perceptions and historical changes in land use. Community-developed base maps in combination with social/cultural data created a new understanding of defined landscape units, ownership, roads and historical land use as well as hunting and fishing rights (Robiglio *et al.* 2003).

This approach enables the identification of social factors that influence land-use dynamics and the alignment of researchers' perceptions with the reality of the communities using the land. Underlying challenges relate to the accuracy of defining spatial boundaries, poor understanding of local languages and high cost and time factors.

Nevertheless, indications are that this approach provides data often lacking in environmental decision making and can be replicated in multiple geographic and social/cultural regions to support better links between environmental planning and social values and priorities (Robiglio *et al.* 2003).

Significant barriers to successful implementation remain for many local and participatory approaches. The inadequate enforcement and implementation of local rights remains a challenge: for example, government authorities have often been slow in allocating community entitlement to forests designated as community forests (see section on human rights) (Sunderlin *et al.* 2008). Conflicts between local and state laws, as well as suspicion about communities' capacity to achieve sustainable management, affect government willingness to transfer authority. Better understanding of the multiple meanings and values attributed to forests by local communities can establish a basis for locally appropriate institutional arrangements (Box 9.12). Other barriers include the limited use of markets due to insufficient finance, poor information and technology flows, inadequate market links, and communities' inability to exploit economies of scale (Scherr *et al.* 2004). Enhancing capacity and entitlements, as envisaged by the Convention on Biological Diversity (CBD), will be critical to improving environmental and social outcomes.

Water harvesting

Water harvesting is used to collect run-off or floodwater for storage in the soil or in tanks so that it can be used for the production of crops, trees or fodder and for domestic use. Water harvesting therefore supports the realization of the climate change goal (Table 9.1) in strengthening adaptation by ensuring access to freshwater and by reducing the run-off impacts of extreme rainfall events in tropical, sub-tropical and dryland conditions; in addition it is appropriate for both rural and urban communities. Rainwater harvesting also contributes to achieving the freshwater and land goals (see policy on sustainable land management) and to the biodiversity goal through the restoration of water catchments.



Wheat fields in the Northern Highlands of Ethiopia, where improved land management practices have contributed to a reduction in soil erosion.

© William Davies

The importance of this policy option is underpinned by climate change and the understanding that by 2020 some 75–250 million

Box 9.13 Rainwater harvesting in Ethiopia

The lack of water for human consumption, livestock and crop farming has been a major constraint in the arid and semi-arid areas of Ethiopia. Nearly 80 per cent of the population lack access to a domestic water supply and an estimated 46 per cent suffer hunger. The government has been engaged in promoting run-off and roof harvesting structures to help address this challenge. Ethiopia has a potential rainwater harvest equivalent to the needs of more than 520 million people (Mati *et al.* 2006). Farmers who harvested water improved their access to water for a longer period and were able to produce vegetables during the dry seasons, so had higher incomes than those who did not harvest rainwater. In Minjar Shenkora district of central Ethiopia, farmers who used harvested water for supplemental irrigation of onions and onion seedlings obtained average net incomes of US$155 per 100 m^2 plot (Akalu and Adgo 2010). In areas where run-off was channelled into micro-catchments, greater plant growth improved fodder production and carrying capacity of the drylands (Abdelkdair and Schultz 2005). However, the initial construction costs of storage structures and inadequate build quality have undermined their wider adoption.

Africans will live in water-stressed areas (Boko *et al.* 2007), while an increase in extreme rainfall events will adversely affect soils and settlements, including cities. The potential of this approach is evident from diverse contexts: Box 9.13 shows its value in the Ethiopian context. Across the Sahel, innovative rainwater harvesting has been applied to hundreds of thousands of hectares, enhancing agricultural productivity and reducing human susceptibility to climatic variability (Box 9.14) (Reij *et al.* 2009). In Mali, research has quantified the impacts of rainwater harvesting on crop yield increases and ground water recharge (Doumbia *et al.* 2008; Kablan *et al.* 2008).

Establishing effective water harvesting can be challenging, with access to resources, labour and skills being limiting factors (Boxes 9.13 and 9.14) (Saico and Kunene 2010). Families may not be able to afford storage facilities that cater to household size (Saico and Kunene 2010). The returns from water-harvesting investments can be long term, so weak land security for smallholders, and particularly for women, may make them reluctant to invest in such technologies.

Nevertheless, the potential for rainwater harvesting is significant and can be replicated in many countries (Mati *et al.* 2006). Integrating water management into national adaptation planning can support the uptake of such technology by addressing legal and policy constraints and increasing community access to financial resources and skills. Several countries, including Togo, recognize water harvesting as a priority in their national adaptation programmes. Support for local knowledge, practice and innovation can empower communities to act and results in the diffusion of water harvesting through farmer-to-farmer learning. Box 9.14 demonstrates how traditional farming knowledge, which has evolved over hundreds of years in response to rainfall variability, has yielded multiple successes in managing scarce water resources and improving food production.

Expanding opportunities for water harvesting can include the rehabilitation of degraded dams, restoration of watersheds, and conservation of existing forests that contribute to water provisioning. These strategies can improve year-round supply of water, soil conservation, and the expansion of livelihood activities including in the agro-pastoral sector (Box 9.13).

Natural solutions for adaptation to and mitigation of climate change

The restoration and maintenance of ecosystems can provide valuable resources for climate adaptation, disaster risk reduction and mitigation (see also section on REDD+, above), and thus help achieve the climate change goal. By enhancing environmental goods and services, ecosystem restoration can also contribute to the realization of the land, oceans and seas, water, and biodiversity goals (Tables 9.1 and 9.2).

Restoration can involve diverse actors at transboundary, national or community level and includes the maintenance of protected areas. By restoring or maintaining ecosystems, natural

Box 9.14 Enhancing traditional water harvesting practices in Burkina Faso

Zaï planting, planting in a shallow pit, in Burkina Faso demonstrates that investment in water and soil conservation improves crop yields. In the Yatenga Province, for example, average sorghum yields increased from 594 kg per hectare during the period 1984–1988 to 733 kg per hectare in the period 1995–2001 as a result of the adoption of *zaï* techniques. Millet yields rose from 473 kg per hectare to 688 kg per hectare for the same periods (Reij and Thiombiano 2003). These improvements have resulted in a reduction of poverty. In Ranawa village, for example, the number of poor families decreased by 50 per cent between 1980 and 2001 (Hien and Ouédraogo 2001).

While these technologies are rooted in local practice and can be mastered by all farmers, indications are that the better-off and medium-income farmers use this technology more than poor farmers simply because they have the resources to pay for labour when needed (Kaboré and Reij 2004). The main disadvantage of the *zaï* techniques is that they require considerable physical effort and good health, especially where digging is required over a large area.

Source: Barry *et al.* 2008



***Zaï* agriculture helps capture water.** © *Jennifer Mohamed-Katerere*

solutions provide opportunities for adaptation and mitigation. Mangrove restoration, for example, can enhance coping capacity by stabilizing coastlines (Duke *et al.* 2007; Mcleod and Salm 2006). Mangrove restoration also supports adaptation through the provisioning of environmental goods such as food, fuel and wood. For example, Nigeria's mangrove forests provide breeding grounds for more than 60 per cent of the fish caught between the Gulf of Guinea and Angola (Carrere 2009). In Sudan, the restoration of rangelands – achieved through rotational grazing and a shift in livestock composition – helped improve livestock pasture and food security (Buffle and Elasha 2011). An unexpected consequence of this effort was that pastoral nomads were attracted to the area, with conflict being avoided by using traditional local institutions and values to negotiate access. Protected areas, including in Niger, have been found to support the *in situ* conservation of wild crop relatives, which are often more drought resistant than domesticated crops and can be used to strengthen agriculture and food security (Dudley *et al.* 2010).

Ecosystem restoration frequently requires a coherent but cross-cutting multisectoral approach as drivers and pressures exist at multiple levels. Large-scale or global drivers include oil exploration, agricultural expansion and pollution, infrastructure and transport development, population growth and settlements, and coastal development (Adger *et al.* 2005). At the same time, local livelihoods can place pressure on resources where governance and management are weak, for example through unsustainable fuelwood harvesting in mangroves (Ajonina *et al.*2005; Ajonina and Usongo 2001). Establishing integrated approaches that address drivers at multiple levels is often challenging, especially where coordination and collaboration between policy development agencies and policy implementing agencies are weak. Poor data collection, monitoring and information further constrain adaptive management. Inadequate legislation that is sector-based, conflicting, deficient and unenforceable provides a weak basis for planning and management (Madzwamuse 2010; Gordon *et al.* 2009).

In addition, enhancing the conservation of ecosystems and their capacity to regenerate requires a better understanding of the links between different ecosystem components (Abdulla *et al.* 2011; Davis *et al.* 2011) as well as of social-ecological resilience (Johnson and Welch 2010; Adger *et al.* 2005). Investing in and generating ecological knowledge and translating it into information that can be used in governance and policy development is essential for management success (Adger *et al.* 2005), and requires a better interface between science, policy makers and communities. Regional cooperation, community-driven strategies and public-private partnerships (Box 9.15) 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 this.

Given that adaptation is about local capacity, it is important that strategies and projects enjoy shared understanding between policy makers, technical agencies and communities (Box 9.16) (Patt and Schroeter 2005). Unless this is achieved, there is a risk that adaptation strategies will run counter to local livelihoods, values and cultures, and that uptake will be low, as in the government-initiated resettlement scheme following Cyclone Eline in 2000 in Mozambique (Patt and Schroeter 2005). The loss of easy access to resources and social support were key obstacles to support for resettlement. A second major challenge was the conflicting perception of climate risk severity held by the government and the communities. These results highlight the need for active dialogue across stakeholder groups as a necessary condition for formulating and successfully implementing policies (Patt and Schroeter 2005). Ongoing dialogue creates the basis for reassessing strategies and responding to change (Box 9.16)

Stakeholder pollution management

Pollution management is important for restoring ecosystems and realizing human health goals. It contributes to achieving the social

Box 9.15 Mangrove restoration in Mauritius

In 2008, in response to declining mangrove forests in Mauritius, the non-governmental organization *Association pour le Développement Durable*, with support from the European Union and the Ministry of Finance, planted about 10 000 mangrove seedlings at Le Morne, a small fishing village in the south. The local community was actively involved. Cooperation included training on planting techniques by the Albion Fisheries Research Centre of the Ministry of Fisheries and Rodrigues. In 2011, multiple levels of cooperation and funding from a commercial bank under a corporate social responsibility scheme led to an additional 40 000 seedlings being planted. An island-wide survey has been undertaken to identify potential areas for replication.

Source: ADD 2011



Mangrove planting at Le Morne. *© Subash Chacowry/ADD*

Box 9.16 Social learning and knowledge in community-based adaptation strategies

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).

Communities of the Campo Beach raised over 4 000 mangrove seedlings in community-run nurseries and planted them as a green shield to protect Campo Beach from coastal erosion and wind. This project was a response to collapsing concrete walls along the beach. Dialogue, learning and inclusion in project development led to active community involvement in different aspects of the project, including seedling development, the demarcation of mangrove wood-gathering zones, locally based enforcement and continuous involvement in monitoring and evaluation. Locally appropriate technologies, including energy-efficient fish-smoking houses, have been adopted.

Source: Ajonina *et al.* 2009



Smallholder farmers of Eastern Africa play an important part in the global agenda for the conservation and sustainable use of natural resources and the equitable sharing of related benefits. *© Guenter Guni/iStock*

and environmental aspects of the selected goals for biodiversity, freshwater, oceans and seas, and climate (Tables 9.1 and 9.2).

Africa has relied primarily on regulatory approaches to achieve pollution targets. These approaches influence environmental outcomes by regulating processes or products, limiting the discharge of specified pollutants, and restricting certain polluting activities to specific times or areas (Bernstein 1997). However, regulatory instruments are often inefficient in achieving pollution control objectives, especially where resources for monitoring pollution and compliance are lacking. The level of expenditure required for ensuring compliance with increasingly stringent environmental laws is an unmanageable cost for many governments. In contrast, stakeholder-driven management approaches have the potential to make pollution control economically advantageous to commercial organizations. These approaches can involve varying degrees of incentives, information and administrative capacity for effective implementation and enforcement. The principal types of economic instruments used for controlling pollution include pricing, pollution charging and marketable permits (Bernstein 1997).

Box 9.17 Managing acid mine drainage in the Olifants catchment

The upper Olifants catchment lies in the Gauteng and Mpumalanga provinces of South Africa, where coal mining, mineral processing and agriculture are key economic activities (Hob *et al.* 2008). The Olifants' waters are polluted by acid mine drainage, particularly from coal mining.

The controlled discharge scheme, introduced in the upper Olifants catchment in 1997 with the support of industrial stakeholders, takes advantage of the natural assimilative capacity of the river system during high flow conditions to control the discharge of acid mine drainage (Hob *et al.* 2008). The upper catchment is divided into management units, each with a distinct waste load allocation based on the assimilative capacity of the unit. Participating industries are allowed to discharge poor-quality water to the host management unit in proportion to the assimilative capacity of the unit and their share in the scheme (Limpitlaw *et al.* 2005).

The scheme has succeeded in reducing sulphate concentrations at the Witbank Dam (World Coal Institute 2002), which is expected to contribute to the ecological integrity of the river in the long run. Significantly, discharge during low-flow periods is reduced. Costs are borne by the polluter, ensuring that general tax can be put to other uses. Industries in the area including mines and power stations made significant capital and operational investments towards this project, with one company investing over R100 million (US$13 million) in December 2007 for drainage, storage and treatment systems to improve the quality and quantity of its discharges (World Coal Institute 2002). The flood risk has been reduced and a healthier community is envisaged.

Unfortunately, water quality problems in the Olifants catchment persist. Success for similar initiatives depends on strong institutional capacity, economic stability, government recognition of innovative ideas and the committed involvement of stakeholders.

Box 9.17 on pollution control in the Olifants illustrates how stakeholder involvement can be successfully implemented and lead to a shift in established assumptions about where responsibility for pollution management lies.

CONCLUSION: BUILDING ON SUCCESS

This environmental policy appraisal suggests that opportunities for building on existing success can be effectively harnessed to ensure better implementation and positive outcomes for people and the environment.

Replicating and up-scaling effective approaches is important, but policies should not be blindly replicated, and should be modified to achieve good fit with local, national and regional conditions. As amply demonstrated in the policy options detailed above, it is important to maximize opportunities by focusing on options that are mutually reinforcing and cross-cutting (Table 9.2). Finding and developing synergies is cost effective when financial and human resources are limited. Ensuring that policies are not in conflict with each other and that they do not lead to an externalization of adverse impacts is important.

As the policy appraisal shows, effective policy implementation requires reducing or removing barriers and strengthening enabling conditions. Insufficient monitoring, special-interest decision making, weak governance and rights, and a lack of adequate capacity have undermined policy success.

Policies that have in-built flexibility are needed to address environmental change. Investing in monitoring and evaluation, as well as social learning, supports revision and modification of policy responses, as illustrated in many of the policy options discussed here, including, for example, natural solutions for adaptation and mitigation.

Decision making that is strategic and takes account of how changes in environmental use and governance affect the resilience of the social-ecological system has been shown to be effective in securing economic, social and environmental benefits. Integrating human and ecological understanding and priorities in environmental management can help ensure that choices do not destroy or undermine the environmental resources that underpin future options. Such approaches – including ecosystem-based management – prioritize the interface between people and nature and do not favour just one ecosystem component, industry sector, community or socio-economic group (Davis *et al.* 2011). Ecosystem-based management is one way to maintain the Earth System's ability to adapt to change, as compared to other approaches that focus on fixed targets and state systems, or on hard-engineering solutions that often interfere with natural processes (Abdulla *et al.* 2011).

Strong accountability helps secure government and private-sector commitment to implementation and to achieve agreed outcomes (Najam and Halle 2010) (see also the sections on local, inclusive and participatory approaches, human rights, and stakeholder pollution management). For countries to be better able to demonstrate results, systems for monitoring progress need to be established. 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.

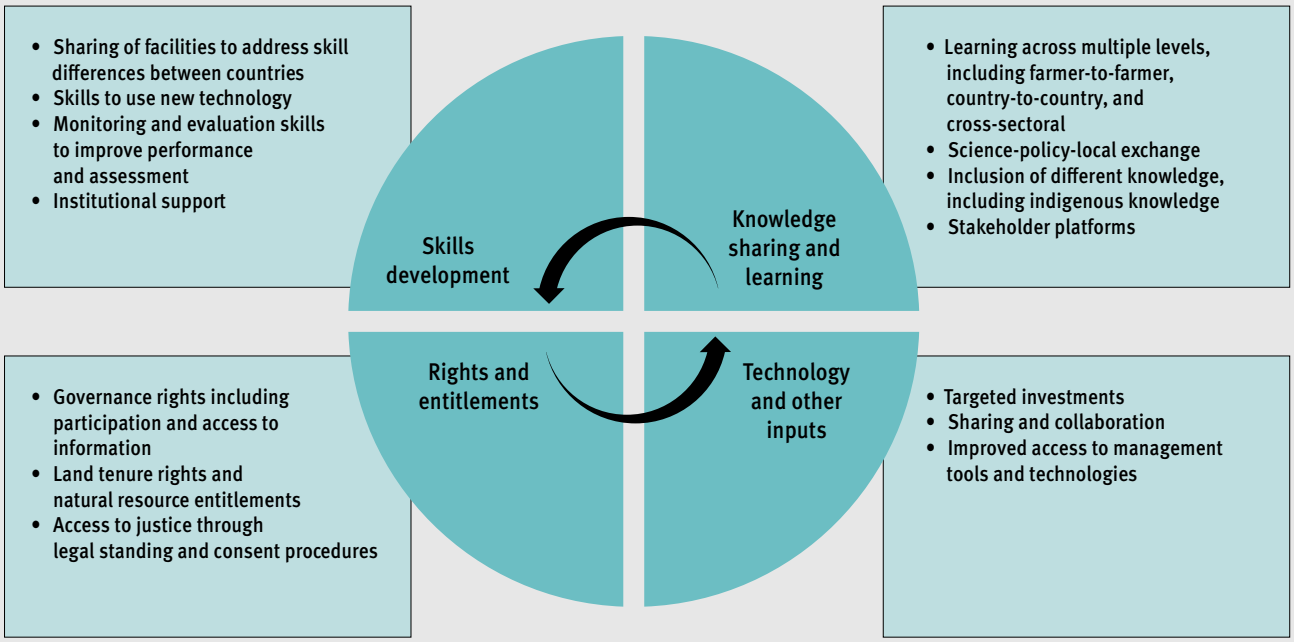
Cooperation has been shown to be effective for achieving sustainable management, including policy options for transboundary coastal and land-based resource management, and where there are multiple stakeholders. This has improved equity, enhanced skills sharing and reduced conflict. In some cases, external support and collaboration with donors have helped establish effective platforms for engagement, learning and sharing knowledge and skills, including in TerrAfrica and under the Nairobi Convention. Partnerships with the private sector and environmental managers or custodians have been shown to be effective in securing benefits in many of the policy options, including payment for ecosystem services, and in mangrove restoration. 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.

Strengthening the governance and institutional regime for more equitable benefit sharing is critical, given that ecological and social resilience are tightly inter-twined, as South Africa's basic water policy shows. Weak tenure and entitlements stand out as key



The central Namib Desert, Namibia. *© Lucyna Koch/iStock*

Figure 9.3 Selected strategies from the policy options for strengthening key components of capacity



barriers to achieving equitable benefits for payment for ecosystem services including REDD+, community-based management and other policy options. While these are national problems, the scale and commonality of the challenges suggest that developing and adopting regional or global protocols for cooperation and sharing could provide the basis for more effective engagement and management of benefits and losses. Strengthening and integrating human rights perspectives in environmental management frameworks at national and regional levels supports more inclusive, long-term approaches by protecting livelihood rights, ensuring inclusion and reducing conflict. Regional human rights bodies can play an important role in solidifying the piecemeal environmental benefits that human rights recognition has already brought, especially where the mandate of regional courts and the rights of citizens to bring actions are strengthened, as shown in the human rights policy option.



Cloud forests of Nyungwe Forest National Park, in southwestern Rwanda, hold potential for REDD+. *© Guenter Guni/iStock*

Environmental policy is often out of step with realities on the ground, with governments acting alone often unable to effect the necessary change. Innovative institutional arrangements for pooling financial resources, knowledge and capacity, however, can contribute to achieving environmental goals. Improving capacity and equity among diverse communities, including governments, is essential to support collaboration and to secure rights. The policy options demonstrate the potential of various strategies to enhance capacity (Figure 9.3). At regional and sub-regional levels, for example, mechanisms for sharing information and knowledge, as in the management of marine pollution, could be better utilized.

Addressing the barriers to sustainability and achieving the agreed environmental goals addressed in this chapter can create a springboard to improve environmental performance and to move from promising policies to successful policies. Strengthening environmental management can help protect the ecosystem goods and services on which development and human well-being opportunities are based and provide a basis for dealing with key challenges including food security, poverty, urbanization and climate change impacts.

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