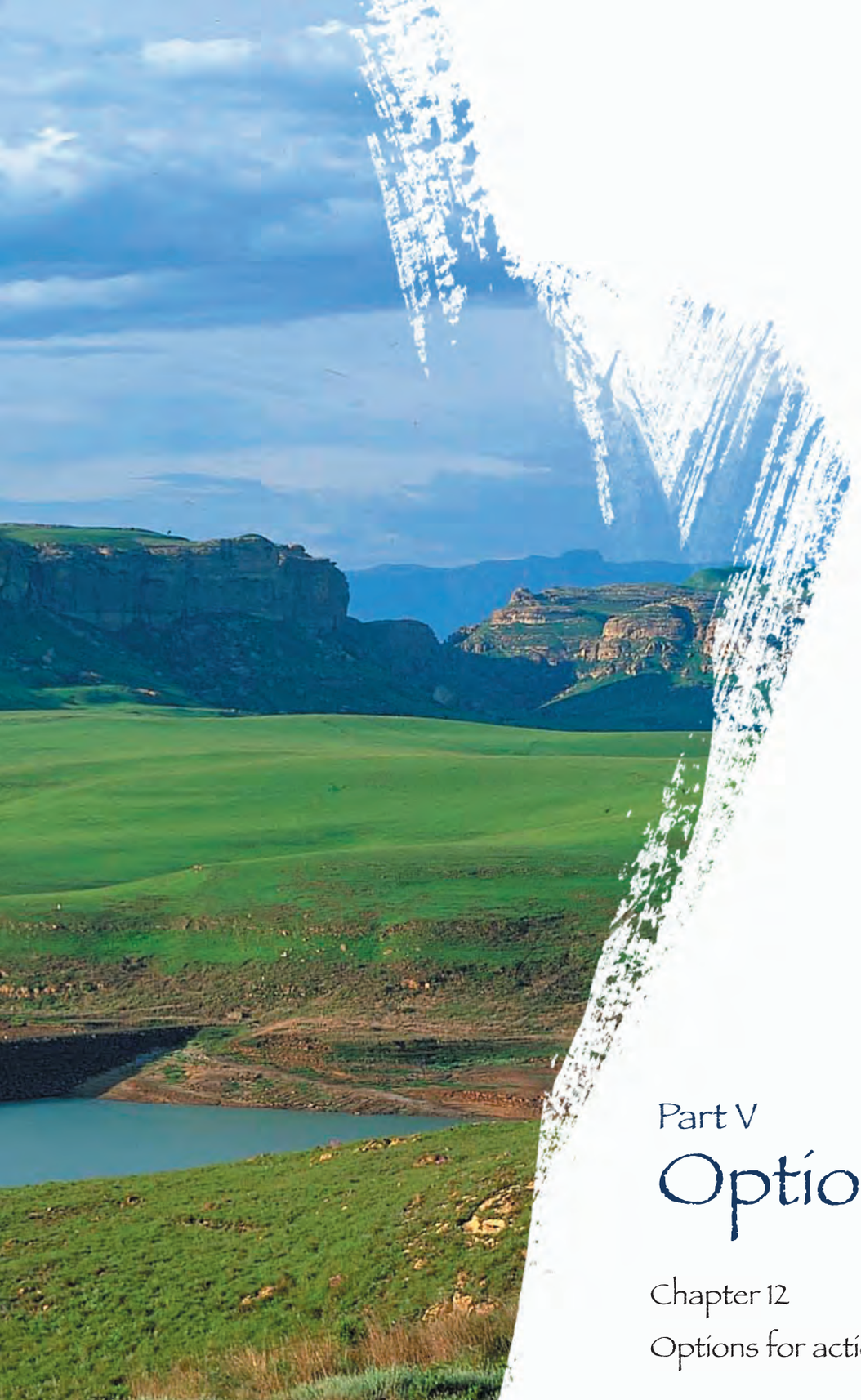

Part V

Options for action

Chapter 12

Options for action

Chapter 12
Options for action

At a glance

This chapter details the options for action that should be considered by policy and decision-makers to avoid a grim 'current future' scenario and propel South Africa on a sustainable growth path. It focuses on the major generic options for action, the cross-cutting issues, and actions for tackling specific environmental issues.



12.1 INTRODUCTION

Having examined the past and current state of our environment and looked at possible futures, we need to consider what action to take to improve the state of our environment and move towards the 'Laduma!' scenario (see Chapter 11, section 11.4.5). The chapters dealing with specific themes as well as the scenarios that have been generated are rich with suggestions for achievable options. While the scenario exercise depicts various possible worlds in which we may live, we also require foresight to determine what actions to prioritize, so that we can optimize our future opportunities and drive investment towards sustainable development.

The human footprint in South Africa is growing consistently. Accordingly, the sustained provision of some ecosystem services is threatened: biodiversity is being lost, land is being degraded and left unproductive, the quality and availability of inland water resources is compromised, marine and coastal resources in some instances have collapsed, and indoor and ambient air pollution is worsening in many settlements.

12.1.1 Why do we need to take action?

This report shows that South Africa's environment, upon which the well-being of its people depends, is generally in a state of decline. The human footprint in South Africa is growing consistently. Accordingly, the sustained provision of some ecosystem services is threatened: biodiversity is being lost, land is being degraded and left unproductive, the quality and availability of inland water resources is compromised, marine and coastal resources in some instances have collapsed, and indoor and ambient air pollution is worsening in many settlements. All this is happening in the context of the overwhelming development challenges facing South Africa.

Furthermore, significant threats to environmentally sustainable development are fuelled by persistently high levels of poverty, the socio-economic divide, and human vulnerability. South Africa therefore risks a collapse of ecosystem functioning, which will challenge any development progress made (see Box 12.1). It will also weaken progress made towards achieving the Millennium Development Goals (MDGs), in particular the targets associated with poverty, hunger, disease, child mortality, and access to water[1].

South Africa has a deliberate development plan to meet the Millennium Development Goals and, specifically, to halve unemployment and poverty by 2014. This plan is spearheaded by the Accelerated and Shared Growth Initiative of South Africa (AsgiSA), which commits large investment into infrastructure, skills development, and the agriculture and tourism sectors. Many developed countries have already made investments such as this that are energy inefficient and that deplete natural resources unnecessarily. The opportunity exists for South Africa to incorporate sustainability thinking into the roll-out of its planned investment.

It is crucial, therefore, to devise and implement a range of actions that target the improvement of planning and decision-making processes, are effective in dealing with current and emerging issues and problems, and that alter the causes of degradation. These actions should build on what has already been achieved, not with the intention of making short-term progress but rather from a long-term perspective based on long-term goals.

This chapter is intended to extend the dialogue among South Africans about what should be done to ensure environmental sustainability. It identifies a broad set of priority options for institutional, legal, economic, social and behavioural, and technological action. These aim to effect change in the causes of degradation in response to feared, emerging, or prevailing problems with ecosystems, as identified in preceding chapters. The suggested actions also aim to address the uncertainties of the scenarios presented in Chapter 11.

These actions were identified and refined through an iterative process. Their initial identification was based on the facts presented in earlier chapters. They were then incorporated into the National Strategy for Sustainable Development (NSSD) consultative process, assessed by

Box 12.1 The view of the National Strategy for Sustainable Development – implications of natural resource degradation

"The above trends suggest that we continue to assume that resources such as water, energy, minerals, plant and animal products and air quality will constantly be available no matter how we live, produce and consume. We have also viewed our rivers, seas, land and air as unending sinks for increasing amounts of solid, liquid or airborne wastes – but the increasing degradation of our natural resources clearly indicates these sinks can no longer cope. This unsustainable approach is also causing increasing inequality. The spatial distribution of poverty in South Africa indicates that it is not usually the poor who are benefiting from rising resource consumption and waste. To redress the consequences of unsustainable growth requires more and more public and private funds – which could otherwise be invested in poverty eradication and job creation.

A development strategy that depends on the acceleration of material economic growth will hit increasingly costly resource constraints resulting in unsustainable development. This is because increasing resource use and rising levels of unproductive waste result in a waste of money, which means less money is available for investment in economic and social development. By improving our planning tools, developing our human resources appropriately, raising awareness and applying cutting-edge technology for sustainable development, we can counteract the above trends."

Source: Department of Environmental Affairs and Tourism (2006)[6]

policy experts on the NSSD team, and further refined through consultation with government, civil society, and the private sector stakeholders. The process is ongoing and this chapter should not be seen as an endpoint in itself. The actions should be discussed, assessed, and developed further, and concrete implementation plans drawn up.

This chapter has three main sections:

- **Priority cross-cutting options for action:** this section details the overall responses and points of action required to move towards the 'Laduma!' scenario
- **Key emerging and cross-cutting issues:** these were identified as cross-cutting issues that affect almost all components of the human–environment system, so they require special attention
- **Tackling specific environmental issues:** this section presents responses and policy actions required to deal with specific environmental issues.

12.1.2 Who is responsible for taking action?

Government at all levels plays a central role in devising and implementing actions affecting the environment[1]. It controls domestic laws, regulations, policy decisions, and the implementation of related actions; it provides the bridge between the international and domestic context; it initiates research and technological development programmes; and it operates the basic education systems. Government often has the widest range of actions at its disposal relative to other actors, because of its control over law-making and its economic power to implement decisions[1]. Also, polices and activities in non-environmental sectors (such as economic development policy and the building of roads, dams and other civic infrastructure) are often responsible for causing environmental change.

Responsibility for implementing the suggested actions, however, does not rest on government's shoulders alone. The contribution of other actors is just as important for making progress in and towards environmentally sustainable development, particularly in the context of limited capacity within the state machinery.

Local communities are increasingly seen as the most appropriate guardians of their own ecosystems and resources[1]. Community empowerment, especially among women and the youth, is a potentially effective leverage point for action, and non-governmental organizations (NGOs) have an important role to play. Education, knowledge acquisition, and the encouragement of voluntarism-based actions in local communities and among consumers are fundamental in the work of NGOs. Participation in policy development, decision-making, and keeping government and the private sector activities in check are also critically important.

Finally, the private sector, as a major user of ecosystem services, is in a powerful position to influence the causes of environmental change. On its own, as well as through partnerships with government and other stakeholders, it can effect change using incentive-based research, such as, for example, in the development and use of new products and techniques to protect ecosystems, and through education and awareness-raising. Clearly, all actors play important roles in implementing and propagating behavioural and ecosystem change[1]. Consequently, the suggested actions in this chapter are directed at the different actors, and responsibilities for each action are specified in Annexure 3.

12.2 PRIORITY CROSS-CUTTING OPTIONS FOR ACTION

The options for action in this section have been identified as areas of systemic weakness requiring attention, and/or as potential points of leverage in the progress towards a 'Laduma!' future. They cannot be approached and implemented in isolation. The complex nature of the environment's systems and the human–environment relationship means that it is crucial to integrate the actions and to promote cross-cutting ones. The National Action Plan to Combat Land Degradation to Alleviate Rural Poverty, for example, aims to address not only environmental degradation but also human poverty and vulnerability.

Furthermore, South Africa's developmental challenges place poverty in the spotlight in the context of attempts to reverse environmental degradation: without the alleviation of poverty, progress towards environmentally sustainable development is unattainable[2]. Among the prerequisites for achieving this ideal are: the development of social capital to reduce human vulnerability to environmental changes and disasters, the real empowerment of women and the youth, increased participation in public affairs by all concerned, and the extension of access to resources and to environmental justice.

12.2.1 Strengthening implementation and enforcement

There is broad consensus that over the past decade South Africa has put in place a largely adequate and progressive framework of environmental policies and laws. Since 1999, we have focused on improving the governance framework for specific issues such as protected areas, biodiversity, and air quality. These, however remain mere intentions until they are implemented and enforced effectively. As the general downward trends in indicators of environmental quality reveal, implementation and enforcement require considerable improvement. This area of activity is one of the most important of those that require attention.

Box 12.2 Suggested actions – strengthening implementation and enforcement

- **Improve capacity within regulatory authorities** to effectively manage, implement, and review the various Integrated Environmental Management procedures and tools, notably the new EIA Regulations, within the context of broader sustainable development frameworks.
- **Roll out a national environmental capacity-building programme for local government** at appropriately senior level (politicians, city managers, and departmental directors) to embed environmental considerations in municipal strategies and plans.
- **Train members of the judiciary** in principles of environmental management and sustainable development and build legal capacity within the national and provincial environmental departments.
- Ensure appropriate, adequate, and continuous **training for Environmental Management Inspectors**.
- Renew focus on the **implementation of multi- and bilateral agreements** to improve regional and international governance.

A prime example of successful implementation and enforcement, however, is the management of our pelagic fisheries and the establishment of Environmental Courts in the Western Cape, which are becoming effective in enforcing some aspects of our marine legislation. Pelagic fish stocks are in a stable state, but more capacity is needed in our environmental courts.

Financial resources, institutional capacity, and stakeholder willingness are crucial to ensure that the downward trends in the quality of the environment are halted and reversed. Critically important in improving implementation and enforcement is the building of capacity across all spheres of government, but particularly at local government level. The Department of Environmental Affairs and Tourism has recently awarded a contract to develop training courses for the environmental management inspectors (or, 'Green Scorpions'), which will empower local, provincial, and national government officials to enforce the law in cases of environmental crimes.

12.2.2 Mainstreaming the environment

Some of the most significant drivers of environmental change and users of ecosystem services originate outside the sectors that are responsible for their management[1]. Indeed, the condition of the environment is often determined by macroeconomic, trade, and other policies, rather than by policies within the environmental sector itself. Worldwide, few macroeconomic responses to poverty reduction have considered the importance of sound management of ecosystem services as a mechanism to meet the basic needs of the poorest. Consequently, while some policies may be harmful to the environment, changing them can provide one of the most effective means of improving management of the environment.

The progress made in developing a sound environmental governance framework in South Africa has been stalled by the fact that environmental issues have only to a limited

Box 12.3 What is mainstreaming?

'Mainstreaming' in this context refers to the integration of environmental sustainability goals and objectives into the economic sectors, into development models, policies and programmes, and thereby into all human behaviour. Mainstreaming is applied in the following ways:

- The environment, biodiversity, and principles of sustainable use are:
  - integrated into production systems that depend on natural resources (for example, agriculture, forestry, mining, tourism, and cross-cutting areas of the economy such as energy, manufacturing, infrastructure, transport, construction, and trade)
  - incorporated into national policy-making and financial markets including development policy and legislation, land-use planning, finance, taxation, and economic incentives.
- A range of tools is used, including protected areas, buffer zones, and biological corridors, as well as interventions affecting privately owned land, such as incentives, subsidies, and direct payments. Much of the focus is on land not under formal protection.
- Mainstreaming activities involve a broad range of actors with partnerships among conservation agencies, non-governmental organizations, government, business, and communities.

The Convention on Biological Diversity calls for contracting parties to "integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies".

Sources: Peterson and Huntley (2004)[4] and Cowling (2004)[5]

extent been integrated into national, provincial, and local economic development and planning strategies and decision-making. Strengthening the implementation of the relevant laws and policies will require bringing environmental sustainability principles into the mainstream of all aspects of governance, planning, decision-making and operation, and, in broad terms, into all of human behaviour (see Box 12.3).

This mainstreaming applies to the both the public and private sectors, notably integrated and spatial planning such as National Spatial Development Perspective, Provincial Growth and Development Strategies, and Integrated Development Plans; budget allocation processes and mechanisms such as the Municipal Infrastructure Grant and Medium Term Expenditure Framework; and state-owned funders and private sector funders such as banks. All banks and private investors should be encouraged formally to adopt the Equator Principles to guide investment decisions. It is hoped that the NSSD, which functions primarily to improve integrated planning and decision-making in all sectors by including natural resource and social equity concerns, will make a significant contribution to mainstreaming.

A concerted effort is needed to shift current thinking from a model of weak sustainability to one of strong sustainability (see Chapter 1, Figure 1.1), which recognizes the heavy dependency of our economy and our society on the services produced by the natural environment. One potential leverage point is the Department of Education's roll-out of the revised National Curriculum Development Statements, which incorporate environmental and sustainability principles into the school syllabus. This roll-out, together with improved planning and implementation of sustainability principles within existing education policy, will provide the basis for the development of a strong sustainability mode of thinking.

Another potential leverage point is the incorporation of the depletion and degradation of natural resources into national economic systems. South Africa's environmental policies are currently dominated by regulatory instruments such as standards, bans on the use of certain goods or technologies, liability payments (such as the mining rehabilitation fund), and non-tradable permit systems[3]. Information disclosure strategies are used selectively and there is a growing trend towards voluntary agreements.

While there are several existing environmentally-related taxes, such as the general fuel levy, plastic bag levies, and electricity- and water-use levies, most of these are intended to raise revenue to cover administration and implementation costs rather than to improve the environment. Further, past and current economic accounting systems have been concerned mainly with the flow of economic activity, ignoring the stocks of natural capital on which such activities are based. They do not assign value to the environmental services provided by natural resources and systems. Because of this accounting system, national income measures such as the gross national product do not reflect the depletion or degradation of environmental assets and therefore give a misleading view of national wealth.

Economic markets can provide an efficient means of allocating scarce resources, such as water, but they often fail, particularly in the appropriate allocation of environmental goods and resources, which results in insufficient consideration of environmental issues in everyday market activities. This is the case in South Africa, a fact that is recognized by the National Treasury, which has begun a policy dialogue on the role of market-based instruments, such as taxes and charges, in environmental fiscal reform. By implementing such taxes and charges to influence the

Box 12.4 Suggested actions – mainstreaming the environment

- Ensure that the roll-out and revision of the National Strategy for Sustainable Development (NSSD):
  - **incorporates environmental considerations** sufficiently and appropriately
  - **translates into practice**, by motivating diverse stakeholders to articulate and own the strategy.
- Develop processes that continue to **mainstream the environment and sustainability considerations** into all aspects of human behaviour.
- **Integrate sustainability criteria**, including biodiversity, in all levels of integrated and spatial planning, as well as into project formulation and selection checklists by public and private funders. Specific plans to be targeted are the National Spatial Development Perspective, Provincial Growth and Development Strategies, Integrated Development Plans and associated Spatial Development and Environmental Management Frameworks. Specific funders and implementers to be targeted include all levels of government, major infrastructure funders such as the Municipal Infrastructure Grant, Transnet, the IDC, ESKOM, the Development Bank of Southern Africa, state-owned enterprises, and private sector funders.
- Create a **shift in mindset from weak to strong sustainability** within government, business, and society in general.
- Increase focus on the **value of natural capital to human well-being** by extending to all sectors of society (through communication and education) the concept of ecosystem services in relation to human well-being.
- Continue the discussion proposed by the **environmental fiscal reform policy paper** and promote the use of economic instruments such as charges, taxes, and incentives to encourage natural resource management and pollution reduction.

Box 12.5 Suggested actions – building capacity

- Improve the **planning and implementation of environmental sustainability principles** within existing education policy and improve the effectiveness of environmental education campaigns, particularly among the youth.
- **Mainstream sustainable development principles** into the National Skills Development Programme.
- Increase investment into **sustainability-focused research and development** particularly in land rejuvenation and conservation farming, and energy efficiency in building techniques and industrial manufacturing processes.
- Roll out a **national environmental capacity-building programme for local government** at an appropriately senior level (politicians, city managers, and departmental directors) to embed environmental considerations in municipal strategies and plans.
- Make the **capacity building of officials a mandatory component of outsourced projects** through 'on the job' training by including officials as part of the project team and through guideline documents or toolkits that can be used for similar projects in future.
- Target and develop **civil society education and awareness campaigns** around the value of natural capital for human well-being.
- **Establish partnerships to develop the access to information and the skills** that non-governmental and community-based organizations, including women, youth and vulnerable groups, need, to be able to participate in environmental debates.
- **Increase investment in and extend the application of information and communication technology** to support capacity building in integrated planning, particularly at local government level.

way in which markets operate, it is possible to encourage more efficient resource use.

Statistics South Africa (StatsSA) is currently leading the development of the Natural Resource Accounts for minerals and water. Discussion documents have been published for land, energy, and water quality accounts. Position papers are in progress for biodiversity, air quality, aquatic resources, and wooded land, timber, and forest products. The pace is slow, however, owing to limited resources and capacity within the responsible unit in StatsSA. This unit needs to be expanded and the cooperation strengthened between the user departments and StatsSA.

Quantifying the depletion and degradation of natural resources makes it possible to determine effective policy actions. A central cause of environmental degradation is that the costs of degradation have not so far been internalized by the public and corporate sectors. An important recommendation, therefore, is to adjust accounting procedures so that the real costs of degradation are included in expenditure decisions, and to make sure that natural resource accounts are kept up to date as satellite accounts to the System of National Accounts. On the basis of such data, the sustainability of economic activities and economic growth can be assessed.

12.2.3 Building capacity

Capacity[6] is made up of human resources, finances, administration, infrastructure, and institutional systems. To ensure that environmental and sustainability thinking becomes a practical reality in everyday life, additional capacities and skills in these areas are needed in all sectors of society. This requires us to focus attention on the key areas of education, skills development, and sustainability-orientated research and development. In addition, major priorities include building the capacity of local government, multi-sectoral partnerships, and community empowerment.

Broad-based human development and education at all levels of society are crucial to achieve clearer public understanding of environmental issues, to develop new environmental values and aspirations, and to increase capacity among those responsible for policy-making and implementation. Important building blocks to a sustainable future are the national educational curriculum (Curriculum 2005), which includes environmental considerations, and the National Framework for Education for Sustainable Development currently under development.

In the face of a lack of technically-skilled labour in South Africa, such as scientists and engineers, the National Skills Development Strategy and the Human Resource and Skills Strategy are important tools for developing a literate and technically-skilled population. However environmental and sustainability principles need to be incorporated into these strategies so as to address this aspect of the skills shortage.

South Africa must harness science and technology to make progress towards environmentally sustainable development. The Department of Science and Technology's Research and Development Strategy promotes a more sustainable society and economy, and the increasing public and private investment in research and development initiatives provides a solid basis. However, a more coherent and clearly identified research and development programme focusing on sustainability considerations is required.

Two areas of capacity-building require urgent attention in South Africa: those of local government and civil society. Developing the capacity, resources, and political will to implement mandated environmental responsibilities are substantial challenges for local government. With the

decentralization and delegation of powers called for by South Africa's Constitution, and the consequent increasing responsibilities of local government, there are also significant challenges to the improvement of service provision and social and economic development and to ensuring a safe and healthy environment. An environmental capacity-building programme for senior officials and councillors needs to be rolled out nationally for local government, as has already been done in Mpumalanga. This programme should focus on clarifying local government roles and responsibilities for the environment. Equally important is the development of tools and mechanisms to combat both the loss of institutional memory and knowledge due to the high turnover rate of officials, particularly in local government, and the lack of appropriate succession planning.

As indicated in the scenarios in Chapter 11, improved policy and the role of the state are seen by most people to hold the key to effective environmental governance and progress towards sustainable development. Given the implementation challenges that government faces, however, considerable focus also needs to be placed on developing capacity in other sectors. South Africa needs to improve access to information and to develop the skills needed to participate in technical debates among non-governmental and community-based organizations, especially women and youth.

12.2.4 Environmental information for decision-making

Timely and accurate information are essential for ensuring appropriate responses and policies with regard to environmental change. In compiling this report, information gaps were encountered as well as problems with some of the data needed to assess the state of the environment and to comment fully on policy responses and processes.

The data inadequacies that currently exist stem largely from the absence of a coherent monitoring and evaluation framework, that is integrated across all government departments and research institutions. Data generation exercises, such as the population census and the national land-cover survey, do not dovetail with reporting programmes such as those dealing with the state of the environment, or those required to fulfil South Africa's obligations to the many multi-lateral environmental agreements that it has signed. Often, monitoring is either not conducted at regular intervals or not conducted at all; in some cases, the monitoring network is so sparse that meaningful interpretation over large spatial scales cannot be made. The areas where scantiness of data is critical include air quality, carbon emissions, land degradation and desertification, some aspects of biodiversity, water quality and groundwater availability, disaster surveillance, and human vulnerability. Such conditions result in outdated data being analysed and decisions being taken based on insufficient and inappropriate data.

Box 12.6 Suggested actions – environmental information for decision-making

- Develop an integrated approach to **collecting, managing, sharing, and reporting on environmental and other related matters** across all government departments and research institutions, particularly in the case of important cross-cutting data sets (for example, the population census and data on land-cover change).
- Develop **data collection and monitoring initiatives that target priority environmental issues** including air and water emissions, land degradation and desertification, water quality and availability, cultural heritage, human vulnerability, and effectiveness of governance.
- Improve **access to environmental information** in accordance with pertinent legislation, such as the Promotion of Access to Information Act.
- Develop **mechanisms to promote the appropriate translation of environmental science and research** into practical policy and into usable and understandable information for the public, as much closer collaboration is needed between scientists and policy-makers and between scientists and civil society.
- Continue the development of **appropriate environmental indicators and indices** that feed into policy development and decision-making.
- Use appropriate technologies, such as **remote sensing, GIS and the internet,** to provide access to information and to build accessible and integrated environmental information systems.

This report strongly recommends that a major monitoring and data-management improvement programme be initiated across all national government departments and research institutions. It is hoped that the NSSD will help to address this challenge.

The interface between information and policy-making also requires attention. Scientific and research information, which is often technical in nature, needs to be translatable into practical policy. This could be achieved through effective communication. Information needs to be presented in a non-technical manner, understandable by decision and policy-makers. State of the environment assessments are valuable tools in this endeavour and should be used in strategic planning, monitoring, reporting, and giving feedback. They aim to produce and communicate the relevant information, but their usefulness needs to be understood by government and civil society, so such reports need to be written in reader-friendly, non-technical language. State-supported science institutions could play a part in disseminating this kind of material to the policy-makers and the public.

"If you're trying to adjust a system state to your goal, but you only received delayed information about what the system state is, you will overshoot and undershoot".

Donella Meadows (1997)



Box 12.7 Suggested actions – climate change

- **Reduce the dependence on fossil fuels** through a focused drive to develop cost-effective alternative sources of energy, including solar, wind, wave, hydrogen, nuclear, and biomass. Particular attention should be paid to developing and implementing incentives to promote energy efficiency, renewable energy, and solar water heaters. A target should be set to install one million solar rooftops by an agreed date.
- **Extend and implement the use of cleaner technology** across the country, particularly in Eskom's coal-fired power stations.
- Establish **appropriate adaptation strategies** for the socio-economic and biophysical environments, linked to national development initiatives such as AsgiSA, the Integrated Sustainable Rural Development Programme, the Urban Renewal Programme, and the Extended Public Works Programme. These adaptation strategies should be integrated into Provincial Growth and Development Strategies, Integrated Development Plans, and conservation management plans.
- Ensure **adequate funding and capacity for research** on climate change and its impacts on society and the environment in order to guarantee that appropriate strategies and policies are developed, including funding increases for renewable energy and energy efficiency interventions (technologies as well as economic spin-offs).
- Implement a **communication strategy** alerting the general public to the potential outcomes of climate change.

State of the environment reports are not yet being used in this way at national government level, but this National State of the Environment report and other similar reports can usefully form the basis for future policy and strategic development.

12.3 KEY EMERGING AND CROSS-CUTTING ISSUES

12.3.1 Climate change

The key emerging issue covered in this report is climate change. Worldwide, it is thought to be one of the most important environmental and development issues facing society. Most scientists and governments recognize that, while uncertainties exist, there is strong evidence to suggest that human activities, notably greenhouse gas emissions, are changing the earth's climate and that further change is inevitable[1].

Although South Africa is still a developing economy, our dependence on coal-driven energy sources and the energy intensity nature of our economy have resulted in an extremely high carbon emission level per unit of gross national product, compared to the rest of the world. We have emission levels equivalent to that of developed nations such as the United Kingdom. We are also located in one of the regions most susceptible and vulnerable to climate change, and we appear already to be experiencing the early effects of global warming and climate variability. Average land and sea surface temperatures have increased, sea level is rising, rainfall patterns have changed, and the intensity and frequency of extreme weather events have increased.

Projected climate changes in South Africa over the next 50 years indicate that the western parts of the country will become dryer, that certain areas will experience shorter rainfall seasons, and that air temperatures will rise, particularly in the interior. Other potential changes include increased incidence of floods and droughts and more severe temperature inversions, which will exacerbate air pollution problems. Such changes in climate will significantly affect all components of the natural environment, various sectors of the economy, such as agriculture, fishing and tourism, human health, and, therefore, the well-being of all South Africans. Changes in terrestrial ecosystems and species distributions are already being correlated with climatic changes over the sub-continent, and the pace of these changes is expected to accelerate.

Given these risks, addressing the challenge will require a broad range of mitigation and adaptation activities. Mitigation involves reducing emissions, while adaptation involves measures to increase the capability to cope with impacts[1]. While many responses to climate change overlap with those of human vulnerability (see section 12.3.3 below), several points are worth mentioning.

Reducing emissions in South Africa will require improving the sustainability of production and consumption. Economic growth is still firmly linked to energy-intensive resource consumption[6]. Reducing emissions therefore means improving energy efficiency, increasing the use of renewable energy sources, implementing cleaner technologies, and moving toward a zero-waste economy. As yet, too little attention has been paid to large-scale energy efficiency and renewable energy interventions. A strong drive to develop cost-effective alternative sources of energy is required. This should include providing solar, wind, wave, hydrogen, nuclear, and biomass alternatives[a] via a decentralized network of energy generation entities.

No mitigation effort, no matter how rigorous, will prevent the climate from changing[1]. Adaptation is therefore an essential component of our response strategy. It will require strategies that are linked to planning and decision-making processes at all levels, such as AsgiSA, the Integrated Sustainable Rural Development Programme, the Urban Renewal Programme, provincial growth and development strategies, and integrated development plans. Also, management plans for ecosystems and conservation areas

will need to incorporate climate adaptation strategies. Specifically for biodiversity conservation, the management of biodiversity outside formal reserves is likely to become increasingly important[1].

12.3.2 HIV and AIDS

The effects of the HIV and AIDS pandemic are accelerating in South Africa. There is agreement that it will slow the rate of population growth and also reduce growth in gross domestic product, but estimates of the rates of decline vary.

The effects of HIV and AIDS on the environment are not clear. Escalating dependency on and exploitation of natural resources by marginalized poor communities (with increased numbers of orphans and single parent families, loss of ability to work, and lower productivity) are cause for concern. Furthermore, the loss of skills in critical cohorts of the working population – the 20–45 year olds – may have adverse economic consequences, which could indirectly lead to environmental degradation. The links between HIV and AIDS and environmental health are more evident. People living with HIV and AIDS may be more susceptible to environmental hazards such as respiratory infections.

Belated recognition by society of the risks of the disease, as well as inadequate mobilization of mitigation and adaptation strategies, have exacerbated the risks to the country. This said, South Africa's HIV and AIDS treatment programme is today one of the biggest in the world with over 200 000 citizens receiving ARV medicines through public and private health care facilities. Significant advances have also been made in promoting HIV and AIDS awareness and behaviour change.

It is difficult for the state on its own, however, to provide adequate care, drugs, and nutrition to combat the disease, and more needs to be done across all sectors. Partnerships between government and business, communities and NGOs are therefore seen as a key element in combating the disease. In the environment sector, HIV and AIDS considerations need to be incorporated into strategies, policy, and planning. More generally, abandoning the social stigma attached to the disease is a prerequisite for more compassionate approaches and will help society as a whole to play its part in caring for those suffering from the disease.

2.3.3 Human vulnerability

An undesirable combination of circumstances in South Africa, some of which link closely to decreasing social coherence and social capital[b], makes people vulnerable to environmental change. These conditions include poverty, HIV and AIDS, population growth, inadequate access to basic services, transformation of ecosystems to provide the resources to meet rising population demands, current climate variability, poor land-use practices, as well as accelerating changes in our environment due to climate change, invasive alien species, and habitat destruction. Droughts increasingly threaten food security; floods and fires in densely populated informal settlements take human lives and cause immense damage and loss of property; infectious diseases attack the poor at random; changes in the distribution of vector borne diseases cause new outbreaks.

The cumulative evidence for increasing human vulnerability to environmental change in South Africa calls for a significant policy response and action on several fronts. Responding to vulnerability requires building on people's

Box 12.8 Suggested actions – HIV and AIDS, and the environment

- Incorporate **HIV and AIDS** considerations into all strategies, policies, and plans that affect the environment and the use of natural resources.
- Promote **public and private sector campaigns that raise awareness** about HIV and AIDS and about ways to reduce the social stigma attached to the disease.
- Improve the **capacity for administering and managing** the roll-out of anti-retroviral drugs.
- **Promote partnerships** between government, business, communities and NGOs to combat HIV and AIDS.

Box 12.9 Suggested actions – human vulnerability

- Implement a programme to rectify the **effects of past poor land-use planning processes**, as many settlements are located dangerously close to hazardous areas such as rivers, mines, and industrial sites.
- Entrench **environmental and human vulnerability considerations** further into development and land-use planning.
- Build the **coping capacity of communities at risk**, by
  - developing social capital through building informal networks and extending participation in public affairs and decision-making;
  - instituting prevention and preparedness initiatives in communities and institutions responsible for disaster management; and
  - improving the rigour of vulnerability assessments and early warning systems.
- Improve the **understanding of the effects of environmental change** on vulnerable groups.

own responses, providing institutional support, and promoting resilience and adaptive capacity among the people most at risk. Social responses have frequently focused on a reactive mode of mitigating the impacts of environmental change or natural disaster, rather than on a pre-emptive mode, which addresses issues ahead of a potential crisis. The onset of conditions that create threats and vulnerability may be gradual or inconspicuous. Ways need to be found to show how environmental change risk-reduction and management relate to other risks, as well as to link these activities to ongoing development agendas.

One of the most effective responses to human vulnerability to environmental change is to strengthen mechanisms that provide early warning, such as vulnerability assessments and disaster management planning. Vulnerability assessment can measure the severity of potential threats on the basis of known hazards and the levels of vulnerability of societies and individuals. It can be used to translate early-warning information into preventive action and is necessary for early warning and emergency preparedness. Results should ideally be integrated into the long-term planning policies of institutions and governments, and should promote institutional responsiveness to increasing vulnerability, as well as action for disaster preparedness and mitigation.

Such policy responses should be complemented by initiatives aimed at improving the capacity of vulnerable groups to cope with a threat when it becomes a reality. Improving coping capacity of groups when they are at greatest risk can greatly reduce the damage caused by extreme events or environmental degradation.

Box 12.10 Suggested actions – land use

- Institute a coordinated and rigorous **land-resources monitoring and assessment programme** to give timely, accurate, and periodic information needed on the condition and trends in the land resource (including land-cover use and change, and degradation), which should feed into the National Action Programme on Land Degradation.
- Develop and institute a **large-scale land rejuvenation programme** that prioritizes and supports conservation farming methods, including organic farming.
- Increase **extension support to beneficiaries of the land reform programme**, and improve institutional capacity for implementing the programme and developing in beneficiaries the skills they need for successful and sustainable land management.
- Improve **access to and support from financial institutions** for emerging farmers.
- Formulate and **implement a plan to deal with the issue of land administration in communal areas**.
- Support **capacity building initiatives** for sustainable land management.
- Develop **targeted education and awareness initiatives** on the benefits of using alternative sources of energy to lessen the dependence on biomass.

12.4 TACKLING SPECIFIC ENVIRONMENTAL ISSUES

While there are clear cross-cutting options for action that need to be applied to the environment as a whole, there are also more specific actions that can be taken to address specific environmental issues. In this section, key suggestions for action are made for each environmental theme presented in Part II. A more detailed list of actions for addressing specific environmental issues, as well as the actors responsible for implementing them, are presented in Appendix 3. Appendix 3 separates actions according to their nature[c], namely, social and behavioural, knowledge and cognitive, institutional and legal, economic, and technological. While this categorization is one-dimensional, and many responses do not fall neatly into any single category, it is a useful framework for understanding where the focus of intervention should lie.

12.4.1 Sustainable land use and management

Integrated and holistic programmes are required to deal with past and current intensifying pressures on land resources. Transformation of land from natural habitat, climate variability and incidence of drought in many areas in South Africa, widespread land degradation and desertification, demands for access to land, and the need to increase food production, are some of the areas that require intervention.

Opportunities exist to optimize land use in South Africa to support livelihoods and at the same time to improve environmental conditions. There are also opportunities for agricultural development in communal areas, many of which have sufficient potential for sustainable production. Reversal of land degradation, particularly in grazed landscapes, is an excellent opportunity to protect the country's biodiversity. A key tool is the National Action Plan to Combat Land Degradation and Alleviate Rural Poverty, which recognizes these needs but, so far, little progress has been made in implementing this plan. One of the most important elements of success is availability of reliable and up-to-date information about the quality and productivity of land resources.

12.4.2 Sustaining our biodiversity and ecosystems[8]

South Africa is rapidly losing biodiversity, despite recent encouraging developments in its management. Ecosystem functioning is being severely impaired, particularly in aquatic ecosystems, which are in a poor state of health. Predictions that drivers of change in biodiversity will stay stable or intensify their pressure implies that in South Africa, as in the rest of the world, it may not be possible to attain the World Summit on Sustainable Development goal of reducing the rate of biodiversity loss by 2010.

The report of the Millennium Ecosystem Assessment recommends that, in addition to such short-term goals and targets (which do not necessarily align with the characteristic longer response times of political, socio-economic, and ecological systems), longer-term goals and targets will be necessary (extending, for example, as far as 2050).

While there is good policy and legislation in place for the wise use and management of biodiversity, several gaps and contradictions require attention[1]. The first relates to the policy framework for integrated management of terrestrial and freshwater environments. There is an urgent need to integrate land and water policy and management as a basis for integrated management strategies[1]. Second, there is a gap regarding fiscal instruments for biodiversity management. For example, incentives such as tax deductions for private landowners for expenditure on controlling alien invasives or rehabilitation should be considered. Most of South Africa's biodiversity is in private hands and landowners are often willing to contribute their own resources to maintaining biodiversity on their land. Harnessing this pool of private resources would see benefits for the provision of ecosystem services that contribute to the public good.

Third, tools for including biodiversity considerations in environmental assessment and land-use decision making are insufficient. The biodiversity considerations in environmental assessments often fail to address aspects of ecosystem functioning or cumulative impacts. Guidelines for dealing with biodiversity issues in environmental assessments, such as those used in the Western Cape, should be produced for other provinces. In addition, 'biodiversity offsets' could add to the environmental sustainability of developments[8]. These involve setting aside land in the same or a similar ecosystem elsewhere, at the cost of the developer. Biodiversity offsets are already being implemented to some extent in South Africa, but with no legal or policy framework to guide them, so there is little consistency in the way they are being applied. Systematic application of biodiversity offsets could provide significant benefits at little cost to the fiscus.

Finally, there is lack of clarity on the ways in which biodiversity-related functions are distributed in practice among the three spheres of government, and between management of protected areas and management of the wider landscape[8]. There is significant scope to clarify, and to develop more appropriate and effective resource allocation mechanisms, to allow the respective spheres to fulfil their mandates.

Box 12.11 Suggested actions – biodiversity and ecosystems

- Work with **production sectors** that are major land users (such as agriculture, infrastructure and property development, forestry and mining), to develop and implement sector-specific wise-practice guidelines.
- Ensure that **land-use planning and decision making adequately incorporate biodiversity considerations**, particularly in the case of spatial development frameworks, integrated development plans at local level, and environmental impact assessments, which frequently gloss over considerations of biodiversity.
- Make the case for the **value of biodiversity**, including the links between biodiversity and socio-economic development, and disseminate it among decision-makers and the public.
- Prevent and control the **impact of invasive alien species**. This requires the coordination and alignment of resource allocation and implementation strategies among the multiple institutions involved in preventing invasive alien species (plants, animals, and microorganisms) from entering the country and in controlling invasive alien species already present.
- Develop and implement a **register of protected areas**.
- Expand the **protected area network** to incorporate a representative sample of South Africa's biodiversity as well as key ecological processes.
- Increase the focus on **conserving and raising awareness of freshwater biodiversity**.

12.4.3 Improving aquatic ecosystems, water availability, and water quality

Demands on South Africa's scarce water resources are increasing and some projections show that there will be a deficit in available water by 2025. The Department of Water Affairs and Forestry's (DWAF) National Water Resource Strategy (NWRS), states, however, that there should be sufficient water for the near future to meet all needs, including the environment's, if it is carefully managed.

The growing demands (ecological, domestic, industrial, and agricultural) must be balanced equitably, and the NWRS is seen as the main driver for ensuring the

Box 12.12 Suggested actions – inland waters

- Improve **land management** throughout catchments so that it does not compromise the integrity of river and wetland systems.
- Develop a comprehensive **wetlands inventory**.
- Ensure the **establishment of catchment management agencies** in the most important catchments. Provide additional resources and build capacity in the CMAs and in the IDP process for integrated land and water management, which should incorporate and enforce the 'polluter pays' principle.
- Fast-track the implementation of the Department of Water Affairs and Forestry's **Wastewater Discharge Charge System** and implement incentives for reducing consumption, including amendments to by-laws, building regulations, and regulations governing the re-use of grey water and treated sewage.
- Extend capacity to implement fully the **Water Services Strategic Framework** in consultation with all key partners.
- Review **water management in the agricultural sector**, taking into account irrigation systems and the use of aquifers and rivers, and develop a strategy for more efficient and sustainable use of water in the sector.
- Strengthen links between the **monitoring and assessment of water resources and planning and policy**, including extending the Rivers Health Programme assessments to cover all catchments, and incorporating the results of this and the National Spatial Biodiversity Assessment into water resources planning.
- Promote and extend the **use of cleaner production**, especially in industries producing large volumes of solid, liquid, and airborne wastes (including the implementation of the DEAT's Cleaner Production Strategy).

Box 12.13 Suggested actions – marine and coastal resources

- Improve the **planning and monitoring of development in coastal areas** with a focus on the protection of biodiversity, as a concerted effort is urgently required to improve the sustainability of developments, including golfing estates.
- Promote the **non-consumptive use of marine and coastal resources** by growing the tourism potential of SCUBA diving, whale watching, and marine safaris.
- Ensure that the **Line-fish Management Protocol policies are implemented and enforced** to ensure recovery of collapsed stocks.
- Ensure that **management efforts** give attention to the **west coast and KwaZulu-Natal coastlines**, in addition to the current efforts being placed on the Western and Eastern Cape coasts.

achievement of this balance. It is only through large engineering projects such as the Lesotho Highlands Water project that current demands are being met, however, so meeting future needs will require substantial capital investments in infrastructure.

The institutional restructuring of DWAF to separate its water supply function from its strategic resource-protection function has largely been completed, and the focus needs to shift to implementation and capacity-building. Further work is also required to ensure effective cooperative governance between the many government departments with responsibilities related to water management.

The pricing of water use, from the perspective of both the supply of water and the discharge of effluent, is starting to reflect the true cost of water and is expected to put pressure on all water users to increase efficiencies and look for ways to minimize use. An important instrument is the DWAF's Wastewater Discharge Charge System, due to be implemented shortly, that will impose a cost-recovery-based charge and a tax on the discharge of waste effluent on all registered dischargers.

To improve aquatic ecosystem health, the River Health Programme needs to be extended to cover the entire country, and its results, as well as those of the National Spatial Biodiversity Assessment, should be integrated into water resources planning. The River Health Programme has identified management priorities for each river system that has so far been assessed, and it is the responsibility of the provincial implementation teams to identify and implement actions to deal with these priorities. At present, all river systems are highly fragmented and none are conserved intact, so declaring several entire river systems or entire tributaries as protected areas could contribute to reversing the loss of aquatic biodiversity. It may be time to investigate a Wild and Scenic Rivers Policy (and programme), similar to that in the United States of America. Candidates for inclusion could be the upper and middle reaches of the Umkomaas and Mzimkulu in KwaZulu-Natal and the entire Mtamvuna River in southern KwaZulu-Natal, the upper reaches of the Sabie and Crocodile in Mpumalanga, and the Olifants in the Western Cape.

12.4.4 Using our marine and coastal resources wisely

Despite coastal and marine ecosystems being relatively intact, there are still significant threats to their sustainability. Many linefish stocks have collapsed, and certain estuaries near urban areas are being degraded through increased coastal development, discharge of wastewater, exploitation of marine resources, and climate change (all of which are among the most significant threats). It is essential to maintain these important areas by mitigating some of these threats as far as possible and by ensuring coping capacity.

The different types of coastal and marine resource use

(for example, for commercial and recreational benefit) require different management measures. Improved regulations governing the marine and coastal environment now require focused enforcement to assist in rebuilding stocks. Increased focus on non-consumptive marine resource use is needed to advance the tourism potential of the marine environment, ultimately leading to a greater contribution to the overall well-being of South Africans in future.

12.4.5 Improving our air quality

Improving the quality of our air and adapting to and mitigating climate change are, arguably, the most pressing and challenging environmental issues. South Africa's urban areas generate unacceptably high levels of pollution that exceed health limits; many households still use coal and wood for cooking, lighting, and heating; and, owing to the energy intensity of our economy and its dependence on cheap coal for power, we contribute disproportionately to greenhouse gas emissions. Furthermore, we are one of the countries most susceptible to the adverse effects of climate change.

Considerable focus is needed on developing alternative energy sources, implementing cleaner technologies, putting in place incentives for greater energy efficiency and reduction of emissions, and enforcing the much improved air quality legislation. The need for dealing with climate change is self-evident (see Box 12.14 for specific recommendations).

12.4.6 Creating sustainable human settlements

Human settlements in South Africa are divided socially and economically. Growing urban areas and populations result in overwhelming development challenges. Recent success in delivering electricity and water to communities contrasts with the inadequate sanitation facilities and increased housing backlogs in cities. Access to health care and social services has improved in the past few years, but the distribution and quality of health and educational services remain varied and unequal. In addition, many waste management sites operate below acceptable health standards; and many settlements are located in inhospitable and hazardous environments.

Over the past decade, South Africa has introduced wide-ranging policies, programmes, strategies, and plans to address the country's developmental challenges. They include improving conditions in all human settlements by upgrading the planning, service-delivery, monitoring, and regulation functioning of local authorities. Severe resource constraints and increasing levels of corruption in local government, however, hamper such efforts.

A more integrated approach to urban and rural development is needed, as well as exploration of strategies to support improved implementation of the land reform programme, strengthening local governance, and overcoming the socio-economic and political inequalities in settlements. To this end, it is critical for environmental considerations to be incorporated into local planning processes, such as spatial development frameworks and integrated development plans. A Sustainable Human Settlements Strategy, which is currently undergoing debate within government, places the issue of settlements and their sustainability firmly on South Africa's political agenda.

Box 12.14 Suggested actions – atmosphere

- Ensure **adequate funding for the establishment of the national air quality monitoring system**, and air quality management plans at local level.
- Adopt the revised **air quality limits and standards** as a matter of urgency.
- Extend and implement the use of **cleaner technology**.
- Reduce the dependence on fossil fuels through a focused drive to develop **cost effective alternative sources of energy**, including solar, wind, wave, hydrogen, nuclear, and biomass. Particular attention should be paid to developing and implementing incentives to promote renewable energy and solar water heaters. A target should be set to install one million solar rooftops by an agreed date.
- Improve **data and information systems** through fast-tracking the setting up of air quality monitoring networks.
- Institute an awareness campaign about the **health and safety risks** of using coal and wood for cooking and heating.
- Roll out the **Implementation Strategy for the Control of Exhaust Emissions** and integrate policing with vehicle roadworthiness, adopt Euro technologies for new vehicles, and reduce the sulphur, benzene, and aromatics content of fuels.
- Put in place a **new regulatory framework that stimulates market incentives and disincentives**, to create markets for renewable energy generation, cleaner technology, and energy efficiency, with a commitment by major cities to employment growth in an expanding alternative energy sector.

12.5 CONCLUSION

South Africa, unlike many other developed countries, now has an opportunity to ensure that development is environmentally sustainable. While many of the biophysical trends presented in this report suggest an overall



Box 12.15 Suggested actions – human settlements

- Ensure that **local governments have the capacity** to handle the wide range of responsibilities that have been allocated to them.
- Significantly increase **investments in public transportation**, including freight by rail and passenger transport via rail, bus, and mini-bus. The provision of new services, the upgrading of existing services, and the gradual conversion to biofuels should be top priorities.
- Implement **sustainable human settlement strategies** that promote: diverse communities via densification; mixed land-use regulations; shortening the distance between home and work; linking home and work via public transport, pedestrian, and cycling routes; enhancing the quality of the natural environment; and improving the safety and accessibility of settlements.
- Improve coordination of **urban development strategies**, including housing delivery, infrastructure construction, social services, safety, health, and transportation.
- Develop **design guidelines and information resources** to support the built environment and design professions to incorporate sustainability criteria into the design of infrastructures and buildings.
- Ensure that **AsgiSA realises the potential for long-term economic and ecological sustainability** by promoting investment incentives that favour investments in fixed assets that reinforce the overall vision, mission, and principles of the NSSD.
- Give consideration to the introduction of a 'feed-in tariff' that will **create a market for localized electricity generation**, which can be sold into the grid at an agreed tariff.
- Promote changes in **taxation, investment incentives, and other fiscal interventions**, plus 'licence-to-operate' mechanisms, which reinforce market trends towards more sustainable production and consumption.

deterioration in the condition of the environment, there are positive signs, particularly in the economic and social arenas. Those responsible for policy development as well as all decision-makers should carefully consider these trends and the actions suggested in this chapter, and develop integrated, forward-thinking, and practical strategies for the implementation of suggested actions.

These strategies should be developed for actions that will leverage and maximize downstream benefits. The strategies should have clear goals, realistic time-bound targets, mechanisms for monitoring progress, and mandated responsibilities and associated resources for their implementation. Clearly, it is in South Africa's interests to pursue a pathway of environmentally sustainable development that will ensure a lasting improvement in the quality of life of all South Africans.



NOTES

a. Examples of alternative sources of energy include: wind power generation via solar wind farms; solar power via solar roof tops so that houses can generate more energy than they consume; demand side management via strategies such as the installation of solar water heaters and compulsory insulation; and the production of ecologically sustainable biofuels.

b. 'Social capital' refers to the degree to which a community or society collaborates and cooperates (through such mechanisms as networks, shared trust, norms, and values) to achieve mutual benefits.

c. The typology used here to categorize required actions according to their nature is similar to that used for actions in the global Millennium Ecosystem Assessment report[1].

REFERENCES

1. Millennium Ecosystem Assessment (2005). *Ecosystems and Human Well-being: Policy Reponses. Volume 3: Findings of the Responses Working Group of the Millennium Ecosystem Assessment.* Island Press, Washington, DC. http://www.millenniumassessment.org

2. United Nations Environment Programme (2002). *Global Environment Outlook 3. Past, Present and Future Perspectives.* Earthscan, London.

3. National Treasury (2006). A Framework for considering market-based instruments to support environmental fiscal reform in South Africa. Draft Policy Paper, April 2006. Compiled by the Tax Policy Chief Directorate.

4. Peterson, C. and Huntley, B. (2004). What is Mainstreaming Biodiversity? Unpublished Proceedings of Mainstreaming Biodiversity in Production Landscapes and Sectors Workshop (September). South African National Biodiversity Institute, Cape Town.

5. Cowling, R.M. (2004). The process of mainstreaming: conditions, constraints and prospects. Unpublished paper.

6. Department of Environmental Affairs and Tourism (2006). *South Africa's National Strategy for Sustainable Development: Draft Integrated Srategy for Review.* Department of Environmental Affairs and Tourism, Pretoria. 21 April 2006.

7. Meadows, D.H. (1997). Places to intervene in a System: Strategic Levers for Managing Change in Human Systems. http://www.sustainalaska.org/pdf/WholeEarthRev.pdf

8. Driver, M., Smith, T., and Maze, K. (2005). Specialist Review Paper on Biodiversity for the National Strategy for Sustainable Development. Report compiled by the National Biodiversity Institute on behalf of the Department of Environmental Affairs and Tourism, Pretoria. http://www.environment.gov.za

ANNEXURE 1: NATIONAL, PROVINCIAL, MUNICIPAL AND SECTORAL STATE OF ENVIRONMENT REPORTS

State of Environment Reports Published

Title of the published output	Year of publication	URL link to full text
Summary State of the Environment Report for the Cape Metropolitan Area, Year 1 (1998)	1998	http://www.cmc.gov.za/soe
Summary State of the Environment Report for the Cape Metropolitan Area, Year 2 (1999)	1999	http://www.capetown.gov.za/soe
Summary State of the Environment Report for the City of Cape Town, Year 3 (2000) (Summary)	2000	http://www.capetown.gov.za/soe http://www.deat.gov.za/soer/
North West Province State of the Environment Report Overview (2002)	2002	http://www.nwpg.org.za http://www.deat.gov.za/soer/
State of the Environment Report (2002), North West Province, South Africa (Comprehensive)	2002	http://www.nwpg.org.za http://www.environment.gov.za/soer/
State of the Environment Report for the City of Cape Town, Year 5 (2002)	2002	http://www.cmc.gov.za/soe http://www.environment.gov.za
State of the Environment Report for the City of Cape Town Year 4 (2002)	2002	http://www.cmc.gov.za/soe
Ekurhuleni Metro State of the Environment Report (Comprehensive)	2003	http://www.deat.gov.za/soer/ http://www.ekurhuleni.com
Joburg State of the Environment Report (Comprehensive)	2003	http://www.joburg.org.za http://www.deat.gov.za/soer/
Limpopo State of the Environment Overview (2003)	2003	http://www.deat.gov.za/soer/reports/limpopo/Limpopo.pdf
Mangaung State of the Environment Report (Overview)	2003	http://www.deat.gov.za/soer/ http://www.mangaung.co.za
Mbombela State of the Environment Report (Comprehensive)	2003	http://www.deat.gov.za/soer/reports/mbombela/MbombelaSoER.pdf
Mogale City State of the Environment Report (Comprehensive)	2003	http://www.deat.gov.za/soer/reports/mogale/main.html
Mpumalanga State of the Environment Report (2003) (Comprehensive and Overview)	2003	http://www.deat.gov.za/soer/reports/mpumalanga/main.html http://eia.csir.co.za/mpumalanga/documents%5CMPU_SOE_2003_TOC.pdf
State of the Environment Report Gap Analysis for the City of Tshwane (2001—2002) (Gap Analysis)	2003	http://www.cmc.gov.za/soe
Eastern Cape State of the Environment Report (2004) (Comprehensive)	2004	http://www.deat.gov.za/soer/
Ekurhuleni State of the Environment Report (2004) (Comprehensive and Overview)	2004	http://www.ekurhuleni.com http://www.deat.gov.za/soer/
Gauteng State of the Environment Report (2004) (Comprehensive)	2004	http://www.deat.gov.za/soer/ http://www.dacel.gpg.gov.za
Northern Cape State of the Environment Report	2005	http://www.northern-cape.gov.za/
Western Cape State of the Environment Overview Report (2005) (Comprehensive)	2005	http://www.capegateway.gov.za/eng/publications/reports_research/W/120813

Municipal State of Environment Reports

Municipality	Expected Date of Publication
Drakenstein Local Municipality	2006
Nkangala District Municipality	2006
Sedibeng District Municipality	2006
The City of Tshwane	2006
West Rand District Municipality	2006
Eden District Municipality	2007

Provincial State of Environment Reports

Province	Expected Date of Publication
Free State (Comprehensive)	2007
KwaZulu-Natal (Comprehensive)	2006
Limpopo (Comprehensive)	2006
North West (second five yearly SoE report)	2007

Sectoral Reports

State of Rivers Reports		
Title of the published output	**Year of Publication**	**URL link to full text**
Crocodile, Sabie-Sand & Olifants River Systems	2001	http://www.csir.co.za/rhp/ http://www.deat.gov.za/soer/
Letaba and Luvuvhu River Systems	2001	
uMngeni River and neighboring rivers and streams	2002	
Diep, Hout Bay, Lourens and Palmiet River Systems	2003	
Free State Region River Systems	2003	
The Hartenbos and Klein Brak River Systems	2003	
Berg River System	2004	
Buffalo River System	2004	
Crocodile (West) Marico Water Management Area	2005	
Greater Cape Town's Rivers	2005	
Olifants / Doring and Sandveld Rivers	2006	
State of Estuaries		
State of South African Estuaries: geomorphology, Ichthyofauna, water quality and aesthetics	2000	http://www.deat.gov.za/soer/
Catchment Land cover	2001	
State of Vegetation		
Vegetation of South Africa, Lesotho and Swaziland	1999	http://www.deat.gov.za/soer/
Other Reports Underway		
State of Air		http://www.deat.gov.za/soer/
State of Coasts		
State of the Forest Report		

ANNEXURE 2: MILLENNIUM DEVELOPMENT GOALS (MDG), TARGETS, AND INDICATORS FOR SOUTH AFRICA

Note: Targets refer to either specific MDG targets or targets set by South Africa, where these are available. For some indicators explicit targets have not been set.

GOAL 1: Eradicate extreme poverty and hunger

Target 1: Halve, between 1990 and 2015, the proportion of people whose income is less than US$1 a day

South Africa's approach to poverty eradication is premised on the need for an integrated approach that includes social security grants, free access to basic services, free basic education, local economic development, and sustainable job creation. Evidence suggests rising poverty and inequalities, but the positive impact of social grants may be starting to reverse this trend.

INDICATORS	1995	2001	Target by 2015
Proportion of population living below international poverty line of US$1/day (or R87/month)*	7.6	11.3	5.7
Proportion of population living below international poverty line of US$2/day (or R174/month)*	30.9	34.4	-

Source: Statistics South Africa. Based on 'A poverty profile of South Africa' Statistics South Africa (2005) (using the 1995 and 2000 Income and Expenditure Surveys, the 1995 October Household Survey, and the September 2000 Labour Force Survey).

*For those readers who require information on the 1995 Income and Expenditure Survey, the measures are as follows: proportion of population living below international poverty line of US$1/day or R87/month, 7.6%; proportion of population living below international poverty line of US$2/day or R174/month, 30.9%; poverty gap at US$1/day, 0018; poverty gap at US$2/day, 0.106; Gini-coefficient, 0.59; Share of the poorest 20% in national consumption, 3.4%; 0.59 is Gini-coefficient excluding social transfers. If transfers are taken into account, the Gini-coefficient is 0.35.

Target 2: Halve, between 1990 and 2015, the proportion of people who suffer from hunger

Interventions have included school feeding schemes, community gardens, and food parcels for the destitute. Using malnutrition amongst children as an indicator, evidence suggests that hunger for the poor remains a persistent problem and there is no evidence of significant improvements.

INDICATORS	1994 (6-71 months)	1999 (12-71 months)	Target by 2015
Prevalence of underweight children under five years of age (%)	9.3	11.1	5.6
Percent of children showing wasting (%)	2.6	3.6	1.3
Percent of children showing stunting (%)	22.9	23.8	11.9

Sources: South African Vitamin A Consultative Group (1995); Department of Health (2000).

Notes:

'Underweight' refers to the proportion of children with a weight for age that is under 2 standard deviations from the norm (reference population median).
'Stunting' is defined as the proportion of children with height for age under 2 standard deviations from the norm (reference population median).
'Wasting' refers to the proportion of children with weight for height that is under 2 standard deviations from the norm (reference population median).

Goal 2: Achieve universal primary education

Target 3: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling

Apart from basic access, the government has committed to a programme to improve all the physical conditions of primary schools, including elimination of open veld schools. There are positive enrolment trends, but many schools require improved infrastructure.

INDICATORS	Database 1	Database 2	Database 3	2015 MDG target
Primary net enrolment ratio (%)	88 (Census 1996)	94 (Census 2001)	96 (LFS 2004)	100
People aged 17 years who have successfully completed a minimum of primary education (%)	81 (Census 1996)	84 (Census 2001)	-	100
Literacy rate of 15 to 24 year olds (%)	95 (OHS 1996)	96 (GHS 2003)	98 (LFS 2004)	100

Sources: Statistics South Africa, Census 1996 and Census 2001; October Household Surveys 1996; General Household Survey 2003; and Labour Force survey March 2004.

Notes:

Primary education net enrolment ratio (NER) is the number of primary school students aged 7-13, divided by the total number of children in the population aged 7-13.
Literacy rates: the proportion of people who say they can read and/or write in at least one language.
Primary school in South Africa includes Grades 1 through 7, or seven years of education.

Goal 3: Promote gender equality and empower women

Target 4: Eliminate gender disparity in primary and secondary education preferably by 2005 and in all levels of education no later than 2015

Trends in this regard are very positive, with the number of female learners at higher levels exceeding the number of male learners. There are programmes aimed at targeting skills development for women in ABET sector, higher education sectors, and through learnerships and specific programmes for women in science and technology.

INDICATORS	1994	1996	2001	2003	2004
Ratio of girls to boys in:					
- primary education (girls per 100 boys)	98:100	96:100	-	-	-
- secondary education (girls per 100 boys)	118:100	-	112:100	-	-
- tertiary education (girls per 100 boys)	-	92:100	-	116:100	-
Ratio of literate females to males (15–24 years)	-	111:100	-	109:100	-
Share of women in wage employment in the non-agricultural sector (%)	-	41	43	-	-
Proportion of seats held by women in national parliament (%)	25	-	-	-	33

Source: Education Foundation of South Africa; Statistics South Africa; Census 1996 and 2001.

Sources: This assessment is based on the contents of the 2005 Millennium Development Goals (MDG) Country Report that was the South African Government's official submission to the MDG Summit in 2005, updated from various independent sources.

Goal 4: Reduce child mortality

Target 5: Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate

This remains a persistent problem at unacceptably high levels despite improved immunisation.

INDICATORS	1998	2002 Preliminary %	2003 (estimates)	Target by 2015
Neonatal mortality rate (per 1000 live births)	20	-	-	-
Infant mortality rate (per 1000 live births)	45	44	-	15
Under-five mortality rate (per 1000 live births)	59	60	-	20
Proportion of 1 year-old children immunized against measles (%)	72	-	78	90

Sources: South African Demographic and Health Survey (DOH - SADHS), 1998; Department of Health, 2001, Statistics South Africa, Causes of death 1997-2003, 2004.

Note: Neonatal mortality is the probability of dying within the first month of life, infant mortality is the probability of dying in the first year of life, and under-five mortality is the probability of dying between birth and age five.

Goal 5: Improve maternal health

Target 6: Reduce by three-quarters, between 1990 and 2015, the maternal mortality rate

Positive trends over the last ten years are set to continue.

INDICATORS	1992-1998	1998 SADHS (NDoH)	Revision	2004 NDoH / Stats SA	2005 National Target	Target by 2015
Maternal mortality ratio (per 100 000 live births)	-	150	84	124	100	38
Proportion of deliveries that are supervised by trained birth attendants (%)	84	-	-	-	90	-

Sources: South African Demographic and Health Survey (SADHS), 1998; National Department of Health / Statistics South Africa.

Note: Maternal mortality ratio (MMR) refers to the number of maternal deaths (women who die as a result of childbearing, during the pregnancy or within 42 days of delivery or termination of pregnancy in one year) per 100 000 live births during that year.

Goal 6: Combat HIV and AIDS, malaria and other diseases

Target 7: Have halted by 2015, and begin to reverse the spread of HIV and AIDS

The disease continues to spread at high rates despite commencement of various education and treatment campaigns.

INDICATORS	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
HIV prevalence among 15 – to 29-year-old pregnant women	7.6	10.4	14.2	17	22.8	22.4	24.5	24.8	26.5	27.9
Contraceptive prevalence rate	-	-	-	-	-	-	-	-	-	-
Number of children orphaned by HIV and AIDS	-	-	-	-	-	-	-	-	-	-

Sources: Department of Health, 2004. National HIV and Syphillis Antenatal Sero-Prevalence Survey in South Africa 2003.

Target 8: Have halted by 2015, and begin to reverse the incidence of malaria and other major diseases

Both diseases are on the increase, especially in poor areas. South Africa is however one of the few sub-Saharan countries that will meet the target. Challenges include treatment completion for TB and Malaria vector control, particularly given that climate change is expected to lead to an increased spread of malaria.

INDICATORS	1997	1998	1999	2000	2001	2002	Target
Prevalence and death rates associated with malaria (per 100 000)	1.2	1.3	2.6	2.4	1.9	1.8	-
Proportion of the population in malaria-risk areas using effective malaria prevention and treatment measures	-	-	-	-	-	-	-
Prevalence and death rates associated with tuberculosis (per 100 000)	53.4	67.6	79.4	96.4	113	131.7	-
Proportion of tuberculosis cases detected and cured under directly observed treatment, short-course (DOTS) (%)	-	-	-	53.8	53.7	53.9	85

Sources: Statistics South Africa, 2005 (mortality and causes of death), 1998, 1999, 2000, 2004 (mid year estimates); Department of Health Annual Report 2003/2004.

Note: To be classified as 'cured', patients must be smear-negative at the end of the treatment.

Goal 7: Ensure environmental sustainability

Target 9: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources

Per capita carbon emissions remain high and is likely to increase by 4% per annum. There is a slight improvement in energy efficiency. The 2010 Biodiversity target will in all likelyhood not be met.

INDICATORS	1994/1995	2000	2003	MDG Target
Proportion of land area covered by forest (%)	7.6	7.6	7.6	-
Ratio of area protected to maintain biological diversity to surface area (%)	5.9	6.1	6.2	10.0
Energy use (kg oil equivalent) per US$ 1 000 GDP	296.0	-	283.0	-
Carbon dioxide emissions (tons per capita per annum)	7.6	7.2	7.8	-

Sources: Department of Water Affairs and Forestry, Department of Environmental Affairs and Tourism; Statistics South Africa, Environmental Accounts; Earth Trends 2003; CSIR National Land Cover.

Target 10: Halve, by 2015, the proportion of people without sustainable access to safe drinking water

Access to safe water has improved to about 80%, but access to safe sanitation is still around 65%, although improving each year. Strategies and programmes are being developed to integrate sanitation provision into new human settlement and rural development strategies.

INDICATORS	1994	2004	Target to 2015
Proportion of total population with access to improved water source (%)	60.1	78.7	80.1
Proportion of rural population with access to an improved water source (%)	44.4	63.6	72.2
Proportion of urban population with access to an improved water source (%)	70.3	87.7	85.2
Proportion of total population with access to basic sanitation (%)	48.7	63.7	74.4
Proportion of rural population with access to basic sanitation (%)	32.5	44.5	66.3
Proportion of urban population with access to basic sanitation (%)	58.8	76.9	79.4

Source: Department of Water Affairs and Forestry.

Note: In South Africa, basic service levels for water are defined as a minimum quantity of 25 liters of potable water per person per day within 200 metres of a household not interrupted for more than 7 days in any year and a minimum flow of 10 litres per minute for communal water points. This is a substantially higher standard than the basic services defined by the Millennium Development Goals as 20 litres of potable water per person per day within 1 000 metres of a household.

Target 11: Have achieved, by 2020, a significant improvement in the lives of at least 100 million slum dwellers

Shrinking household sizes has resulted in an increase in the number of people living in slums despite the construction of 1.7 million homes.

INDICATORS	1996	2001	Target to 2015
Percentage of urban households with an adequate water supply	98.5	97.5	-
Percentage of urban population with an adequate water supply	98.7	97.7	-
Percentage of urban households with adequate sanitation disposal systems	78.5	79.4	-
Percentage of urban population with adequate sanitation disposal systems	78.8	80.4	-
Percentage of slum households	32.0	28.0	-
Percentage of population living in slums	27.0	25.0	-
Number of slum households (millions)	1.7	2.1	-
Number of people living in slums (millions)	6.0	6.4	-

Note 1: Indicators related to the issue of slum conditions tend to differ, depending on whether population or household data are used for analysis. The table gives both sets of data. From 1996 to 2001, the annual average growth rate of urban households was 6.2%, compared to a 2.9% growth rate for the urban population. This disparity would suggest that, in addition to the migration of single young adults into urban areas, existing households might be breaking up into smaller units.

Note 2: Sanitation in 2001 includes ventilated pit latrines, but this distinction cannot be made for 1996.

Goal 8: Develop a global partnership for development

Target 16: In cooperation with developing countries, develop and implement strategies for decent and productive work for youth

There are few signs of improvement despite numerous programmes. South Africa has released its first draft of the Youth Enterprise Strategy and the Joint Initiative on Priority Skills (JIPSA), that identifies youth employment creation as an area needing intervention.

INDICATORS	2000	2001	2002	2003	2004
Youth unemployment rate, aged 15–24, total	47.7	54.2	56.6	56.8	51.8
Youth unemployment rate, aged 15–24, males	44.1	50.1	51.8	54.2	44.8
Youth unemployment rate, aged 15–24, females	51.2	58.7	61.9	59.7	58.4
Ratio of youth unemployment 15–24; adult 25–65, unemployment, total	44.0	44.0	45.0	50.0	50.0
Ratio of youth unemployment 15–24; adult 25–65, unemployment, males	47.0	45.0	48.0	53.0	48.0
Ratio of youth unemployment 15–24; adult 25–65, unemployment, females	42.0	42.0	43.0	48.0	52.0
Share of youth unemployed to total unemployed, total	30.8	30.3	31.2	33.5	33.4
Share of youth unemployed to total unemployed, male	32.1	32.0	32.6	34.8	32.6
Share of youth unemployed to total unemployed, female	29.6	29.7	30.0	32.3	34.1
Share of youth unemployed to youth population, total	14.3	15.4	16.8	15.6	14.2
Share of youth unemployed to youth population, male	14.4	15.0	16.3	15.8	13.6
Share of youth unemployed to youth population, female	14.3	15.9	17.2	15.4	14.7

Target 18: In cooperation with the private sector, make available the benefits of new technologies, especially information and communications

Increase in mobile telephone subscribers is mainly attributed to the new evolution towards second-generation wireless system and introduction of prepaid cards targeting people on the lower bracket of the economy. The mobile telephone networks have grown their subscribers at a faster rate as compared to the fixed line networks whose subscribers have been declining. Although there are some 120 Internet service providers in South Africa, access to the Internet is still restricted to some geographic locations and segments of the society.

INDICATORS	1995	2000	2001	2002	2003	2004
Telephone lines and cellular subscribers – fixed lines (thousand)	-	5 493	4 962	4 924	4 844	4 821
Telephone lines and cellular subscribers – mobile phones	-	5 284	8 322	10 934	13 797	18 295
Telephone lines and cellular subscribers – total density (thousand)	-	10 767	13 284	15 858	18 641	23 116
Personal computers (per 1 000 people)	27.9	66.4	69.6	72.6	75.8	82.7
Internet users	1 820 000	2 400 000	2 890 000	3 100 000	3 325 000	3 566 000

Sources: Operators Annual reports for 2004; SA Census 1996 and 2001, ITU, United Nations Development Programme

ANNEXURE 3: SUGGESTED ACTIONS FOR ADDRESSING PRIORITY ENVIRONMENTAL ISSUES

Actors responsible for implementing actions are indicated in brackets in bold next to the suggested action. The following codes apply: GN = national government; GP = provincial government; GL = local government; R = research; B = business and industry; C = civil society.

Issues	Nature of action				
	Social and behavioural (S)	Knowledge and cognitive (K)	Institutional and legal (I)	Economic and incentives (E)	Technological (T)
CROSS-CUTTING THEMES					
1. Strengthening implementation and enforcement	a. Train the judiciary in principles of environmental management and sustainable development and build legal capacity within the national and provincial environmental departments (GN, GP)		b. Improve capacity within regulatory authorities to effectively manage, implement and review the various Integrated Environmental Management procedures and tools, notably the new EIA Regulations (GN, GP) c. Ensure appropriate, adequate, and continuous training for Environmental Management Inspectors (GN, GP) d. Renew focus on the implementation of multi- and bilateral agreements to improve regional and international governance (GN)		
2. Mainstreaming the environment	a. Develop processes that continue to mainstream the environment and sustainability considerations into all aspects of human behaviour (ALL) Refer to action 3(I)d d. Create a shift in mindset from weak to strong sustainability within government, business, and society in general (ALL) e. Increase focus on the value of natural capital to human well-being by extending the concept of ecosystem services in relation to human well-being to all sectors of society (ALL)		b. Ensure that the roll-out and revision of the National Strategy for Sustainable Development (NSSD) incorporates environmental considerations sufficiently (GN) f. Integrate sustainability criteria, in all levels of integrated and spatial planning (i.e. NSDP, PGDSs, IDPs, SDFs), as well as into project formulation and selection checklists by public and private funders (i.e. government, major infrastructure funders such as the Municipal Infrastructure Grant, Transnet, the IDC, ESKOM, the Development Bank of Southern Africa, state-owned enterprises and private sector funders) (GN, GP, GL, B)	c. Continue the discussion proposed by the environmental fiscal reform policy paper, and promote the use of economic instruments such as charges, taxes and incentives to encourage natural resource management and pollution reduction (GN, B)	
3. Building capacity	a. Target and develop civil society education and awareness campaigns around the value of natural capital for human well-being (ALL)	c. Increase investment into sustainability-focused research and development particularly in land rejuvenation and conservation farming, energy efficiency in building techniques and industrial manufacturing processes (GN, R, B)	d. Mainstream sustainable development principles into the National Skills Development Programme (GN)		f. Increase investment in and extend the application of information and communication technology to support capacity building in integrated planning, particularly at local government level (GN, GL, R, B)

	b. Roll out a national environmental capacity-building programme for local government at an appropriately senior level to embed environmental considerations in municipal strategies and plans (GN, GP, GL) g. Make the capacity building of officials a mandatory component of outsourced projects, through 'on the job' training by including officials as part of the project team and through guideline documents or tool kits that can be used for similar projects in future (GN, GP, GL)	h. Establish partnerships to develop the access to information and the skills that non-governmental and community-based organizations, including women, youth and vulnerable groups, need to participate in technical debates (GN, GP, GL, C)	e. Improve the planning and implementation of environmental sustainability principles within existing education policy and improve the effectiveness of environmental education campaigns, particularly among the youth (GN)		
4. Environmental information		a. Integrate the collection, management, and sharing of information and reports on environmental and other related matters across all government departments and research institutions, particularly in the case of important cross-cutting data sets (R, GN, B) d. Develop data collection and monitoring initiatives that target priority environmental issues (e.g. air and water emissions, land degradation and desertification, water quality and availability, cultural heritage, human vulnerability, and effectiveness of governance) (R, GN) g. Continue the development of appropriate environmental indicators and indices that feed into policy development and decision-making (GN, GP, GL, R)	b. Develop mechanisms to promote the appropriate translation of environmental science and research into practical policy and into usable and understandable information for the public, as much closer collaboration is needed between scientists and policy-makers and between scientists and civil society (R, GN) e. Improve access to environmental information in accordance with pertinent legislation, such as the Promotion of Access to Information Act (ALL) f. Conduct regular integrated environmental assessments, surveys and inventories (R, GN, GP, GL, B)		c. Use appropriate technologies, such as remote sensing, GIS and the internet, to provide access to information and to build accessible and integrated environmental information systems (GN, GP, GL)
Sustainable land management					
5. Land use		a. Institute a land-resources monitoring and assessment programme to give timely, accurate, and periodic information needed on the condition and trends in the land resource, which should feed into the National Action Programme on Land Degradation (GN, R)	b. Apply the precautionary principle with respect to genetically modified organisms, including regulations to ensure public access to all relevant information (GN, B)	c. Improve access to and support from financial institutions for emerging farmers (B, GN)	Refer to action 7Te

6. Access to land			a. Increase extension support to beneficiaries of the land reform programme and improve institutional capacity for implementing the programme and developing in beneficiaries the skills they need for successful and sustainable land management (GN, B) b. Formulate and implement a plan to deal with the issue of land administration in communal areas (GN, GP, GL)		
7. Land degradation and desertification	a. Support capacity building initiatives for sustainable land management (GN, B) b. Develop targeted education and awareness initiatives on the benefits of using alternative sources of energy to lessen the dependence on biomass (GN, GP)	c. Develop rigorous desertification indicators and mapping methodologies (R) Refer to action 5Ka	d. Fast track the roll-out of the National Action Programme to Combat Land Degradation (GN)		e. Develop and institute a large-scale land rejuvenation programme that prioritizes and supports conservation farming methods (GN)
Sustaining our biodiversity and ecosystems					
8. Overexploitation, habitat degradation and loss	a. Develop targeted awareness campaigns at sectors having the largest impact on biodiversity, e.g. agriculture, forestry and mining (GN, B, C) e. Make the case for the value of biodiversity, including the links between biodiversity and socio-economic development, and disseminate it among decision-makers and the public (ALL)	b. Update land-cover data on a properly comparable basis (R, GN) Refer to actions 7Kc, 4Kd and 13Kf	c. Work with production sectors that are major land users (such as agriculture, infrastructure, property development, forestry and mining), to develop and implement sector-specific wise-practice guidelines (GN, B, C) f. Ensure that land-use planning and decision making adequately incorporate biodiversity considerations, particularly in the case of SDFs and IDPs at local level, and EIAs (GL, GP, GN)	d. Increase the use of co-management agreements with communities and business to improve sustainable management of ecosystems (B, C, GN, GP, GL)	
9. Protected areas		a. Develop and implement a register of protected areas (GN, GP, GL)	b. Expand the protected area network to incorporate a representative sample of South Africa's biodiversity as well as key ecological processes (GN, GP, GL)		
10. Invasive alien species	a. Assist local government to develop appropriate alien plant management plans (R)		b. Prevent and control the impact of invasive alien species. This requires co-ordination and alignment of resource allocation and implementation strategies between the multiple institutions involved in preventing invasive alien species from entering the country and in controlling invasive alien species already present (GN, B, R, GL)		
Improving aquatic ecosystems, water availability and water quality					
11. Water scarcity and service delivery	a. Extend capacity to fully implement the Water Services Strategic Framework in consultation with all key partners (GN)	b. Review water management in the agricultural sector, taking into account irrigation systems, use of aquifers and rivers, and develop a strategy for more efficient and sustainable use of water in the sector (GN, B)	c. Strengthen co-operation with the Department of Provincial and Local Government and the South African Local Government Association to ensure the effective adoption of water services responsibilities by local government (GN, GP, GL)	d. Fast track implementation of tariff structures to reward water demand management (GN, GL) e. Encourage municipalities through financial incentives to maintain water supply infrastructure (GN, GL)	

12. Water quality	a. Scale up public awareness campaigns to reduce littering and uncontrolled waste disposal (GL, C)	b. Standardize and consolidate monitoring results nationally for both surface and groundwater (GN, R)		c. Fast-track the implementation of DWAF's Discharge Charge System and implement incentives for reducing consumption, including amendments to by-laws, building regulations and regulations governing the re-use of grey water and treated sewage (GN, GL)	d. Promote and extend the use of cleaner production in industries producing solid, liquid and airborne wastes (GN, B, C)
13. Degradation of aquatic ecosystems	a. Increase the focus on conserving and raising awareness of freshwater biodiversity (GN)	b. Strengthen links between the monitoring and assessment of water resources and planning and policy, including extending the Rivers Health Programme assessments to cover all catchments and incorporating the results of this and the National Spatial Biodiversity Assessment into water resources planning (GN, R) f. Develop a comprehensive wetlands inventory (GN, R)	c. Improve land management throughout catchments so that it does not compromise the integrity of river and wetland systems (B, C, GN, GP, GL) d. Ensure the establishment of catchment management agencies in the most important catchments. Provide additional resources and build capacity in the CMAs, and in the IDP process for integrated land and water management, which should incorporate and enforce the 'polluter pays' principle (GN, GL, C, B)	e. Continue the discussion proposed by the environmental fiscal reform policy paper, and promote the use of economic instruments such as charges, taxes and incentives to encourage natural resource management and pollution reduction (GN, B, C)	
Using our marine and coastal resources wisely					
14. Overexploitation of stocks			a. Promote the non-consumptive use of marine and coastal resources by growing the tourism potential of SCUBA diving, whale watching, and marine safaris (GN, B, C) b. Ensure that Line-fish Management Protocol policies are implemented and enforced to ensure recovery of collapsed stocks (GN)		
15. Habitat degradation		Refer to action 18Kb	a. Improve the planning and monitoring of development in coastal areas, as a concerted effort is urgently required to improve the sustainability of developments, including golfing estates (GL, GP, GN, B, C)		
16. Protection and management			a. Management efforts should give attention to the west coast and KwaZulu-Natal coastlines, in addition to the current efforts being placed on the Western and Eastern Cape coasts (GN)		
Atmosphere					
17. Improving air quality	a. Institute a public awareness campaign about the health and safety risks of using coal and wood for heating and cooking (GN, C)	b. Ensure adequate funding for the establishment of the national air quality monitoring system, and air quality management plans at local level (GN, GL) Refer to action 4Kd	c. Adopt revised air quality limits (GN) d. Develop and implement a transport policy that supports efforts to reduce vehicle emissions (GN)	e. Put in place a new regulatory framework that stimulates market incentives and disincentives to create markets for renewable energy generation, cleaner technology and energy efficiency, with a commitment by major cities to employment growth in an expanding alternative energy sector (GN, GL)	f. Roll out the Implementation Strategy for the Control of Exhaust Emissions and integrate policing with vehicle roadworthiness, adopt Euro technologies for new vehicles and reduce the sulphur, benzene and aromatics content of fuels (GN, B) g. Extend and implement the use of cleaner technology (B)

18. Climate change	a. Implement a communication strategy alerting the general public to the potential outcomes of climate change (C, GN)	b. Ensure adequate funding and capacity for research on climate change and its impacts on society and the environment in order to guarantee appropriate strategies and policies are developed, including funding increases for renewable energy and energy efficiency interventions (GN, R, B) Refer to action 17Kb	c. Establish appropriate adaptation strategies for the socio-economic and biophysical environments, linked to national development initiatives such as ASGISA, the Integrated Sustainable Rural Development Programme and the Urban Renewal Programme, the Extended Public Works Programme. These adaptation strategies should be integrated into Provincial Growth and Development Strategies, Integrated Development Plans, and conservation management plans (GN, GP, GL, B, C)	d. Put in place a new regulatory framework that stimulates market incentives and disincentives to create markets for renewable energy generation, cleaner technology and energy efficiency, with a commitment by major cities to employment growth in an expanding alternative energy sector (GN)	e. Reduce the dependence on fossil fuels through a focused drive to develop cost effective alternative sources of energy, including solar, wind, wave, hydrogen, nuclear and biomass. Particular attention should be paid to developing and implementing incentives to promote energy efficiency, renewable energy and solar water heaters (B, GN, GL, R) f. Invest in clean coal production technologies capable of sequestrating and/or reusing CO2 (B, GN, R)
Creating sustainable human settlements					
19. Integrated planning and service provision	a. Ensure that local governments have the capacity to handle the wide range of responsibilities that have been allocated to them (GN, GP, GL)		b. Implement sustainable human settlement strategies that promote diverse communities via densification; mixed land-use regulations; shortening the distance between home and work; linking home and work via public transport, pedestrian and cycling routes; enhancing the quality of the natural environment; and improving the safety and accessibility of settlements (GN, GP, GL, B) c. Improve coordination of urban development strategies, including housing delivery, infrastructure construction, social services, safety, health and transportation (GL) d. Include sustainability criteria into all spatial and integrated planning, e.g. IDPs and PGDSs, and project formulation and selection of public and private funding of infrastructure projects (GN, GP, GL)		
20. Infrastructure: buildings, transport, energy		a. Increase investment into sustainability science and technologies that link directly to the infrastructure programme (GN, B, R)	b. Develop design guidelines and information resources to support the built environment and design professions to incorporate sustainability criteria into the design of infrastructures and buildings (GN, B) e. Ensure there is a balance between private sector investments in the energy sector, with a rapid escalation in public sector investments in new generation and transmission capacity, including renewable energy and coal-based generation (GN)	c. Ensure that ASGISA realizes the potential for long-term economic and ecological sustainability by promoting investment incentives that favour investments in fixed assets that reinforce the overall vision, mission and principles of the NSSD (GN, B, C) f. Significantly increase investments into public transportation, including freight by rail and passenger transport via rail, bus and mini-bus. The provision of new services, the upgrading of existing services and the gradual conversion to biofuels should be top priorities (GN, GP, GL, B)	d. Build durable and appropriate housing adhering to building standards and supervise builders carefully (B, GL)

				g. Give consideration to the introduction of a 'feed-in tariff' that will create a market for localized electricity generation that can be sold into the grid at an agreed tariff (GN) h. Promote changes in taxation, investment incentives, and other fiscal interventions, plus 'licence-to-operate' mechanisms, which reinforce market trends towards more sustainable production and consumption (GN, B, C)	
21. Integrated waste management	a. Hold competitions to reward waste recycling programmes (GL, C, B)	b. Focus on the collection of waste generation data, for general and hazardous waste (GN, GP, GL)	c. Implement Integrated Waste Management Plans to reduce wastes (GP, GL)	d. Apply incentives for improving resource use efficiency and waste recycling programmes (GN)	e. Increase the number of hazardous waste sites (GN)
22. HIV and AIDS and the environment	a. Promote public and private sector campaigns that raise awareness about HIV/AIDS, and how to reduce the social stigma attached to the disease (GN, GL, C, B)		b. Incorporate HIV/AIDS considerations into all strategies, policies, and plans that affect the environment and the use of natural resources (GN, GP, GL, B) c. Improve the capacity for administering and managing the roll-out of anti-retroviral drugs (GN)		
23. Human vulnerability	a. Build the coping capacity of communities at risk, by: developing social capital by building informal networks and extending participation in public affairs and decision-making; instituting prevention and preparedness initiatives in communities and institutions responsible for disaster management; and improving the rigour of vulnerability assessments and early warning systems (GN, GP, GL)	b. Improve the understanding of the effects of environmental change on vulnerable groups (R, GN)	c. Implement a programme to rectify the effects of past poor land-use planning processes, as many settlements are located dangerously close to hazardous areas such as rivers, mines, and industrial sites (GN, C) d. Entrench environmental and human vulnerability considerations further into development and land-use planning (GN, GP, GL)		
24. Cultural heritage	a. Public awareness campaigns to make people aware of the importance and value of the built environment (GL, C)	b. Conduct an audit of state of cultural urban heritage in a sample of cities and towns (GN, R)		c. Allocate tax rebates for activities supporting conservation of cultural heritage and the Arts (GN)	