Biodiversity for Development

South Africa's landscape approach to conserving biodiversity and promoting ecosystem resilience

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The South African National Biodiversity Institute was established in 2004 under South Africa's National Environmental Management: Biodiversity Act, with special responsibility for biodiversity matters relating to the full diversity of South Africa's species and ecosystems. SANBI's mission is to champion the exploration, conservation, sustainable use, appreciation and enjoyment of South Africa's exceptionally rich biodiversity for all South Africans.

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The Global Environment Facility (GEF) unites 181 countries in partnership with international institutions, NGOs, and the private sector to address global environmental issues while supporting national sustainable development initiatives. Today the GEF is the largest public funder of projects to improve the global environment. An independent financial organisation, the GEF provides grants for projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants.

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www.worldbank.org/biodiversity

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A Primer commissioned by the Department of Environmental Affairs and the South African National Biodiversity Institute, funded by the United Nations Development Programme, and written by Mandy Cadman, Caroline Petersen, Amanda Driver, Nik Sekhran, Kristal Maze and Shonisani Munzhedzi

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Background

South Africa and biodiversity

The government of South Africa has committed itself to creating a prosperous and equitable society living in harmony with natural resources, protecting the country's rich biodiversity heritage for the benefit of all its citizens. Government leads on protection of the environment, with Environmental Affairs working closely with other national departments such as Water Affairs; Agriculture, Forestry and Fisheries; and Rural Development and Land Reform.

National statutory organisations such as South African National Parks (SANParks) and the South African National Biodiversity Institute (SANBI) are valuable partners in the country's biodiversity conservation efforts, as are the provincial conservation authorities. SANBI's biome programmes focus on South Africa's priority biomes under threat, involving a range of government and civil society partners in working at the landscape level to ensure that these biomes are protected in a sustainable way that benefits people.

This Primer highlights innovative work carried out to promote biodiversity conservation and socio-economic development through partnerships between the South African government, a range of stakeholders, and international partners such as the Global Environment Facility.

GEF and biodiversity

The Global Environment Facility (GEF) unites 182 member governments – in partnership with international institutions, non-governmental organisations, and the private sector – to address global environmental issues. The GEF provides grants to developing countries and countries with economies in transition for projects on issues including biodiversity, and serves as a financial mechanism for the *Convention on Biological Diversity*. Much of the work showcased in this Primer was carried out through the GEF-3 and GEF-4 investments in South Africa through the United Nations Development Programme (UNDP) and the World Bank.

The GEF recognises the importance of sustainable management of landscape and seascape mosaics that include protected areas as well as a variety of other land and resource uses, seeing this work as complementing its investments in strengthening the sustainability of protected area systems. The GEF's mainstreaming work promotes sustainability measures to help reduce the negative impacts that productive sectors exert on biodiversity, particularly outside protected areas, while highlighting the contribution of biodiversity to economic development and human well-being.

UNDP and biodiversity

The UNDP views the landscape approach as an effective way of mainstreaming biodiversity and ecosystem functioning in low-carbon development that maximises resilience to climate change. The objective of the UNDP's biodiversity work is to maintain and enhance the beneficial services provided by natural ecosystems in order to: secure livelihoods; strengthen food, water and health security; reduce vulnerability to climate change; sequester carbon; and avoid greenhouse gas emissions.

The UNDP's GEF-supported biodiversity portfolio consists of 240 full- and medium-sized projects with a total value of more than US$ 3.5 billion in GEF and associated financing, taking place in more than 100 countries. The UNDP, working with GEF support, has registered significant achievements, including the creation of 154 new protected areas covering nearly 10 million hectares in the period 2004-2010 alone. A further 197 new protected areas covering over 4 million hectares are currently in the process of being established. UNDP-GEF biodiversity projects have also strengthened over 85 million hectares of protected areas around the world.

In addition to the work in protected areas, UNDP-GEF has successfully implemented a range of projects that mainstream biodiversity management objectives into economic sector activities, to ensure that production

processes maintain essential ecosystem functions that sustain human welfare. Over the last five years, these "mainstreaming" projects have influenced 18 distinct production sectors, notably agriculture, fisheries, forestry, travel/ecotourism, water resources and livestock/animal husbandry. The UNDP helps more than 140 countries to conserve and use biodiversity sustainably, and to secure ecosystem services that are vital to human welfare and their development efforts.

The UNDP's biodiversity work is closely integrated with its climate change programme. Through its Territorial Approach to Climate Change, the UNDP is working with countries on adaptation strategies that promote risk reduction and poverty alleviation, researching the effectiveness of ecosystem-based adaptation and evaluating its cost compared with other adaptation options.

It is also assisting countries to identify, combine and sequence finance from multiple sources to meet their adaptation targets. This includes facilitating access to carbon markets, including Clean Development Mechanism markets for afforestation and reforestation, voluntary markets for reduction of emissions in wetlands, the REDD system (reducing emissions from deforestation and degradation), and access to climate risk insurance.

World Bank and biodiversity

The World Bank's mission is to alleviate poverty and support sustainable development. Three of the world's greatest challenges over the coming decades will be biodiversity loss, climate change, and water shortages. Biodiversity underpins every aspect of human livelihoods and well-being. Biodiversity loss and degradation will lead to the loss of ecosystem services and will exacerbate vulnerability to the impacts of climate change, including vulnerability to extreme weather events. The world's poorest communities are the most dependent on natural resources and the most vulnerable to their loss.

In recognition of the important role that ecosystems and natural resources play in maintaining water and food security, the World Bank Group is already a major global funder of biodiversity initiatives. Through lending, GEF grants and other trust funds, it has provided support to 598 projects in more than 120 countries during the last 20 years. This portfolio of biodiversity projects

represents more than US$6 billion in biodiversity investments, including World Bank contributions and leveraged co-financing.

Many of those projects promote sound management of natural resources that could contribute to climate change mitigation and adaptation by maintaining and restoring natural ecosystems, improving land and water management, and protecting large blocks of natural habitat across altitudinal gradients. They support protection in a range of habitats from high-biodiversity forests, grasslands, wetlands and other natural habitats, and provide benefits for local livelihoods as well as biodiversity conservation.

A substantial amount of World Bank biodiversity funding has been dedicated to protected areas, but there is an increasing focus on improving natural resource management and on mainstreaming biodiversity conservation into forestry, coastal zone management and agriculture. Beyond these "traditional" natural resource sectors, the World Bank has successfully tested modalities for supporting protection and improved management of natural habitats through World Bank-funded energy and infrastructure projects and development policy lending.

The World Bank is also managing new climate investment funds, including funds that will target natural ecosystems, especially forests, as carbon stores, and is looking for opportunities to further promote ecosystem-based approaches to assist nations and communities to adapt to climate change. The GEF works to develop these markets. Some gains have been made in creating markets for forest carbon, and in payments for ecosystem services, for example, through the World Bank's BioCarbon Fund, Climate Investment Fund, Forest Investment Program, Forest Carbon Partnership Facility, and Pilot Program for Climate Resilience.

Foreword

The South African government is proud to be showcasing our work on managing biodiversity for development, led by the Department of Environmental Affairs and the South African National Biodiversity Institute, working with many other institutions. The tools highlighted in these pages were developed through partnerships between government and civil society, with critical support from international partners, including the Global Environment Facility, through the United Nations Development Programme and the World Bank.

Since our first democratic elections in 1994, South Africa has embarked on a journey to fulfil the rights enshrined in our new Constitution – to an environment conducive to health and well-being, protected for the benefit of present and future generations. Through a powerful partnership between government and civil society, we have addressed the injustices of the past and placed biodiversity conservation at the heart of our nation's development agenda.

Our experience in South Africa has shown us that we must look after our natural capital if we are to meet our country's pressing socio-economic challenges in the face of climate change. We know that biodiversity underpins development. A recent estimate of the value of ecosystem goods and services to South Africa's economy places this at R73 billion (US$9.5 billion) per annum, equivalent to 7% of the country's Gross Domestic Product.

Biodiversity and healthy ecosystems provide us with essential services – pollination of crops, a regular supply of clean water, and prevention of flooding and soil erosion. Biodiversity is also important as a safety net in rural areas, where communities often depend directly on biodiversity for survival – hunting, fishing and harvesting for food, medicine and shelter. Over half the population of South Africa, 27 million people, rely on medicinal plants for health care, and up to 12 million people use fuel wood, wild fruits and wooden utensils obtained from forests and savannas.

Many of the benefits derived from biodiversity and ecosystems are public goods that appear to be free, and their values are not captured in markets and prices or taken into account in decision-making, leading to loss of biodiversity, degradation of ecosystems and worsening greenhouse gas emissions. We can turn this situation around, however, by investing in maintaining and restoring our ecological infrastructure to promote development and help us adapt to climate change. This kind of investment can promote food security, ensure a sustained water supply, reduce damage from natural disasters and create work opportunities for the unemployed.

In South Africa we are tackling these opportunities and challenges through a landscape approach, with government and civil society role-players working in partnerships across land- and seascapes to conserve, restore and sustainably use biodiversity, while enabling agriculture, forestry and urban development. This Primer outlines a set of practical tools developed for use as part of such a landscape approach, which we trust will be useful for other countries to draw on in shaping their own futures.

Ms Buyelwa Patience Sonjica:
Minister of Water and Environmental Affairs,
Republic of South Africa

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An introduction to the landscape approach

Included in this chapter:

- The landscape approach: what it is and how it has emerged internationally and in South Africa
- How the landscape approach:
  - enables implementation of the ecosystem approach to biodiversity conservation
  - facilitates working in multi-stakeholder partnerships to address the interconnected issues of biodiversity conservation, ecosystem resilience and human well-being
  - enhances ecosystem resilience and ecosystem-based adaptation to climate change
- The purpose and contents of this Primer

1 Emergence of the landscape approach

The landscape approach to biodiversity conservation involves working both within and beyond the boundaries of protected areas, to manage a mosaic of land uses including protection, restoration, production and subsistence use, in order to deliver ecological, economic and social benefits. Partnerships between diverse role-players, effective mainstreaming of biodiversity considerations in land-use planning and the operations of multiple sectors are critical elements of the landscape approach.

This Primer showcases tools that have been developed in South Africa as part of such a landscape approach. It describes how these tools have been developed and used by government and civil society role-players in the period since South Africa's first democratic elections with universal franchise in 1994, to manage, conserve and use biodiversity sustainably in support of socio-economic development. The Primer explains, with the use of selected case studies, how adoption of the landscape approach can:

- enable implementation of the ecosystem approach to biodiversity conservation
- facilitate working in co-operative partnerships to address the interconnected issues faced by biodiversity and society in an integrated way
- promote the resilience of ecosystems and society to climate change.

This introductory chapter sketches the emergence of the landscape approach, both internationally and in South Africa, and briefly explains some of the key principles and concepts underlying this approach. It also introduces the content covered in each of the other chapters in the Primer.

Rural landscape, China

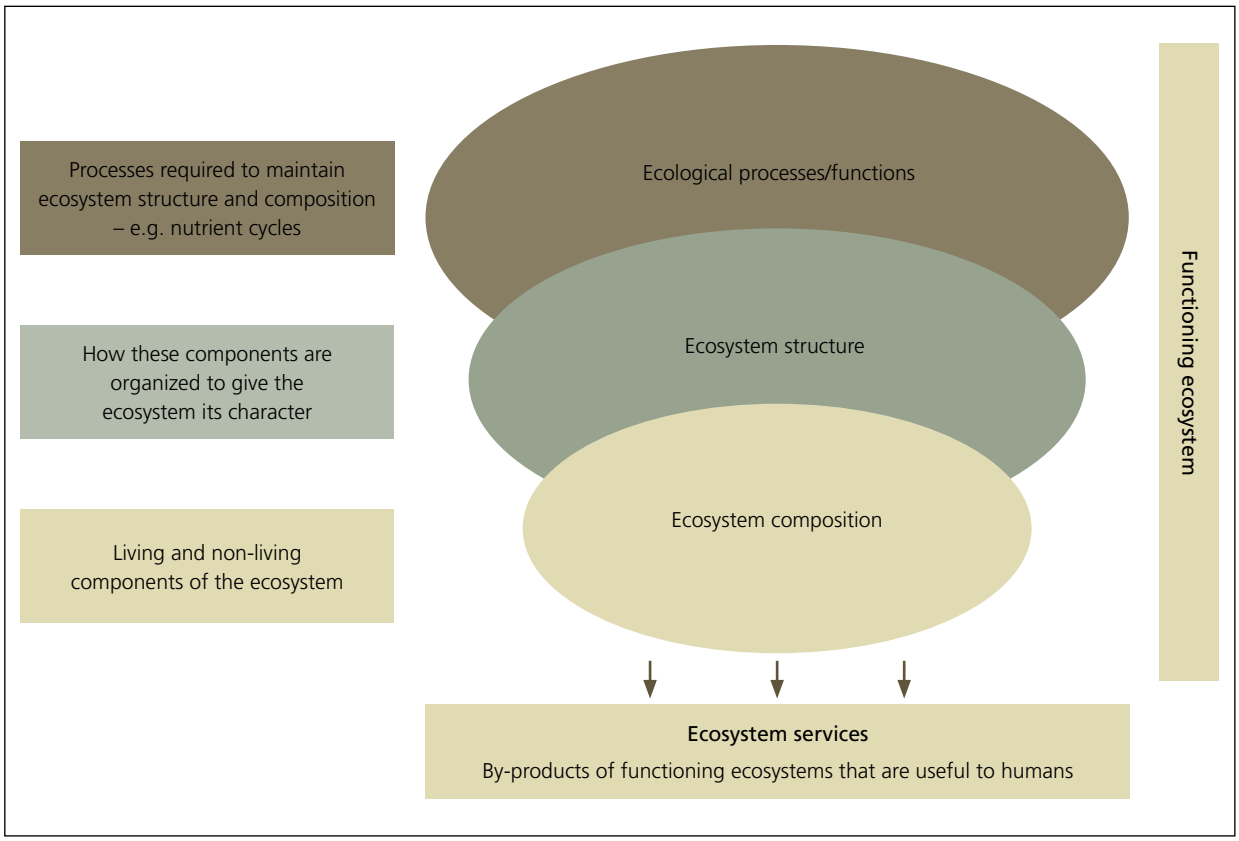


Figure 1.1. Elements of functioning ecosystems

Biodiversity underpins development

It is widely accepted that biodiversity – the variety of genes, species, ecosystems and landscapes on Earth – is a critical foundation of human well-being and economic activity, and has enormous value for all societies. Healthy, functioning ecosystems provide the basic necessities of life through delivery of a variety of ecosystem goods and services, which are the by-products of ecological processes that are of use to humans (see Figure 1.1). Natural resources, living systems and ecosystem services can be viewed as a form of capital – natural capital – like the other forms of capital, such as manufactured, human and financial capital, that are needed for development.

Natural capital supports many socio-economic activities that enable human communities to build sustainable livelihoods and attain an adequate quality of life. Rural communities usually depend directly on biodiversity for food, fuel, shelter, medicines and livelihoods. Similarly, urban communities rely on forests and wetlands and other natural areas to provide clean water and to protect against natural disasters. Biodiversity provides the source of all crops and domesticated livestock, and the variety within them that makes them able to withstand drought and disease. It also forms the basis of many production activities that contribute to food security, provide employment and shape the development path of a country or region.

Biodiversity is under pressure

Development choices, in turn, impact on biodiversity. The condition, management and governance of ecosystems are dominant factors affecting the chances of success in attaining human development goals (SCBD, 2009). Ecosystem functioning can be impaired or lost if the composition, structure or ecological processes that maintain an ecosystem are disrupted. Biodiversity loss disrupts ecosystem functioning, has negative impacts on human well-being and compromises sustainable economic development. Disrupted ecosystems are also more vulnerable to shocks and disturbances and are less able to supply society with critical ecosystem services. The relationship between functioning ecosystems and the provision of ecosystem services is illustrated in Figure 1.1.

The consequences of biodiversity loss and ecosystem disruption are often harshest for the rural poor who depend most directly upon local natural resources for their daily existence, and who are usually the least able to afford substitutes, where these exist. Unsustainable use of biodiversity and loss of ecosystem services pose a significant barrier to meeting the needs of the poor and achievement of the Millennium Development Goals.

Globally, there is growing concern over the loss of biodiversity, the extent to which natural ecosystems are being degraded and the pace at which natural resources are being depleted by unsustainable land-use practices. With pressures on biodiversity intensifying worldwide (see info box), there is a risk that the functioning of major ecosystems may be significantly disrupted or even lost, with catastrophic consequences. At the same time, it is recognised that ecosystems and biodiversity need to be managed and used in a way that caters for the development needs of growing populations. There are often conflicting demands between biodiversity and humans for land, water and other natural resources – a situation that may be expected to worsen in many parts of the world as a result of human-induced climate change.

INFO BOX: Loss of biodiversity and ecosystem functioning

Biodiversity continues to be lost at a rapid rate across the planet. The *Global Biodiversity Outlook-3,* published in 2010 by the Convention on Biological Diversity, points to multiple indicators of continuing decline in biodiversity in all three of its main components – genes, species and ecosystems. Natural habitats in most parts of the world are shrinking, with 35% of all mangrove swamps worldwide, 40% of forests and 50% of wetlands lost over the last century (SCBD, 2009). The abundance of vertebrate species fell by nearly one-third globally between 1970 and 2006, and nearly a quarter of plant species are estimated to be threatened with extinction (CBD, 2010).

The 2005 Millennium Ecosystem Assessment estimated that 15 out of 24 (or 60%) of major global ecosystem services have already been degraded (MA, 2005). In addition, scientists believe that a number of major ecosystems are now at a "tipping point" or threshold at which abrupt and irreversible changes may occur, examples of which include:

- the die-back of large areas of the Amazon rainforest, caused by deforestation, fires and climate change, with consequences for global climate, regional rainfall and widespread species extinctions
- the shift of many freshwater lakes and water bodies to eutrophic or algae-dominated states, caused by the build-up of nutrients and leading to widespread death of fish and loss of subsistence and recreational value
- multiple collapses of coral reef ecosystems, due to a combination of ocean acidification, warmer water leading to bleaching, overfishing and nutrient pollution; and threatening the livelihoods of half a billion people directly dependent on coral reef resources (CBD, 2010).

South Africa's National Spatial Biodiversity Assessment 2004 found that 34% of terrestrial ecosystems, 82% of the main river ecosystems and 65% of marine ecosystems are threatened, with few of these threatened ecosystems currently afforded any formal protection (Driver *et al*., 2005).

One of the biggest causes of the loss of biodiversity and ecosystem functioning is the loss of natural habitat through conversion for cultivation, mining, plantation forestry, infrastructure development and urban development. Other drivers of biodiversity loss and ecosystem degradation include the spread of invasive alien species, over-exploitation of natural resources, pollution and the effects of climate change.

The 2005 Millennium Ecosystem Assessment estimated that, by the end of the current century, climate change will have replaced loss of natural habitat as the primary driver of biodiversity loss. The Intergovernmental Panel on Climate Change (IPCC) predicts that rises in temperature will increase the rate of species extinctions and trigger significant changes in the structure and functioning of all ecosystems (UNEP, 2010). As well as being intensified by climate change, biodiversity loss also contributes to climate change. As natural areas are modified by ploughing or other forms of land use, carbon dioxide and other greenhouse gases stored in natural vegetation and soil are released into the atmosphere, contributing to the greenhouse effect. Although the world's focus has been largely on controlling emissions from fossil-fuel use and industrial processes, the IPCC determined that 20% of annual greenhouse gas emissions in the 1990s came from deforestation and other forms of land-use change.

Rationale for the landscape approach

Endangered white rhinoceros

Over the past two decades, recognition has grown that protected areas alone will never be adequate to conserve a representative sample of biodiversity and maintain functioning ecosystems. Maintaining ecological processes, and the services derived from these, requires management over large areas of land, or landscapes, and conservation efforts need to extend beyond the boundaries of the protected area system. Protected areas cover over 12% of the Earth's land surface and 2% of its oceans, but most of them were not established systematically to represent a full variety of ecosystems or species. Historically, protected areas were often created to protect individual species, usually ones with appeal to the popular imagination. At other times, protected areas were established simply because land was available, and seldom were they created with ecosystem functioning or ecosystem services in mind – a gap which has become more significant because of climate change.

To meet new global challenges, conservation actions need to focus on maintaining functioning ecosystems, and the species assemblages and ecological processes supported by these ecosystems. Although well managed, strategically located protected areas remain the most secure long-term strategy for conserving biodiversity, they are often expensive for governments to establish and maintain and they may carry high opportunity costs. Furthermore, it is difficult to conserve ecological processes in unconnected or isolated protected areas. There remains a need to maintain the integrity of ecosystems across broader landscapes, and for all who live and work in them to play a part in managing the landscape sustainably. This is the essence of the landscape approach in which protected areas are viewed as part of a matrix of land uses that allows for biodiversity-compatibility and maintains ecosystem functioning, and in which biodiversity management objectives are integrated in the strategies, production practices and decisions of a range of land and resource users.

Features of the landscape approach

Working across landscapes, rather than only in protected areas, means that throughout the landscape, areas that are important for biodiversity conservation can be maintained and actively managed in a natural or near-natural state. It also means that connectivity can be created and maintained between natural and near-natural areas across the landscape. This has the multiple benefits of increasing potential ranges for species, allowing for movement of species, ensuring that minimum representative areas for particular ecosystem types are maintained, and enabling the maintenance of ecological processes that operate at a large scale, which is increasingly important in the face of anticipated climate change.

The landscape approach, as interpreted and practised in South Africa, has three essential elements: working beyond the boundaries of protected areas; focusing conservation efforts on biodiversity priority areas within the landscape; and using a range of tools in these priority areas to expand protected areas, mainstream biodiversity priorities in land-use planning and decision-making, and engage with production sectors to encourage biodiversity-compatible production practices. Not all parts of the landscape are equally important for biodiversity. Spatial planning tools to identify priority areas for biodiversity conservation underpin the implementation of the landscape approach in South Africa, as discussed in Chapter 2.

The landscape approach recognises that almost all ecosystems are already influenced or modified to some degree by human activity, and that not all land-use types are compatible with biodiversity conservation. It seeks to keep those areas that are priorities for biodiversity conservation as natural as possible and to manage them to meet biodiversity objectives. Across any given landscape, there are many possibilities for the kind of land-use mosaic that can emerge. What is possible in a particular situation depends not only on the "conservation vision" for that landscape, but on existing patterns of land use, land ownership and land-use rights, cultural values, economic development needs, laws and regulations and their enforcement. The land-use mosaic that exists at any one point in time is unlikely to be static, and adaptive management is needed to maintain a landscape in a state that will be resilient to environmental change over time.

Implementing an ecosystem approach to biodiversity conservation

The landscape approach actively enables implementation of the ecosystem approach to the conservation of biodiversity, as laid out in the Convention on Biological Diversity (CBD) (see info box on page 17). First developed in the 1980s, the ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It recognises that humans are an integral part of ecosystems and stresses the need for holistic and integrated decision-making.

Implicit in the ecosystem approach are the linked ideas of increasing ecological connectivity with a view to increasing resilience, and thinking constructively about management systems in other sectors that can contribute to achieving conservation aims (Dudley *et al.,* 2010).

Freshwater ecosystem, Okavango Delta, Botswana

INFO BOX: The ecosystem approach of the Convention on Biological Diversity

Twelve principles of the ecosystem approach as laid out in the CBD are that:

1. Objectives for the management of land, water and living resources are a matter of societal choices.
2. Management should be decentralized to the lowest appropriate level.
3. Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.
4. Recognising the potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management programme should:
   a) Reduce those market factors that adversely affect biodiversity
   b) Align incentives to promote biodiversity conservation and sustainable use
   c) Internalize costs and benefits in the given ecosystem to the extent feasible.
5. Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.
6. Ecosystems must be managed within the limits of their functioning.
7. The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.
8. Recognising the varying temporal scales and lag-effects that characterise ecosystem processes, objectives for ecosystem management should be set for the long term.
9. Management must recognise that change is inevitable.
10. The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biodiversity.
11. The ecosystem approach should consider all forms of relevant information, including scientific, indigenous and local knowledge, innovations and practices.
12. The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

How much biodiversity is enough?

An important question for conservation ecologists is how the loss of biodiversity will affect the functioning of ecosystems and their ability to deliver ecosystem services. It is sometimes argued that ecosystem functioning is of primary importance, and that composition and structure can be sacrificed as long as functions are maintained. For example, in a grassland ecosystem, several species may perform the function of nitrogen fixation, so that the loss of one nitrogen-fixing species will not prevent this function from continuing.

Ecologists work to identify species or populations that provide specific ecosystem services and to characterise their functional roles and relationships, quantifying their importance in terms of their efficiency and abundance, and evaluating how they respond to changes in the environment, such as predators, resource availability and climate. Studies have frequently been carried out on keystone species in particular ecosystems (such as a mammal at the top of a food chain), without which ecosystem functioning would start to break down.

But, beyond this, there is a large gap in scientific knowledge, with inadequate techniques to account for the many, complex and often invisible interactions between species, many of which may be fundamental to the maintenance of functioning ecosystems. It is, therefore, difficult to judge which species might be redundant, in the sense that their role could be taken over by another species, and which we could "afford to lose". Given the extreme complexity of interrelationships in an ecosystem, many scientists believe it is desirable to apply the precautionary principle and maintain as much diversity as possible at all scales, especially in the context of climate change.

The reality is, however, that many land uses are not biodiversity-compatible and that some biodiversity will, inevitably, be lost. In South Africa, the question of how much biodiversity is enough is answered in practical terms by setting quantitative biodiversity targets. These targets focus on biodiversity pattern and ecological processes, as part of spatial biodiversity planning to identify priority areas for biodiversity conservation (see Chapter 2).

2 How the landscape approach supports ecosystem resilience

The concept of ecosystem resilience emerged in the 1980s, building on the "systems thinking" of the 1970s. In the broadest sense, resilience can be described as that property that enables ecosystems to absorb both expected and unforeseen change (Chapin *et al.,* 2009). A key principle underlying resilience thinking is the likelihood of the ecosystem crossing a threshold or "tipping point", beyond which it will become fundamentally and often irreversibly different (Walker and Salt, 2006). At the same time, it is important to recognise that change is an inevitable part of natural systems and that they pass through adaptive cycles.

Over the past three decades, the concept of resilience has been used beyond its original focus on the ability of landscapes and ecological communities to absorb disturbances and maintain function (Walker and Salt, 2006). More recently, for example, it has been used to describe the ability of countries, regions and communities to withstand the negative effects of climate change, giving rise to the short-hand term "climate-resilience".

Increasing evidence suggests that healthy, biodiverse environments play a vital role in maintaining and increasing the resilience of ecological communities and society to climate change, and in reducing climate-related risk and vulnerability. A growing number of studies indicate that diverse, well functioning ecosystems are better able to adapt to climate change than degraded systems (Reid *et al*., 2009).

Resilience ecology is a relatively young and rapidly developing area of research and debate, and many related concepts and hybrid fields of study have emerged (see info box). For example, in "social-ecological resilience" social scientists and ecologists are collaborating in regions around the world to develop their understanding of how distinct human communities (such as mountain herders, lowland farmers or coastal fishing communities) are coping with changes in weather patterns, identifying future risks, changing their practices or seeking alternative livelihoods. In this context, the landscape approach provides a framework for adaptive governance that enables role-players to strengthen the resilience of their production practices and of the ecosystems on which these depend, reducing their vulnerability to the impacts of climate change.

Flooded fields, Pakistan

INFO BOX: Resilience ecology and related concepts

Resilience: the capacity of an ecosystem to absorb change and re-organise itself, whilst undergoing change, in order to retain its character and ecological functioning

Ecosystem stability: the capacity of an ecosystem to resist disturbances, such as population explosions of a particular species, or invasions of species from outside of the ecosystem

Resistance: the degree to which an ecosystem is able to resist change when it is disturbed and retain its basic characteristics in the face of this disturbance

Managing landscapes for ecosystem resilience

Creating functional connectivity in landscapes is a key aspect of ecosystem resilience. Over the past three decades, there has been a rapid development of concepts aimed at maintaining and restoring ecosystem integrity (IUCN, 2007). Examples of these concepts are ecological networks, corridors and buffer zones, which are used as mechanisms to strengthen linkages across land- and seascapes. Corridors were initially defined as areas of natural habitat at varying scales that provide functional linkages between protected areas, including land and water pathways that link these areas with each other, allowing plants and animals to migrate and disperse and adapt to the pressures of changing habitat conditions and climate. Corridors also facilitate the flows of resources and energy that maintain ecosystem functions (IUCN, 2007). With the development of the landscape approach, the concept of a corridor broadened from linear corridors and stepping stones to include a mosaic of contiguous natural areas that allows movement between patches of natural habitat and protected areas, including areas where production activities occur, for example, in the Mesoamerican Biological Corridor.

In the broad sense, then, ecosystem resilience can be maintained or built through the landscape approach with its focus on large areas, maintaining biodiversity priority areas in a natural or near-natural state, maximising connectivity between these areas, and maximising the diversity of genes, species and ecosystems. Resilient ecosystems are able to:

- **maintain the ecological and evolutionary processes** which allow biodiversity to persist
- **better withstand human-induced pressures** from, for example, pollution, invasion by alien species, too-frequent fires and fragmentation
- **adapt to the effects of climate change**, for example, increased temperatures, increased rainfall variability, more frequent and intense storm surges at sea, thereby reducing the vulnerability of communities to the unavoidable effects of climate change
- **mitigate the effects** of climate change by continuing to capture and store carbon, preventing further greenhouse gas emissions
- **deliver ecosystem services** to humans, for example, nutrient cycling in soil for agriculture, filtration of water in wetlands, pollination of crops by insects, or natural vegetation controlling floods and preventing soil erosion.

Ecosystem-based adaptation

Planned adaptation to climate change involves taking practical action either to reduce vulnerability to climate change risks or to exploit positive opportunities to enhance resilience. Ecosystem-based adaptation is provided by natural ecosystems, which can help societies adapt to the unavoidable impacts of climate change, for example, by buffering against the impacts of greater frequency and intensity of storms, coastal flooding from storms and tidal surges, changes in rainfall patterns that will cause floods and droughts, and an increased frequency of wildfires. Ecosystem-based adaptation is often cheaper and more effective than engineering or technology-based adaptation, and provides natural insurance against climate shocks (see Table 1.1). Ecosystem-based adaptation that works with natural ecosystems and communities, who often have considerable knowledge of adaptation, can provide cost-effective, sustainable, locally managed solutions with benefits for biodiversity, climate change and poverty reduction.

INFO BOX: Managing landscapes for ecosystem resilience

Integrating principles of ecosystem resilience into landscape management involves:

1. Identifying biodiversity priority areas that are aligned with features of the landscape that increase the resilience of natural ecosystems to climate change, allow for migration and dispersal of species, and contribute to ecosystem-based adaptation to climate change
2. Avoiding the further fragmentation of landscapes and loss or fragmentation of the most viable natural patches
3. Ensuring that landscapes are retained in as connected a design as possible
4. Applying appropriate disturbance regimes such as fire and hydrological flow regimes
5. Minimising threatening ecosystem-specific processes such as pollution or over-harvesting
6. Controlling aggressive, invasive alien species that alter the structure and functioning of ecosystems and increase fire risk (Fischer *et al.*, 2006; Holness, 2010).

Table 1.1 Selected examples of the role that intact, functioning ecosystems can play in preventing or mitigating natural, climate-induced disasters (adapted from Dudley *et al*., 2010)

Flooding	Flood attenuation, or providing space for overspill of water	Marshes, coastal wetlands, peat bogs, natural lakes	The Muthurajawella Marsh in Sri Lanka covers an area of 3,068 ha near Colombo. The economic value of flood attenuation provided by this marsh has been estimated at US$5,033,800 per year.
	Absorbing and reducing water flow	Riparian and mountain forests, reedbeds	Benefits, in terms of reduced flood damage to downstream crops, from intact forests in the upper watersheds of Mantadia National Park in Madagascar were estimated at US$126,700.
Hurricanes and storms	Buffering against immediate storm damage	Forests, coral reefs, mangroves, barrier islands	The mangrove system known as the Sundarbans in Bangladesh and India helps to stabilise wetlands and coastlines and contributes to the role of the Sundarbans in buffering inland areas from cyclones.
Fire	Maintaining management systems that control fire	Savanna, dry and temperate forests, scrub land	In South Africa, farmers and communities in fire-prone areas come together in Fire Protection Associations to address wildfire risks to their land. This leads to more effective management of wildfires through clearing of invasive alien vegetation and burning firebreaks.
Tidal waves and storm surges	Creating a physical barrier against ocean incursion	Mangroves, barrier islands, coral reefs, sand dunes	Following the 2004 tsunami, studies in Kikkaduwa, Sri Lanka, where protected reefs are intact, noted that damage reached only 50 m inland and waves were only 2 – 3 m high. At nearby Peraliya, where reefs have been extensively damaged by coral mining, the waves were 10 m high and damage and flooding extended up to 1.5 km inland.

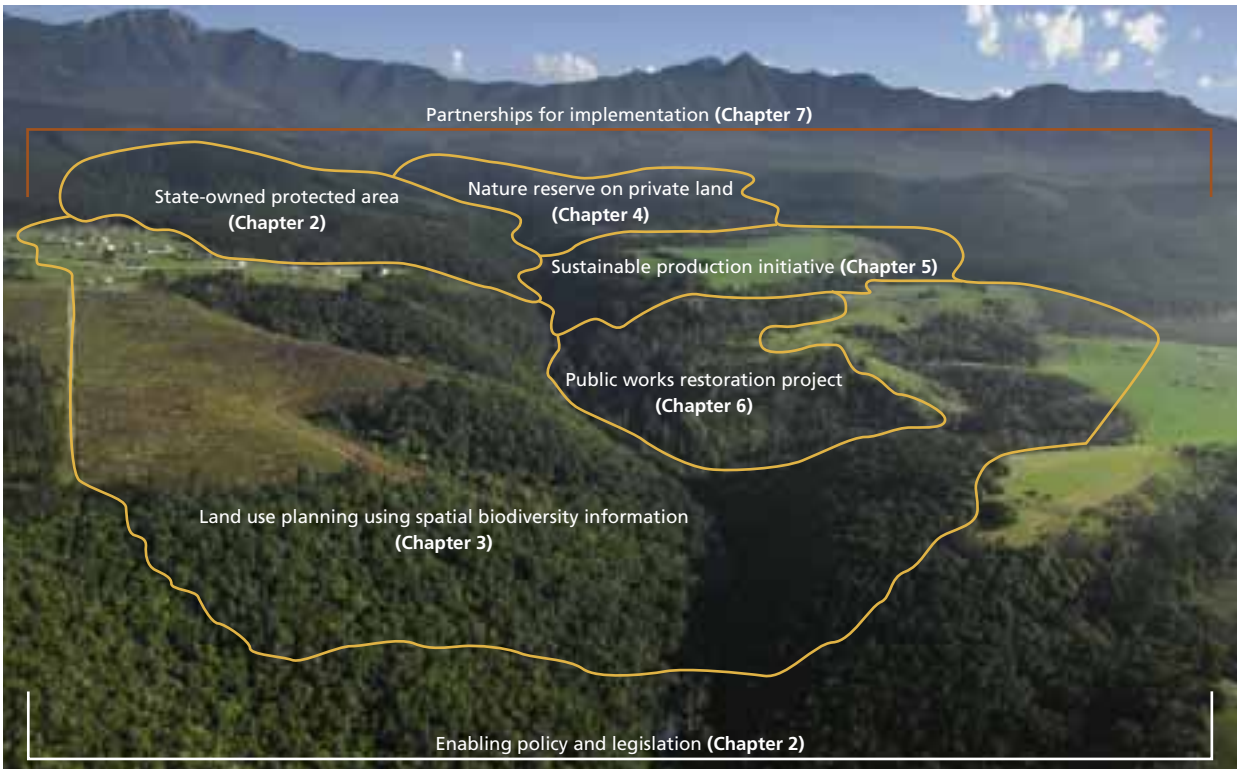
River ecosystem in Thailand

3 The purpose and contents of this book

South Africa is a country with rich biodiversity assets as well as pressing socio-economic challenges and significant climate change risks. Meeting these challenges requires careful management of the country's natural capital, including the conservation and sustainable use of biodiversity, and the protection of ecosystem services that are vital for economic development and the expansion of livelihood opportunities. Climate change adds complexity to this task, requiring a long-term vision for a low-carbon development path, including meeting the country's energy needs while contributing to mitigation, as well as cost-effective and labour-intensive measures for adaptation. The landscape approach represents a novel way of reconciling these issues of biodiversity, development and climate change.

This Primer provides a snapshot in time of what is essentially a work in progress, as the landscape approach is implemented in South Africa. The book presents a range of tools developed within this approach (see Figure 1.2), and explains the critical success factors behind their development and implementation. Included in the chapters that follow are: national biodiversity policy and planning tools that provide a coherent, science-based framework for implementation (Chapter 2); ensuring that land-use planning and environmental assessment are informed by biodiversity considerations (Chapter 3); expanding the protected area system through involving private and communal landowners (Chapter 4); supporting biodiversity-based livelihoods, making production systems more sustainable and influencing supply chains to compensate for the costs of biodiversity management (Chapter 5); leveraging resources for conservation activities such as restoration and clearing of invasive alien plants through environmental public works programmes (Chapter 6); and forging multi-stakeholder partnerships in which the responsibilities for biodiversity management are shared between a range of role-players (Chapter 7).

The Primer responds to a call for South Africa's innovative work to be showcased to a wider audience. Its aims include supporting the design and implementation of Global Environment Facility projects, cross-fertilising policy development internationally, and strengthening the global community of practice working on biodiversity conservation across governments, the private sector and civil society.



The landscape approach – schematic representation of a mosaic of land uses

2

National biodiversity policy and planning tools

Included in this chapter:

- South Africa's path to democracy and people-centred conservation
- Biodiversity conservation and sustainable development: biodiversity assets, climate change risks and socio-economic challenges, and the opportunities that biodiversity provides for development
- Legislative tools for biodiversity conservation: the Biodiversity Act and the Protected Areas Act
- Policy tools for biodiversity conservation: the National Biodiversity Strategy and Action Plan; the National Spatial Biodiversity Assessment; the National Biodiversity Framework and the National Protected Areas Expansion Strategy
- Systematic biodiversity planning as practised in South Africa: methods, tools and their use
- Why these tools work in South Africa

1 South Africa's path to democracy and people-centred biodiversity conservation

South Africa's political and developmental history has played a critically important role in shaping its landscape approach to biodiversity conservation. Following decades of oppressive rule under the apartheid government and associated socio-political unrest, the country's first democratic elections were held peacefully in 1994, with Nelson Mandela emerging as the first democratically elected President. South Africa's history presented the new government with enormous challenges. Amongst these were: serious poverty and unemployment amongst large sectors of the population; a long history of land dispossession that required urgent redress; and the need to provide access to resources and services like healthcare, education, housing and clean water for large numbers of people.

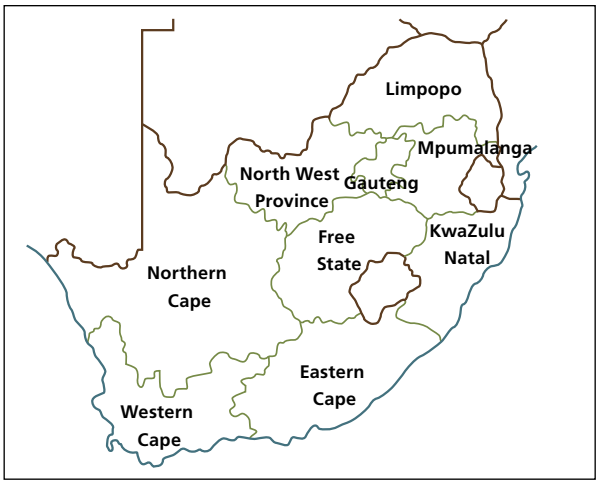


Figure 2.1 The nine provinces of South Africa

The first ten years of democracy saw a thorough overhaul of founding principles, policies and legislation, with the intention of achieving social justice, equitable access to resources and economic sustainability. Three spheres of government were established – national, provincial and local – each tasked with addressing the legacy of the past and ensuring a sustainable future for the country. Nine provinces were created, each led by an elected provincial government with powers and functions set out in the Constitution (see Figure 2.1). Within provinces, a new system of local government was introduced, involving district, local and metropolitan municipalities. Approaches to all key functions of government were transformed and many new policies and laws were developed to deepen democracy, promote co-operative governance and give expression to the goals of the new, integrated South African society.

Under apartheid rule, conservation was associated with people being dispossessed of their land for the creation of game parks and nature reserves, losing their livelihoods and being forcibly removed to overcrowded "homelands". Conservation of the environment was widely perceived as being in conflict with human rights, and a lack of fair access to natural resources further alienated the conservation sector from much of the

South African children learning about biodiversity

Nelson Mandela Foundation/Matthew Willman

Former President, Nelson Mandela

South African population. The new political climate after 1994 brought about a significant shift in thinking in the biodiversity conservation sector about how to do its work. The core business of the sector remained to understand, protect, manage and use the country's rich and valuable biodiversity resources wisely, but there was a new focus on ecosystems, social justice and socio-economic development. In particular, conservation had to embrace approaches that involve people in decision-making and keep people on the land in production landscapes that support sustainable livelihoods.

South Africa's political transition also signalled its return to the global community of nations. With this came the need to respond to international global commitments made since the Rio Earth Summit in 1992. South Africa ratified the Convention on Biological Diversity (CBD) in 1997, endorsing the objectives of the Convention, including the mainstreaming of biodiversity in all governmental policies, plans and programmes. This led ultimately to the development of new biodiversity policies for the country, and the identification of priority areas for conservation action. The White Paper on Sustainable Use of South Africa's Biological Diversity, developed in 1997, set out a number of goals, strategies and priorities for conservation, sustainable use and equitable benefit sharing. A wide range of organisations was involved in developing the White Paper, which set the scene for the development of appropriate legal instruments – the Protected Areas Act in 2003, and the Biodiversity Act in 2004 – together with their associated tools.

It has taken collaboration between an inspired group of natural scientists, motivated members of civil society and visionary, committed champions in government to arrive at the co-ordinated set of legislation and policies for biodiversity management and conservation that exist in South Africa today. This, coupled with the support of international and local donor agencies and funding from government and the private sector, has facilitated the development and piloting of innovative tools that conserve biodiversity and promote ecosystem resilience, while supporting socio-economic development.

The Umgano community stewardship site, Umzimkhulu District, KwaZulu-Natal

2 Biodiversity conservation and sustainable development in South Africa

South Africa's landscape approach to managing biodiversity involves state and civil society role-players working in partnerships across land- and seascapes to conserve, restore and use biodiversity sustainably in order to promote the resilience of ecosystems and enhance livelihoods. This chapter explains South Africa's context and sets out the national policy and planning tools that underpin this landscape approach. South Africa is a country with rich biodiversity assets but pressing socio-economic challenges and significant climate change risks. This section of the chapter briefly outlines these features of the country and the potential for managing its biodiversity to maintain ecosystem services and promote sustainable development.

Biodiversity assets

South Africa is immensely diverse in terms of its people, culture, landscapes, biological resources and ecology. Terrestrial ecosystems are characterised by high levels of species diversity and endemism, particularly in plants. With a land surface area of 1,2 million km^2 – representing just 1,2% of the earth's total land surface – South Africa contains almost 10% of the world's total known bird, fish and plant species, and over 6% of the world's mammal and reptile species. Because a number of the areas of especially high diversity are also under increasing pressure from a variety of sources, three globally recognised biodiversity hotspots have been identified. In the south-west, and falling entirely within South Africa's boundaries, is the Cape Floristic Region (one of the world's six Floral Kingdoms); in the southern interior and along the dry west coast, there is the Succulent Karoo Hotspot, shared with Namibia, and one of only two arid hotspots in the world; and along the eastern seaboard, is the Maputaland-Pondoland-Albany Hotspot, shared with Mozambique and Swaziland.

South Africa has a wide range of climatic conditions and variations in topography and geology that give rise to broad vegetation zones that have been classified in terms of the biome concept. Each of these nine biomes,

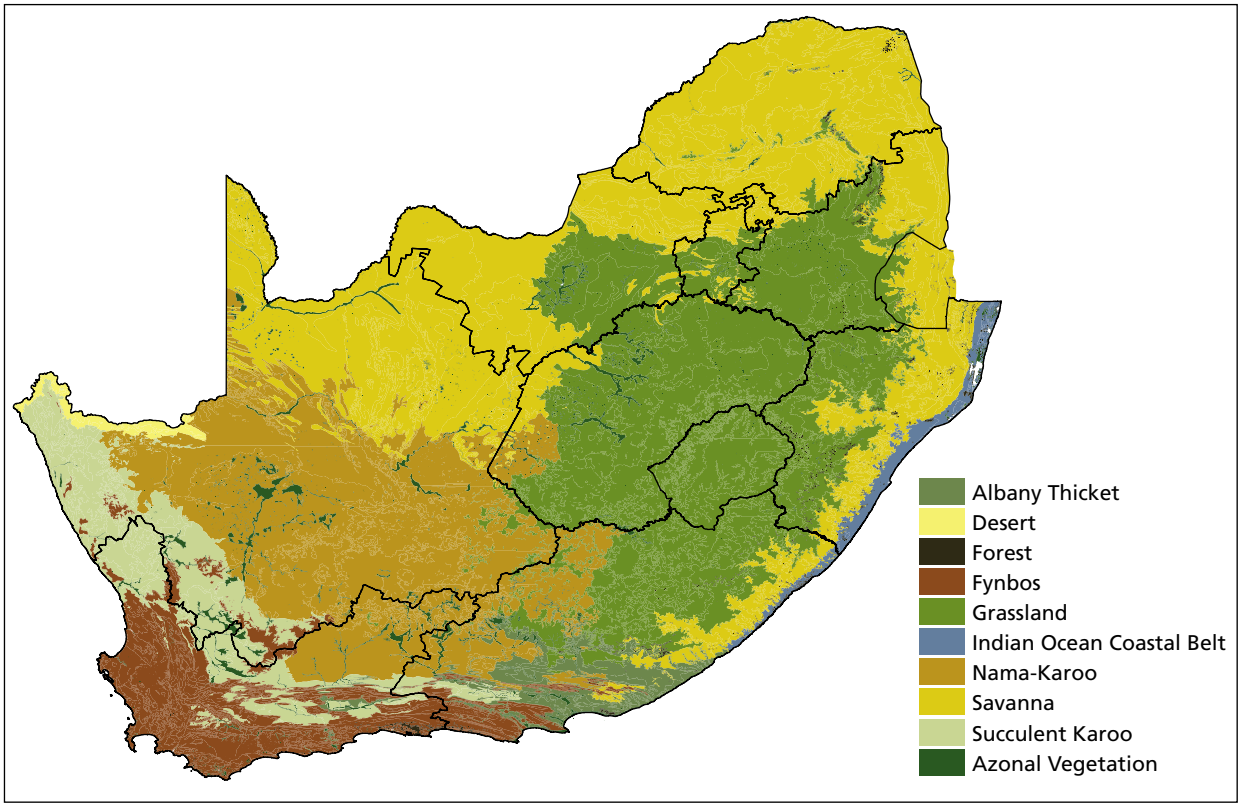


Figure 2.2 Biomes of South Africa

African penguins on Robben Island near Cape Town, Western Cape

shown in Figure 2.2, supports its own collection of plant and animal species and provides a different set of social and economic opportunities.

South Africa's marine and coastal ecosystems, which straddle both the Atlantic and Indian Oceans, include an exceptional range of habitats, from cool-water kelp forests to tropical coral reefs. The southern African coast, spanning a distance of 3,000 km from Namibia in the west to Mozambique in the east, is home to almost 15% of known coastal marine species. Coastal goods and services contribute some 30% to the country's Gross Domestic Product and support the livelihoods of many coastal communities.

Climate change risks

Based on available data sets, scientists argue that the effects of climate change on species distributions, vegetation types and ecosystems in South Africa will be significant, with the most severe impacts being felt in the south and west, in the winter rainfall regions of the Fynbos and Succulent Karoo Biomes. Anticipated changes in climate, such as changes in temperature and in patterns of rainfall (see info box below), will also have serious social and economic impacts and will need to be taken into consideration by those involved with the regions' management and sustainable use of natural resources.

INFO BOX South Africa's vulnerability to climate change

The main impacts of climate change on temperature, rainfall and biodiversity are likely to include:

- temperature increases in the order of 1 – 3 ° C
- disrupted regional rainfall patterns (becoming drier in the west), with an overall decrease in rainfall of some 5 – 10%
- longer dry periods interspersed with more intense rainfall events and associated droughts and floods
- decreased river-flows
- more intense and frequent wildfires
- increased invasion by woody alien plants
- major range shifts and shrinkage of all biomes and many species, particularly endemics
- outright biodiversity loss and an increase in extinctions.

These impacts will place increasing strain on the resilience of many ecosystems, which will affect the livelihoods of the people of South Africa, particularly those living in rural areas. There are likely to be health impacts that will magnify the challenges of food and water security, and people and infrastructure in coastal areas may face the risk of flooding because of storm surges and a rise in sea level. The area suitable for agriculture, and the length of growing seasons and yield potential, especially along the margins of semi-arid areas, are expected to decrease, posing threats to food security (Midgley *et al*., 2010; DEAT, 2010).

The impacts of climate change on biodiversity are closely interlinked with the sustained provision of critical ecosystem services, such as water production and the many provisioning and regulatory services that underpin food security. Impacts on wetland and river systems, which are already under severe pressure, are likely to be both direct, such as changes in water-flow, and indirect, resulting from changes in demand for water for human consumption or crop irrigation.

Water availability is both a key driver of ecological processes and biodiversity pattern and probably the single greatest limiting factor to development that South Africa faces (Turpie, Marais & Blignaut, 2008). More than 60% of river-flow arises from just 20% of the land surface area (DEAT, 2004), between 35% and 60% of wetland systems (depending on the catchment) have been lost through habitat destruction (Dini, 2010) and 80% of the main river ecosystem types are classified as threatened (Driver *et al.*, 2005). Unwise land-use practices, further loss of natural habitat and the effects of climate change are expected to undermine water supplies even further. At the same time, water demand in South Africa is set to rise by some 50% over the next 30 years.

Socio-economic challenges

The South African population, estimated at 48 million people (SA Yearbook, 2008/9), is diverse in every way. Classified as a middle-income country, South Africa is the largest economy in Africa, with a stock exchange in Johannesburg (the commercial and financial hub of the country) that ranks among the ten largest in the world.

Children in an informal settlement, Eastern Cape

Despite this, and despite over 15 years of concerted effort by government to address the socio-economic imbalances created by the past, income distribution is highly skewed and poverty is still widespread, with more than 30% of the population living below the poverty line (Sonjica, 2009).

In the past, the economy was based chiefly on primary production and extraction of resources, particularly minerals. In recent decades, the South African economy has shifted away from primary sectors, with secondary and tertiary sectors becoming more important.

The city of Johannesburg, Gauteng province

Rural landscape near Stutterheim, Eastern Cape

Just over half the population of the country lives in urban areas. Although most major cities and towns are characterised by modern infrastructure and well-developed financial, legal, communications, energy and transport sectors, they also include large (and growing) informal settlements that lack basic services and infrastructure and in which poverty, unemployment and associated social ills are rife. Rural areas, in which agriculture has traditionally provided the economic mainstay, generally have more limited infrastructure and development than urban centres. For reasons relating to the past political system, rural areas under communal land tenure (some 13–15% of total land surface) are characterised by extremely poor infrastructure, high levels of poverty and very few economic opportunities.

Biodiversity as a source of opportunities for supporting development

The protection and enhancement of environmental assets and natural resources is one of twelve key outcomes for government action adopted by the Presidency in 2009. In addition to its own intrinsic value, South Africa's biodiversity provides an important basis for economic growth and development, for example, by providing a basis for the fishing industry, rangelands that support commercial and subsistence farming, the horticultural and agricultural industry based on indigenous species, the tourism industry, locations for the film industry (both local and international), and commercial and non-commercial medicinal applications of indigenous resources.

Equally important is the need to keep biodiversity and ecosystem functions intact to ensure the ongoing provision of ecosystem services on which socio-economic development is based. Many of these benefits are taken for granted, like clean air and water or the prevention of erosion and flooding. The social and economic costs of not managing ecosystems in a sustainable manner are high, as demonstrated through accelerated land degradation and biodiversity loss, loss of ecosystem resilience, loss of freshwater resources, increased infestation by invasive alien species, declines in fish stocks, reduction in water quantity and quality and the deterioration of air quality – all of which were identified as areas of concern in the South African *State of the Environment Report*, published in 2008 (DEAT, 2008).

These impacts compromise the quality of life of all South Africans, but particularly the rural poor, who depend daily on biodiversity resources to meet their basic needs. Creating sustainable jobs, alleviating poverty and improving the quality of life of all South Africans are amongst the most pressing challenges in the country. Responding to this requires a development path in which options for relieving pressures on biodiversity and ecosystems also provide opportunities for addressing poverty, securing essential services and addressing a range of other social improvement needs.

Adoption of a landscape approach to addressing these issues has given rise to an explosion of creative thinking in promoting biodiversity conservation in the context of sustainable development. These are the stories told in this Primer.

3 Legislative tools for biodiversity conservation

South Africa's Constitution and its associated Bill of Rights create the overall framework for environmental governance in the country. Although the Constitution does not specifically refer to "biodiversity", it enshrines certain environmental rights (see info box), and specifies the powers and functions of national and provincial governments in terms of "the environment", "nature conservation" and "natural resources", such as soil, water, forests and marine resources.

In keeping with these Constitutional provisions, three key pieces of legislation collectively set out the principles and procedures governing biodiversity management in the country: the National Environmental Management Act of 1998, the Protected Areas Act of 2003 and the Biodiversity Act of 2004 (see Figure 2.3). In addition, there are several other acts relating to water, forests, marine resources and coastal management that are relevant to biodiversity conservation.

The wide range of legislation dealing with various aspects of natural resource management, together with the three-sphere system of government, has resulted in a large number of government departments and agencies being responsible for biodiversity and protected area management in the country.

South Africa's Biodiversity Act: what makes it special?

The Biodiversity Act provides for the co-ordinated management, conservation and sustainable use of biodiversity across the whole country. It promotes an ecosystem-orientated approach to the management of biodiversity, taking into account the need for social transformation and development goals to be met. It also recognises that biodiversity conservation involves working beyond the boundaries of formal protected areas, across production landscapes.

INFO BOX Environmental rights enshrined in the South African Constitution

The Bill of Rights in the Constitution of South Africa states that all South Africans have the right to an environment that:

- is not harmful to their health and well-being
- is protected for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation, and secure ecologically sustainable development and use of natural resources, while promoting justifiable economic and social development.

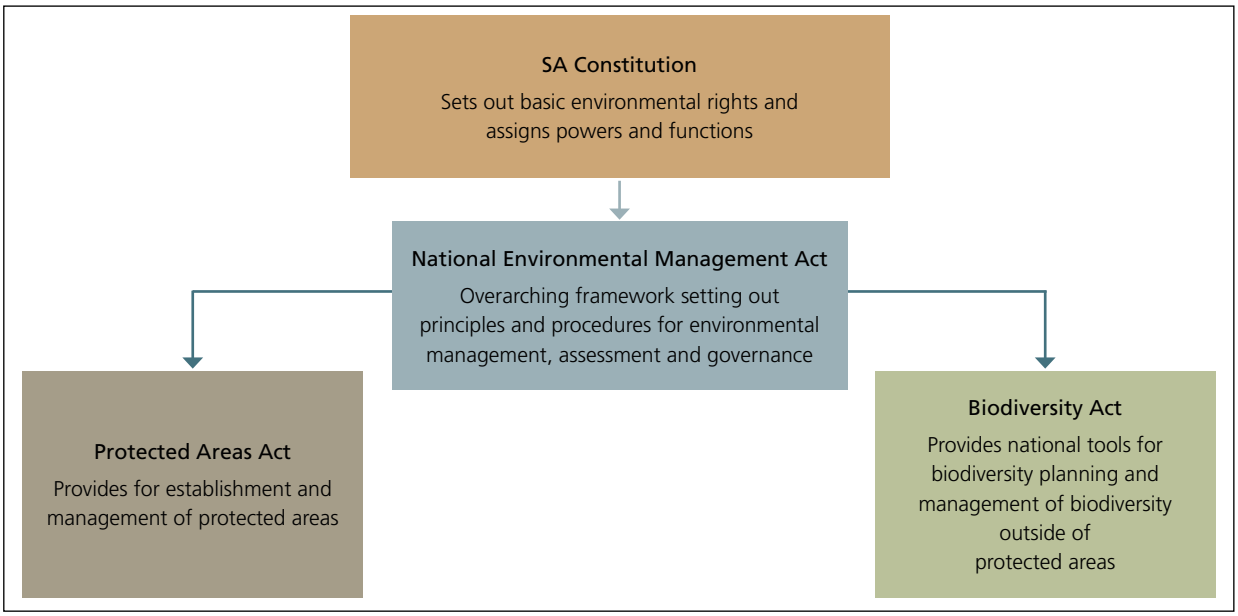


Figure 2.3 Key legislative tools for biodiversity management in South Africa

INFO BOX South Africa's Biodiversity Act at a glance

The National Environmental Management: Biodiversity Act (Act 10 of 2004) provides for:

- the establishment of the South African National Biodiversity Institute
- biodiversity planning and monitoring (including the requirement for a National Biodiversity Framework)
- publication of systematic biodiversity plans (called bioregional plans in the Act)
- the listing of threatened ecosystems and threatened species
- dealing with existing infestations of invasive alien plants, managing their spread and preventing new introductions
- regulating bioprospecting, access and benefit sharing in relation to indigenous biological resources.

The adoption of this legislation has been a significant milestone in South Africa's legislative reform process because:

- It represents the first time that legislation dedicated entirely to biodiversity management has been introduced into South African law, and the first time that measures to enable an ecosystem approach to biodiversity management have been captured in national legislation.
- It represents a nationally agreed approach to biodiversity management and conservation that has legal status.
- It introduces a set of new biodiversity planning and management tools that have legal standing.
- It establishes a public sector institution that is responsible for undertaking and promoting research on indigenous biodiversity, co-ordinating programmes to involve civil society in the conservation and sustainable use of biological resources, and providing science-based policy advice to other organs of state on the management and conservation of the country's biodiversity assets.
- It provides for a National Biodiversity Framework to ensure an integrated, co-ordinated and consistent approach to biodiversity management by organs of state in all spheres of government, NGOs, the private sector, local communities, the public and all other stakeholders.

CASE STUDY The South African National Biodiversity Institute: bridging the science-policy-implementation divide

The South African National Biodiversity Institute (SANBI) was created in 2004 as a direct requirement of the Biodiversity Act. Its purpose is to "champion the exploration, conservation, sustainable use, appreciation and enjoyment of South Africa's exceptionally rich biodiversity, for all people".

SANBI was formed from a pre-existing parastatal agency, the National Botanical Institute, which was mandated to manage the country's network of national botanical gardens and herbaria and to conduct taxonomic research on plants only. The new Biodiversity Institute carries a much broader mandate, which relates to biodiversity of all forms and spans a wide range of functions, including:

- co-ordinating and conducting biodiversity-related research
- monitoring and reporting on the state of biodiversity
- biodiversity planning and policy advice
- conservation management and tourism (botanical gardens)
- management of research collections (plant and animal specimens)
- knowledge networking and information management
- co-ordination of programmes of action involving civil society and other stakeholders
- serving as an advisory body to organs of state, including local government, on all matters pertaining to biodiversity planning, use and conservation.

Kirstenbosch National Botanical Garden, Cape Town

Why does it work?

- Because SANBI was formed out of a **pre-existing institute**, existing staff, facilities and resources provided a significant platform on which the new Institute could be built. This meant that within the space of a few years, critical mass could be gained and significant progress made. At the same time, there were significant challenges involved in integrating new and existing staff into new areas of work, and in developing a new institutional identity.
- SANBI adopted a **"managed network" institutional model**. Responding effectively to such a large mandate required that SANBI should increase its staff capacity significantly, especially in areas of work relating to new functions required by the Biodiversity Act. It would be impossible for the Institute to employ directly all the staff needed, and the institutional model that has been adopted, with a large measure of success, is that of a managed network. SANBI has forged relationships with other institutions in government, the tertiary education sector and civil society, and delivers on its mandate efficiently through this system of institutional partnerships. One of the challenges associated with adopting the managed network model, however, has been identifying appropriate partners, and developing effective working relationships with them.
- SANBI, which is a public entity under a national government department, is an **integral part of government structures** and is provided for by legislation. It is mandated to advise the national Department of Environmental Affairs on matters pertaining to biodiversity, and has the expertise and authority to provide advice on biodiversity planning at the provincial and local levels.
- SANBI can **effectively bridge the divide** that frequently exists between science and policy, and between policy and implementation. It has clear roles relating to research and assessment, innovation and piloting of new methods for implementation, and policy advice based on both science and experience.

SANBI researchers and colleagues conducting field assessments

The Protected Areas Act

Protected areas have been at the heart of South Africa's approach to biodiversity conservation for more than a century. Although the focus over the last 15 years has shifted significantly to integrating protected areas into a landscape approach, formal protected areas still represent one of the surest means of protecting biodiversity and ecosystems. They also provide an effective means for retaining the functions of natural ecosystems that promote resilience and reduce vulnerability to the impacts of climate change.

The National Environmental Management: Protected Areas Act (Act 57 of 2003) provides for the formal protection of a network of ecologically viable areas that are representative of South Africa's biodiversity and natural land- and seascapes. It establishes a consistent set of legal requirements for the management of national, provincial and local protected areas and provides for intergovernmental co-operation and public participation in matters relating to protected areas. The Protected Areas Act also aims to balance the relationships between biodiversity conservation, human settlement and economic development and promotes the sustainable utilisation of protected areas for human benefit.

The Protected Areas Act represents a significant milestone in South Africa's adoption of a landscape approach to biodiversity management, for the following reasons:

- Before the Protected Areas Act became law in 2003, national, provincial and local protected areas were managed according to varying criteria contained in different legislation in each of the provinces. The Protected Areas Act introduced one set of legal requirements for protected area management that is applicable across all protected areas in the country, even though they may be managed by different conservation authorities.
- The Protected Areas Act requires all protected areas to be managed according to ministerially-approved management plans, and it provides basic guidelines for the development of these management plans. Although this requirement has enabled improved and more consistent management of protected areas, its implementation has been administratively complex and time-consuming.
- The Protected Areas Act calls for public participation in the development of protected area management plans and other matters relating to protected areas. In principle, this represents a considerable advance over earlier protected area legislation, but, practically, it has brought its own set of implementation challenges.
- The Protected Areas Act provides for the declaration of formal protected areas not only on state land, but also on private or communal land, and for private and communal land owners to be directly involved in management of these protected areas. These provisions have been pivotal in ushering in a new era in conservation management that operates "beyond the boundaries of state-owned protected areas," and in paving the way for the development of biodiversity stewardship as a key tool for implementation of a landscape approach (see Chapter 4). In this type of approach, a mixture of protection, management, restoration and production is achieved across the landscape, increasing ecological connectivity whilst considering livelihood issues, existing institutions and interests.

Bontebok National Park

Establishment of the Garden Route National Park along the south-eastern coastline of South Africa, demonstrates this new approach to protected area expansion and management and shows how it can enhance resilience to the impacts of climate change (see case study on page 34).

CASE STUDY The Garden Route National Park – connecting landscapes, building resilience

Establishment of the Garden Route National Park, which focusses on "conservation without boundaries or fences", heralds a new era in conservation management for the national conservation authority, South African National Parks (SANParks).

The 120,000-hectare park consists of 51,500 hectares of newly declared land and 68,500 hectares of existing protected areas, including the Tsitsikamma and Wilderness National Parks, the Knysna National Lake Area, the Southern Cape Indigenous Forests and the associated fynbos Mountain Catchment Areas.

The new parts of the park, which span the Eastern and Western Cape provinces and include six municipalities, will have no additional fences or entrance gates. The emphasis will be on landscape management rather than traditionally practised conservation within a confined area. The new park will be unique in that the proximity of the residential areas on its periphery will have a significant impact on the character of the park. Maintenance of the park's integrity will require that SANParks works closely with municipalities and residents of the Garden Route, and public involvement in development of the park management plan will be important.

The Garden Route National Park is expected to play a critically important role in restoring functional connectivity in the landscape and, through this, will enhance resilience and reduce the vulnerability of the region to the impacts of climate-induced natural disasters. This is important, because this region has been heavily impacted in recent years by severe wildfires and water shortages, alternating with flooding events the cost of which has been estimated at nearly at nearly R4 billion (US$520 million).

Storms River Mouth, Tsitsikamma National Park, Garden Route, Western Cape

4 Policy tools for biodiversity conservation

This part of the chapter describes four key national policy tools that guide biodiversity planning and management in South Africa. These are:

- the National Biodiversity Strategy and Action Plan (NBSAP)
- the National Spatial Biodiversity Assessment (NSBA)
- the National Biodiversity Framework (NBF)
- the National Protected Areas Expansion Strategy (NPAES).

In addition, South Africa has developed a Climate Change Response Strategy (2004) which focusses largely on mitigation, but also considers the threats to biodiversity posed by climate change. The Department of Environmental Affairs is also developing sectoral climate change response strategies, including for the biodiversity sector.

SANBI has developed a National Biodiversity Monitoring and Reporting Framework, with a series of headline indicators, to guide and co-ordinate monitoring efforts. The framework deals with pressures on biodiversity, the state of biodiversity (ecosystems and species), and responses (including financial and human capacity to respond to challenges). Development of the headline indicators is an ongoing incremental process. The National Spatial Biodiversity Assessment (NSBA), which is described below, provides some of the key headline indicators for the monitoring and reporting framework.

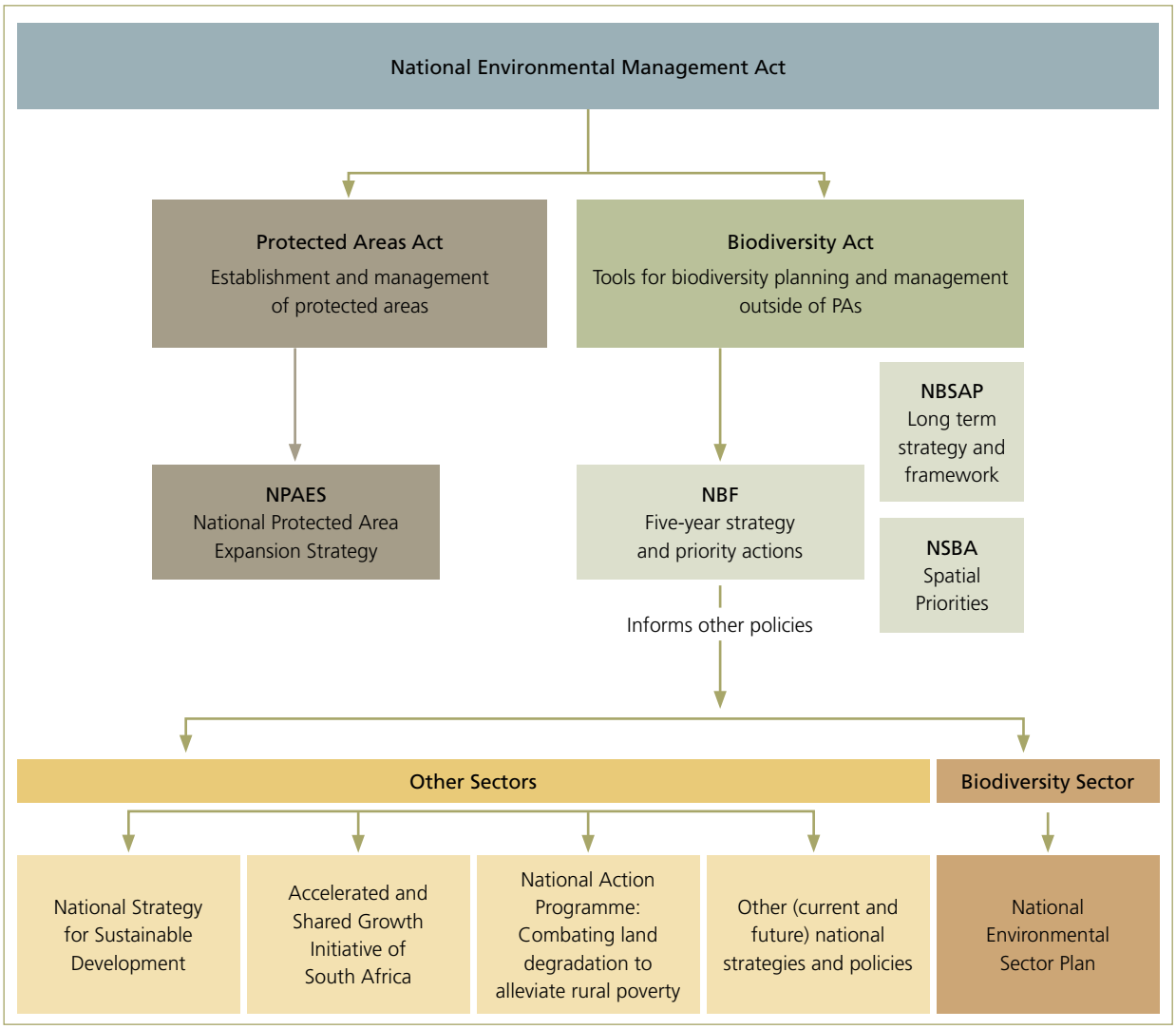


Figure 2.4 Key policy tools for biodiversity management in South Africa, in support of sustainable development

The National Biodiversity Strategy and Action Plan (NBSAP)

In response to requirements of the CBD as well as national needs, South Africa developed a National Biodiversity Strategy and Action Plan (NBSAP) that was published in 2005. The development of the NBSAP, which was made possible by financial support from the Global Environment Facility (GEF) through the United Nations Development Programme (UNDP), was an intensely participatory process led by the national Department of Environmental Affairs. The NBSAP sets out a comprehensive framework and long-term plan of action for the conservation and sustainable use of South Africa's biodiversity and the equitable sharing of benefits derived from such use.

The NBSAP included a spatial component, the National Spatial Biodiversity Assessment 2004, which used systematic biodiversity planning techniques to determine the threat status of terrestrial and aquatic ecosystems countrywide, and to identify broad national priority areas for conservation action. As far as can be established, South Africa was the first country to include a comprehensive spatial assessment as part of its NBSAP.

The NBSAP and the NSBA together informed the development of the National Biodiversity Framework (NBF), which is a requirement of the Biodiversity Act. This effectively gives the NBSAP some legal standing, another feature that sets the South African NBSAP apart from those in other countries.

INFO BOX The National Biodiversity Strategy and Action Plan at a glance

The NBSAP sets out a goal, strategic objectives (with 15-year targets), outcomes (with 5-year targets and indicators) and activities (with lead agencies, partners and the role of government clearly indicated).

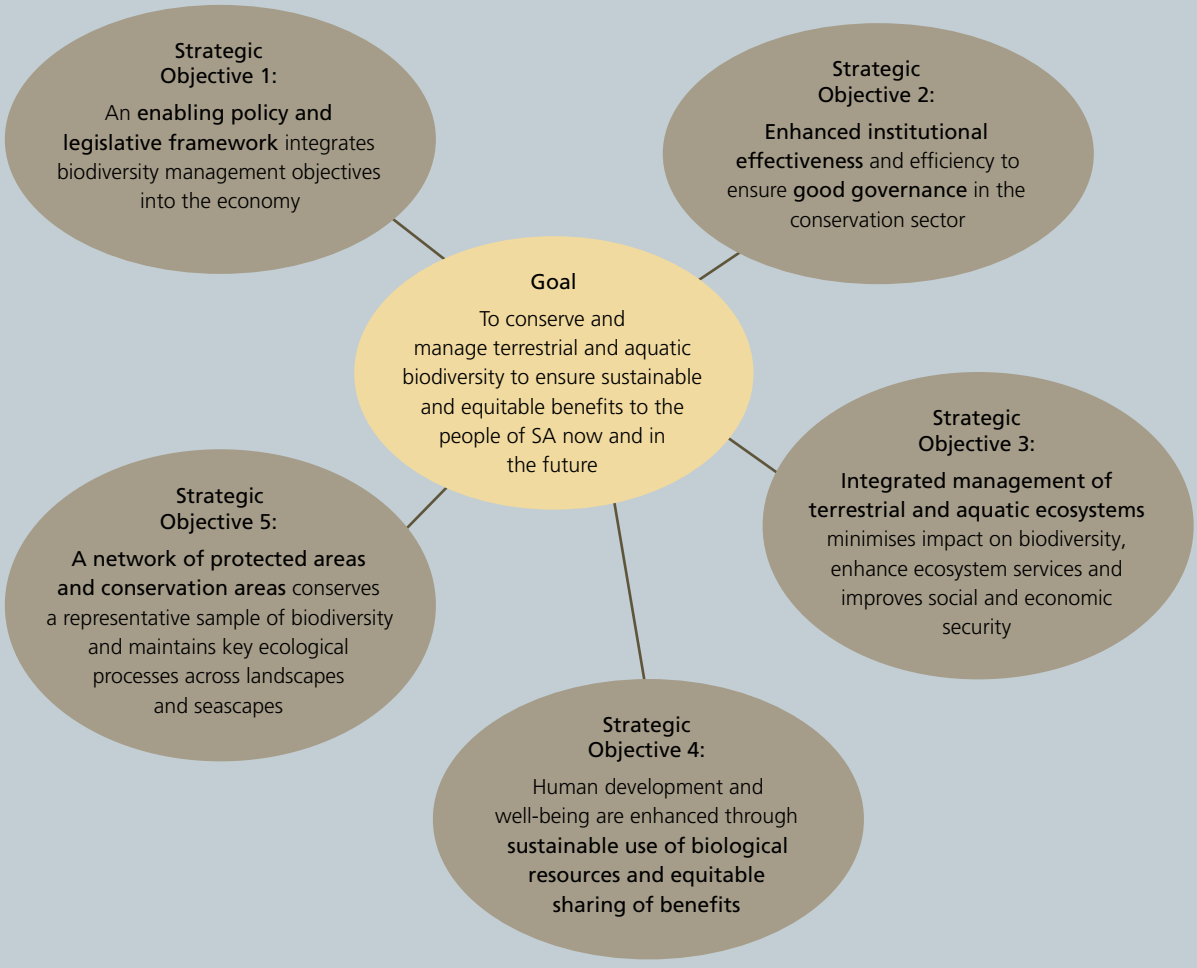


Figure 2.5 Summary of strategic objectives contained in the NBSAP

South Africa's first comprehensive national assessment of the status of biodiversity at the ecosystem level was carried out in 2004 by the South African National Biodiversity Institute, in partnership with the Department of Environmental Affairs. The NSBA provides clear biodiversity targets, spatial priorities and indicators that can be fed into a wide range of other environmental reports and plans at national and regional scale. A key feature of the NSBA is that it focusses on ecosystems – represented by vegetation types – as well as species, and so is well suited to inform a landscape approach to biodiversity conservation and ecosystem resilience.

CASE STUDY The National Spatial Biodiversity Assessment

The purpose of the NSBA was to assess the threat status and protection levels of South Africa's ecosystems and to identify national areas of biodiversity importance that should be prioritised for conservation action. The NSBA has provided:

- a consistent assessment of terrestrial, freshwater, estuarine and marine ecosystems across SA
- the national context for the development of provincial and local spatial biodiversity plans
- an important tool for monitoring
- recommendations for application of the products of the assessment.

The NSBA used systematic biodiversity planning techniques to determine the threat status of ecosystems, map ecological processes, assess the adequacy of the current protected area network, and identify national priority areas for conservation action.

How is ecosystem threat status assessed?

The single biggest cause of biodiversity loss in South Africa is the outright loss of natural habitat and ecosystems. The greater the extent of loss, the more ecosystem functioning is affected, leading eventually to the collapse of the system and the loss of services it provides. Ecosystem threat status is based on how much of an ecosystem's original area remains intact, relative to three different **thresholds** or "tipping points", as shown in Figure 2.7 below. These thresholds indicate the points at which it is estimated that the ecosystem would undergo fundamental change, either in terms of biodiversity pattern or ecological processes.

Figure 2.6 Nine broad priority areas for conservation action identified in the NSBA

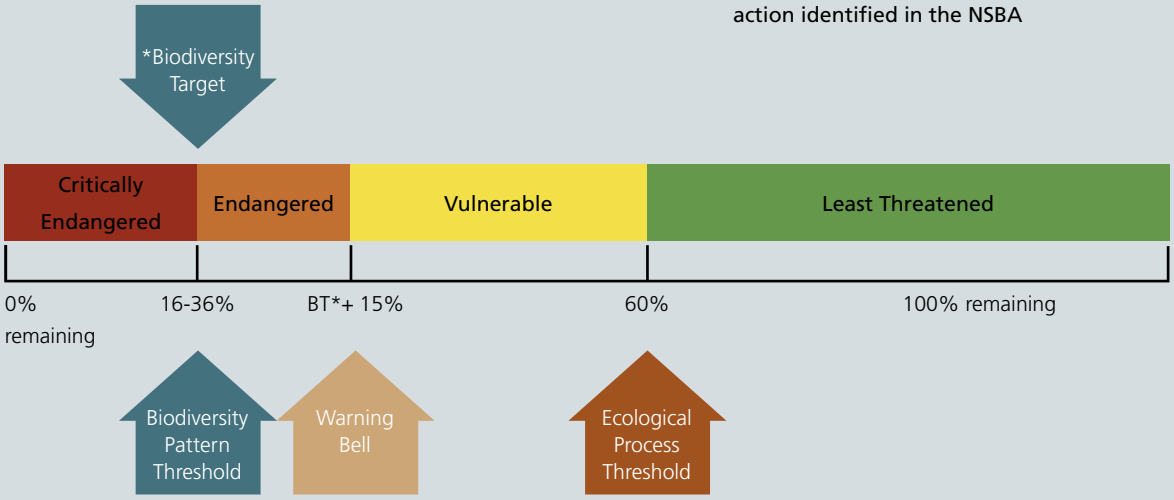


Figure 2.7 Thresholds for assessing ecosystem threat status

The threshold beyond which an ecosystem becomes critically endangered is known as the "**biodiversity target**" and represents the minimum proportion of each ecosystem that is required to maintain biodiversity pattern. For example, the biodiversity target for Swartland Shale Renosterveld, an endangered fynbos vegetation type, is 29%. This means that a minimum of 29% of this vegetation type needs to remain in a natural state to maintain the biodiversity pattern associated with it. The biodiversity target varies from 16% to 36% for different terrestrial ecosystems (depending on how species-rich the ecosystem is), and is set at 20% for freshwater, estuarine and marine ecosystems.

Biodiversity targets should not be confused with protected area targets. Biodiversity targets are based on thresholds that are ideally determined by science, and that may be revised over time as scientific knowledge and information improves. Protected area targets refer to the area of land that should be included in the protected area network by a certain date. They are action targets or political targets that should be updated every few years. In South Africa the ecosystem-specific, 20-year protected area targets that are set in the National Protected Areas Expansion Strategy are a subset of national biodiversity targets that were established in the National Spatial Biodiversity Assessment.

The NSBA addressed a number of key questions about the status of South Africa's biodiversity and generated spatial products to provide answers and generate possibilities for conservation action as follows:

Key questions		Spatial products
Which ecosystems are most threatened?	→	Maps showing ecosystem threat status
Which ecosystems are least protected?	→	Maps showing protection levels of ecosystems
Where is ecological infrastructure concentrated?	→	Maps of national-scale ecological processes
What are the likely future pressures on biodiversity?	→	Maps of future pressures – environmental, social, economic
Where are the most important geographic areas nationally for conservation action?	→	Overall priority map showing nine national priority areas for conservation action

Listing of threatened ecosystems

The Biodiversity Act provides for the publication of lists of threatened ecosystems, in the following categories:

Category of threatened ecosystem	Definition in Biodiversity Act
Critically endangered	Ecosystems that have undergone severe degradation of structure and function due to human intervention and are at high risk of irreversible modification
Endangered	Ecosystems that have undergone degradation of structure and function, but are not critically endangered
Vulnerable	Ecosystems that are at high risk of significant degradation of structure and function due to impacting activities

Ecosystems may also be listed as protected if they are of high conservation value or importance though not critically endangered, endangered or vulnerable.

The first draft list of threatened ecosystems was published in November 2009 in the Government Gazette. This followed a thorough process of expert consultation through which the threatened ecosystems were identified, based on rigorous criteria and best available science, using methods developed in the National Spatial Biodiversity Assessment (2004) as a starting point. The listing of ecosystems (and not only species) is part of what makes it possible to focus interventions at the landscape scale. Threatened ecosystems can be used to identify sites for biodiversity stewardship (as discussed in Chapter 4) or for targeting other forms of conservation action. They also add contextual information for environmental assessment, indicating geographic areas that require special attention in environmental impact assessments or other environmental management frameworks.

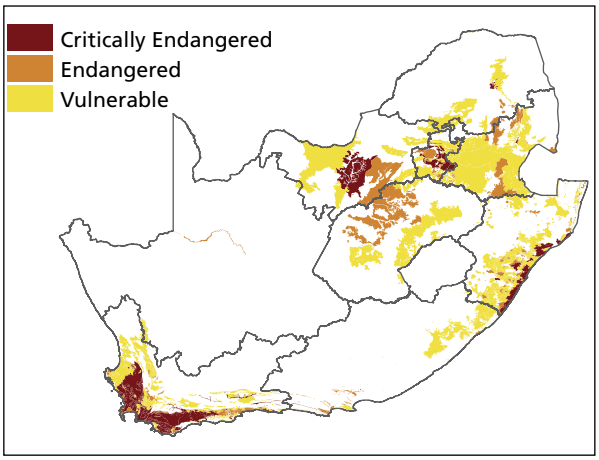


Figure 2.8 Original extent of listed threatened ecosystems

The National Biodiversity Framework (NBF)

The NBF is informed by both the NBSAP and the NSBA; it draws together the key elements of each, and focusses attention on the immediate priorities for action, both spatial and thematic. The purpose of the NBF, published in 2008, is to provide a five-year framework to co-ordinate and align the efforts of the many organisations and individuals involved in conserving and managing South Africa's biodiversity. While the NBSAP is comprehensive, the NBF focusses attention on the most urgent strategies and actions that can make the greatest difference. It identifies 33 priority actions for the period 2008 to 2013, organised according to the five strategic objectives of the NBSAP. The NBF will be reviewed at least every five years, providing an opportunity to take stock of progress, review priorities and realign efforts.

The NBF has been written in such a way that it is useful to organs of state (both those whose core business is biodiversity conservation and those whose is not), government-led programmes, NGOs and the private sector, particularly production sectors whose activities impact most heavily on biodiversity.

It is important to note that the NBF provides a framework for conservation *and* development. It is important to ensure that the way the country achieves its desired economic growth allows for the continued functioning of ecosystems and the persistence of the natural resource base. This is possible, if care is taken over the location of development, the type of development, and the consumption of natural resources in the development process. Sustainable development depends on *where* and *how* development takes place. The NBF serves as an effective instrument for identifying linkages between biodiversity and poverty in national development planning, as illustrated in Figure 2.4. This is in keeping with the UNDP-UNEP Poverty-Environment Initiative operating globally in Africa, Asia, Europe, Latin-America and the Caribbean.

The National Protected Areas Expansion Strategy (NPAES)

As in many other countries, the existing protected area network in South Africa reflects a history in which the location of protected areas was driven by factors that often had little to do with biodiversity importance or representation of species or ecosystems. The result is that some ecosystems and species are well protected while others are severely under-protected, and the protected area network excludes some key ecological processes.

South Africa's National Protected Areas Expansion Strategy (NPAES) has been developed as a tool to achieve cost-effective protected area expansion that enhances ecological sustainability and resilience to climate change. It recognises that the role played by protected areas in climate change response strategies can be increased in several ways, including: (i) having more, larger protected areas; (ii) connecting protected areas with natural corridors in the broader landscape, and (iii) focussing at least some management actions specifically on resilience, adaptation and mitigation needs.

Securing corridors of well managed, natural or near-natural habitats is critical to capturing environmental gradients that allow plant and animal species to move in response to climate change. Corridors also play an important role in helping human communities adapt to the effects of climate change by maintaining ecosystem functioning and buffering against the impacts of natural disasters such as floods and coastal erosion. The NPAES provides maps of the most important areas for protected area expansion with a focus on areas that capture the full range of biodiversity pattern and ecological processes, climatic gradients, a wide range of microhabitats, and natural corridors such as coastal, dune and river corridors.

The expansion of the Namaqua National Park in the Northern Cape demonstrates how protected area expansion is being explicitly planned in South Africa to enhance the resilience of ecosystems and facilitate natural adaptation of species and ecosystems to climate change (see case study on page 40).

Namaqualand landscape, Northern Cape

Although South Africa is not unique in having a protected areas expansion strategy, the NPAES has some innovative characteristics, including that: it sets ecosystem-specific protected area targets, so that not all hectares count equally towards meeting the targets; it is underpinned by a systematic biodiversity plan that identifies focus areas for protected area expansion based on the ecosystem-specific targets; it explicitly incorporates climate change design principles in identifying the focus areas for protected area expansion; it covers both terrestrial and marine habitats; and it is a nationally agreed and ministerially approved tool. The NPAES recommends two main mechanisms for securing land for protection – acquisition and contract agreements, including through biodiversity stewardship. The development of an effective model of biodiversity stewardship for implementing the NPAES in South Africa is discussed in detail in Chapter 4.

Namaqua National Park, Northern Cape

CASE STUDY Namaqua National Park – getting the edge on climate change

Namaqua National Park, situated in the Succulent Karoo Biome in the Northern Cape province, has undergone rapid expansion since it was first established in 1998. From its original size of 930 hectares, this national park has grown to nearly 142,000 hectares – about five times larger than its more well known counterpart, the Table Mountain National Park in the Western Cape – and there is potential for future expansion to 700,000 hectares. This expansion, which has been realised through the co-operation of NGOs, international donor organisations and the private sector with SANParks, has made it possible to create a continuous protected area extending from the mountains of the interior to the coast (see Figure 2.9).

Figure 2.9 Expansion map of the Namaqua National Park

Namaqua National Park's rapid expansion has been driven by the need to: (i) secure the ecological assets of the area; (ii) create a year-round tourist attraction based on these natural assets that can stimulate the economy of the region, and (iii) take climate change into account.

The Succulent Karoo is an arid biome characterised by winter rainfall and dry, hot summers. Climate change research indicates that the Succulent Karoo is likely to be the most vulnerable and heavily impacted of South Africa's biomes. Climate models for the region predict an increase in temperature of between 1.6 ˚C and 2.7 ˚C over the next 50 years,

with the biggest rises taking place in the winter months. Rainfall predictions are more varied, but indicate a reduction of some 30% on current figures. This will disrupt the winter rains, upon which the spectacular Namaqualand spring flower displays (and their attendant tourism industry) depend.

A key strategy for building resilience to climate change is to enhance the ability of species to migrate to new areas as the conditions that they require for survival shift. From the outset, the expansion of Namaqua National Park has been explicitly designed to link upland and lowland areas, establishing climate change gradients along which species can move. The park also includes climate refuges, such as mountain ravines and south-facing slopes that provide cooler, and often more moist, habitats that can be colonised by species under pressure from changing climates.

Other ways in which resilience to climate change has been built include:

- protecting as wide a variety of habitats as possible and increasing the number of vegetation types included in the park from one to twelve
- increasing the altitudinal range from 350 to almost 1,000 m, and the variation in rainfall from 30 mm to 180 mm per annum
- incorporating a mean annual temperature variation between the hottest and coldest parts of the park of 3˚ C.

In addition to increasing the ability of the park's species and ecosystems to adapt naturally to changing conditions, there are non-climate stresses, such as inappropriate extractive use of natural resources, that need to be reduced through appropriate planning and management.

In order to reduce pressure on species and ecosystems, SANParks recognises that it is necessary to invest effort throughout the landscape and not just within the boundaries of the park. Corridors, linkages and buffer areas will become increasingly important in the context of climate change.

5 Systematic biodiversity planning: the basis for national policy and planning tools

A key feature of national policy and planning tools in South Africa is that they are based on systematic biodiversity plans. Systematic biodiversity planning (also known as systematic conservation planning – see info box below) involves mapping a wide range of information about biodiversity features and patterns of land and resource use. Planners then set biodiversity targets and analyse the information using specialised software programmes linked to Geographical Information Systems (GIS). Outputs are then interpreted and presented as maps and land-use guidelines. The process for developing a systematic biodiversity plan is outlined in Figure 2.10 on page 42.

Using this methodology, maps can be generated at various spatial scales to indicate where conservation action should be focussed and to assess the implications of different land-use options for biodiversity. Biodiversity plans at different spatial scales answer different questions and can be applied in different ways. The resulting maps can be used to plan conservation interventions, but are also used cross-sectorally to ensure that biodiversity opportunities and constraints are incorporated proactively into integrated development planning and land-use decision-making, to strengthen decision-making regarding infrastructure investment and economic development.

INFO BOX Biodiversity planning or conservation planning?

Systematic biodiversity planning is sometimes referred to as "systematic conservation planning". In this Primer, the term "biodiversity planning" is preferred, as in people's minds "conservation planning" might imply working purely with the establishment or expansion of formal protected areas, rather than with influencing the way resources are used and managed throughout a landscape.

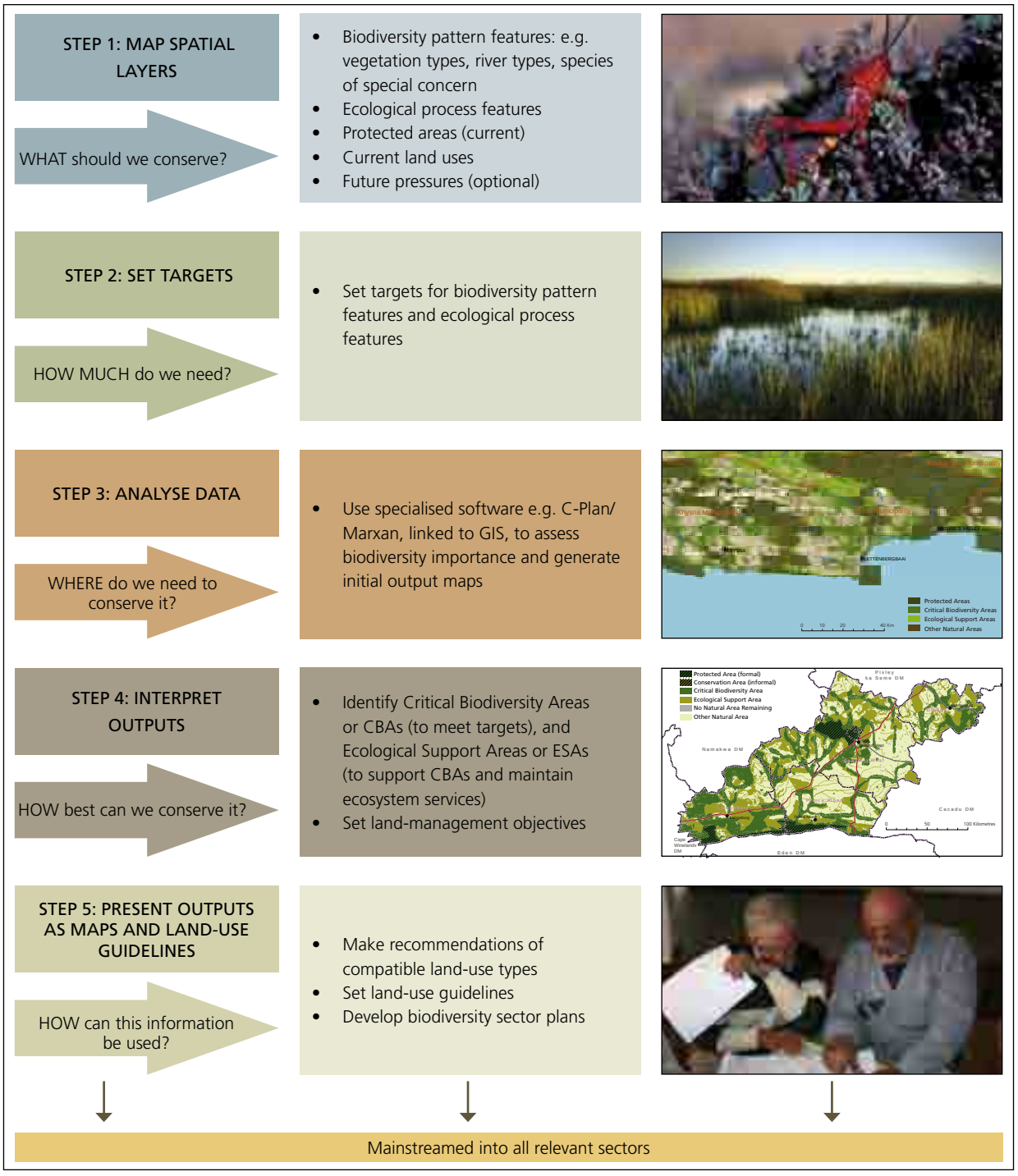


Figure 2.10 Building blocks of a systematic biodiversity plan

Setting spatial priorities for action

Valuable biodiversity is found throughout South Africa, but biodiversity, like social and economic activity, is not distributed evenly across the landscape. Furthermore, due to limited financial and human resources and other practical constraints, it makes sense to prioritise conservation action in areas where there are the best opportunities for meeting the dual outcomes of conservation and socio-economic development. Prioritising areas in terms of biodiversity importance allows for the identification of those areas that should be prioritised for conservation action, as well as areas where it would be more appropriate to locate developments such as agriculture, mining, human settlements, plantation forestry and so on.

INFO BOX Key principles of systematic biodiversity planning

The key principles of systematic biodiversity planning, as practised internationally, include:

- **Representation**: the need to conserve a representative sample of **biodiversity pattern** such as ecosystems and species
- **Persistence**: the need to conserve **ecological processes** that allow ecosystems and species to persist over time
- **Targets**: the need to set **quantitative biodiversity targets**, based on the best available science, that indicate how much of each biodiversity feature should remain in a natural state in order to conserve biodiversity pattern and ecological processes
- **Efficiency**: the need to meet biodiversity targets in the smallest area of land possible
- **Conflict avoidance**: the need to avoid, where possible, identifying critical biodiversity areas in areas with significant pressures from competing land uses.

South African innovations in biodiversity planning

Biodiversity planning has gone from strength to strength in South Africa over the past decade and the techniques and methods reflected here are at the cutting edge of the discipline. South African biodiversity planners have developed some innovative concepts and unique tools that are strengthened by provisions in legislation and policy. Four concepts that position the biodiversity sector well to mainstream biodiversity planning outputs in land-use planning and management are:

An ecosystem focus to planning: An important feature of systematic biodiversity planning in South Africa is that it focuses on ecosystems as well as species. This means that conservation action can focus on threatened ecosystems and areas that are important for ecosystem-based adaptation to climate change, rather than on individual species, increasing both the effectiveness and efficiency of conservation efforts. An ecosystem focus has been possible partly because of the existence of a recently updated vegetation map, and maps of river ecosystem types and wetland types that provide consistent coverage of the whole country at an appropriate scale (1:250 000) for a national assessment. The vegetation types are considered equivalent to ecosystems in systematic biodiversity assessments.

Identification of critical biodiversity areas (CBAs) to meet biodiversity targets: Systematic biodiversity plans identify critical biodiversity areas, which are all the areas required to meet targets for biodiversity pattern and ecological processes. They include ecological corridors needed to maintain connectivity in the landscape and should be maintained in a natural or near-natural state.

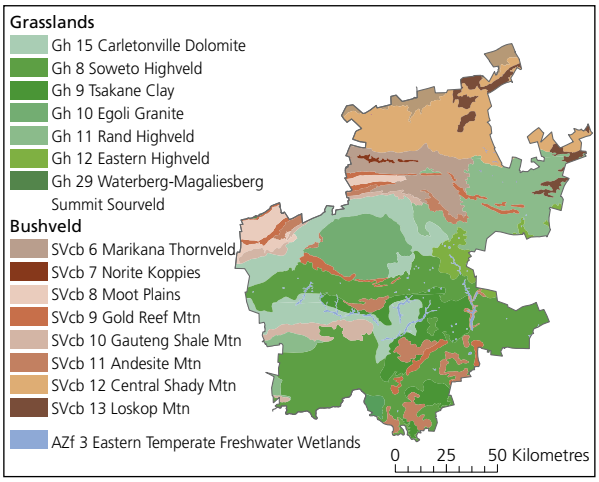


Figure 2.11 Gauteng portion of the SA Vegetation Map

Identification of ecological support areas (ESAs) for maintaining ecosystem services: Ecological support areas play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services. They include, for example, wetlands, riparian zones and high water-yield catchments. ESAs should be maintained in at least a functional state, meaning that ecological functioning should be maintained even if some biodiversity pattern is lost.

Explicit consideration of climate change design principles: This places importance on aligning critical biodiversity areas and ecological support areas with corridors and other areas that are essential for maintaining landscape-scale ecological functions and the ecosystem services they provide. These corridors may be aligned with intact river and coastal corridors, mountain ranges, areas with refuge habitats such as cooler south-facing slopes and ravines, areas with a range of microclimates, altitudinal gradients, climatic

gradients, areas of high topographic variation, or other ecological gradients. These are features of the landscape that increase the resilience of ecosystems to climate change, allow for migration and dispersal of species, and contribute to ecosystem-based adaptation to climate change. A key issue is avoiding the further fragmentation of landscapes, the loss or break-up of the best and most viable natural patches, and ensuring that landscapes are retained in as connected a design as possible. Rather than specifically aimed at responding to a single climate change scenario, the design principles emphasise the conservation of areas important for maintaining ecological functioning under a range of climate scenarios, from the status quo through to the worst case.

Planning products

The products of systematic biodiversity planning include maps displaying networks of critical biodiversity areas and ecological support areas, and land-use guidelines linked to these areas. The land-use guidelines make recommendations on land-management objectives and appropriate land uses to support these objectives in the various areas shown on the maps. In South Africa, a nested system of biodiversity plans at different scales can be used to address specific planning and decision-making issues and can be applied in complementary ways, as discussed in Chapter 3.

The concept of spatial scale is not merely about the size of the area for which the plan is produced, although,

in general, broad-scale plans tend to be prepared for larger areas and fine-scale plans for smaller ones. More importantly, scale has to do with the degree of spatial error associated with the data inputs and the outputs of the plan, and with how the data and maps can be interpreted and applied.

Broad-scale maps can be used to flag broad areas of importance for conservation action at the national or provincial level, whilst finer scale maps can be used to design protected area networks and inform land-use planning and decision-making at the local level. Fine-scale biodiversity planning will not be conducted throughout South Africa, as this would be too resource-intensive and unnecessary. Instead, fine-scale biodiversity planning is being carried out in those areas that emerge as most important in broad-scale biodiversity plans.

Systematic biodiversity plans represent the biodiversity sector's input into a wide range of multi-sectoral planning and decision-making processes, as discussed in Chapter 3.

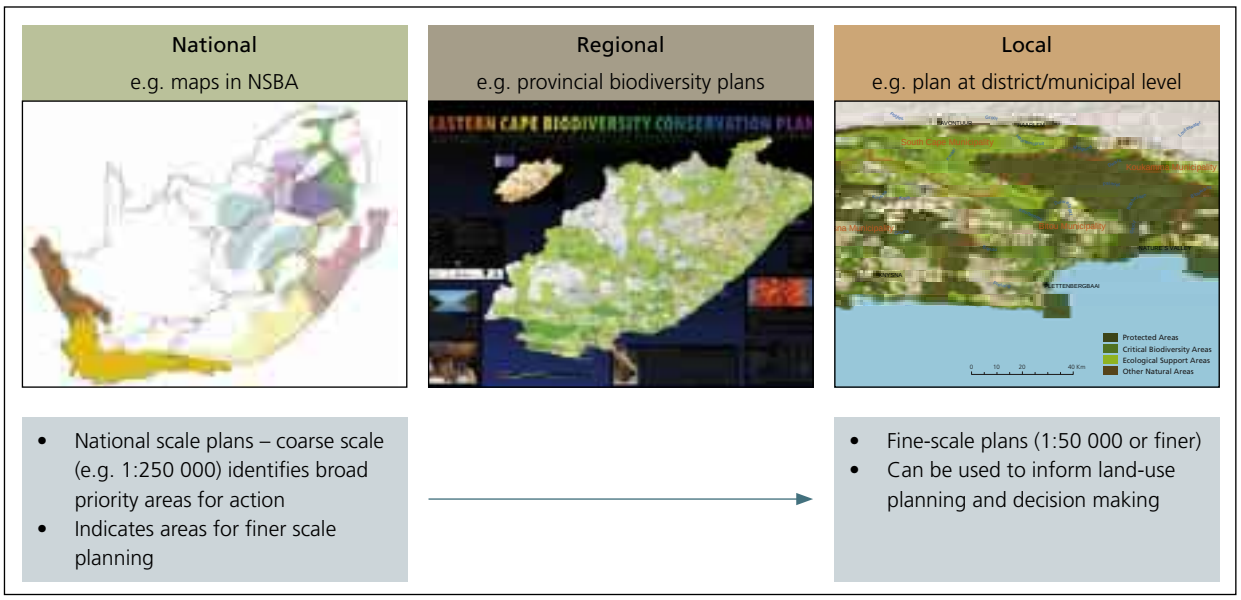


Figure 2.12 Systematic biodiversity planning at different scales

6 Why these tools work in South Africa

The policy and legislative tools outlined in this chapter are still relatively new, and their legal standing has yet to be tested. It also remains to be seen how effective these tools will be in achieving outcomes that conserve biodiversity and ensure ecosystem resilience, while promoting socio-economic development.

Some of the key factors that enhance the potential for such positive outcomes include the following:

- There are dedicated legal, policy and planning tools for biodiversity management and conservation, linked to legislation for broader environmental management. These tools feed into national planning processes incorporating a wide range of sectors.
- Although many countries that are signatories to the CBD have developed a National Biodiversity Strategy and Action Plan, South Africa is one of few that gives its NBSAP legal status and impact through a National Biodiversity Framework which is supported by national legislation.
- There has been a strong focus on systematic biodiversity planning as a basis for policy, and biodiversity plans must be based on rigorous science.
- Systematic biodiversity plans identify critical biodiversity areas (for meeting biodiversity targets) and ecological support areas (important for maintaining ecosystem services), incorporating climate change design principles. This means that these areas contribute to natural adaptation to climate change by promoting the resilience of ecosystems.
- An ecosystem focus, including the identification of threatened ecosystems, has facilitated the design of interventions at the landscape scale. These interventions allow for explicit incorporation of climate change adaptation into biodiversity plans.
- The Biodiversity Act makes provision for a range of biodiversity management tools, each of which has conceptual integrity and clarity of purpose, and all of which fit together in a coherent manner.
- There is a national biodiversity institute that is part of government, mandated with functions that span science, policy and implementation, enabling the institute to play a role in translating science into policy and policy into implementation.
- There is a consistent, nationally endorsed format approved by the Minister for developing biodiversity plans and for feeding these into other planning processes and the economy.

Lesser double collared sunbird

- The provisions of the Biodiversity Act on threatened ecosystems, bioregional plans and biodiversity management plans, together with the provisions of the Protected Areas Act for a wide range of protected area categories, provide powerful tools for achieving biodiversity management both within and beyond the boundaries of protected areas.

The policy and planning tools described in this chapter have not been quick to produce. Their development has built on years of practical experience gained through designing and implementing biodiversity planning interventions, with many lessons learnt in the process and much refinement over time. South Africa is fortunate in that it could rely on local expertise, well capacitated academic and research institutions and motivated people in civil society and government to arrive at the co-ordinated set of legislation and policies for biodiversity conservation that are in operation today. Successful implementation of these policy and planning tools requires that land-use planners and decision-makers are aware of them and use them proactively to guide day-to-day decisions about land use, as discussed in Chapter 3. It also depends on the maintenance of strong institutional partnerships and the availability of adequate resources for ongoing implementation, which is the subject of Chapter 7.

3

Tools for mainstreaming in land-use planning and decision-making

Included in this chapter:

- South Africa's strategy for mainstreaming biodiversity in land-use planning and decision-making outside of protected areas
- Opportunities for mainstreaming biodiversity in planning and decision-making
- Maps and guidelines for incorporating biodiversity in land-use planning and decision-making processes
- Biodiversity sector plans and ecosystem guidelines for environmental assessment
- From planning products to implementation
- Biodiversity GIS – making biodiversity data available
- Investing in processes and people
- Why these tools work in South Africa

1 Products, processes and people: South Africa's strategy for mainstreaming biodiversity in multiple sectors

In South Africa, conservationists are addressing the issues of biodiversity loss and ecosystem degradation through two main types of intervention: unleashing the potential of protected areas, and mainstreaming biodiversity management activities in economic and development sectors. The last decade has seen growing recognition, both globally and locally, that safeguarding ecosystem services in support of socio-economic development requires expanding conservation efforts beyond the boundaries of protected areas and across production landscapes. South Africa's landscape approach to managing biodiversity involves working across landscapes, with protected areas as the core of a matrix of other land-use types that support biodiversity conservation and ecosystem resilience, whilst supporting socio-economic development.

Ideally, all land users and people who make decisions about land and use of natural resources need to be aware of spatial biodiversity priorities, and to take these into account in planning and decision-making processes. This is so that they can identify ecological constraints and opportunities within a landscape, and use these to locate developments and land-use types most appropriately. This process is sometimes referred to as "mainstreaming" biodiversity in other sectors. In South Africa, systematic biodiversity planning (see Chapter 2) has provided a powerful set of tools that facilitates this in a wide range of sectors, at both the policy-making and operational decision-making levels. The way in which these tools are being mainstreamed in land-use planning and decision-making is the topic of this chapter.

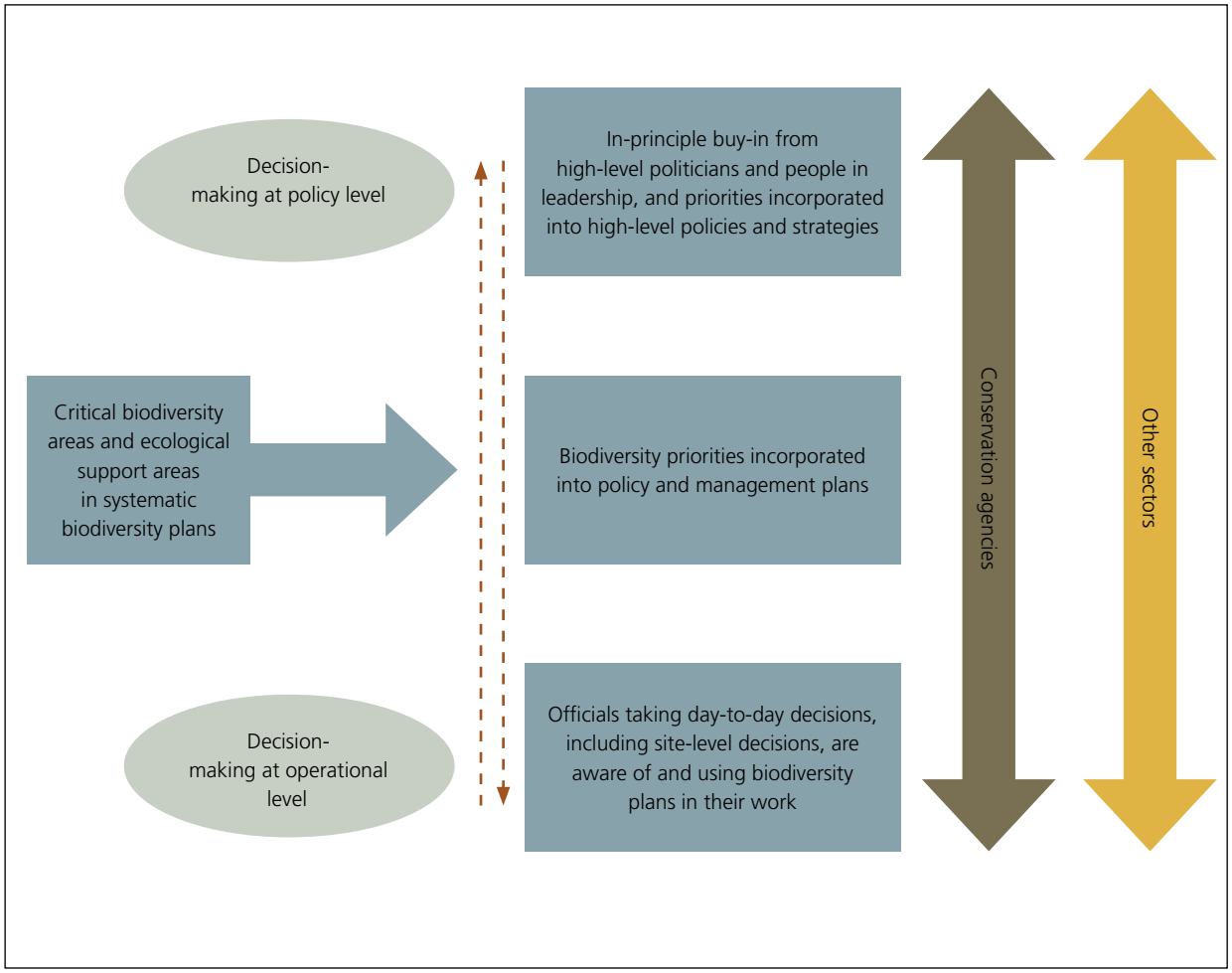


Figure 3.1 Levels at which biodiversity priorities can be fed into planning and decision-making

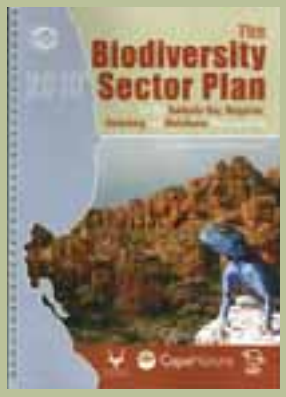
Clear information	Raised awareness and capacity	Embedding in institutions
• Biodiversity sector plans (maps of CBAs and ESAs, and accompanying guidelines) • Ecosystem guidelines for environmental assessment • Tools for serving biodiversity information	• Building individual and institutional capacity • Formal training • Workplace-based mentorship and support • Lesson-sharing and building a community of practice	• Influencing provincial and municipal policy • Incorporating biodiversity priority areas in statutory and multi-sectoral planning instruments (such as Spatial Development Frameworks) • Ensuring that biodiversity priority areas are taken into account in regulation of land-use
Products	**People**	**Processes**
		

Figure 3.2 Key elements of the mainstreaming strategy being applied in South Africa

South Africa's strategy for mainstreaming biodiversity in land-use planning at the local level has three key elements: clear information (with a focus on maps and guidelines); raised awareness and capacity (with a focus on people); and embedding biodiversity priorities into institutions (where the focus falls on processes). Examples of each of these elements are discussed in this chapter.

The policy and institutional context for spatial planning in South Africa

Land-use planning and decision-making in South Africa are carried out within a specific context. In most of the country, decisions about land use are guided by laws, regulations and zonation schemes that govern what land-uses are permissible in particular areas. Responsibility for spatial planning is spread across all three spheres of government (national, provincial and local) and powers and functions within each sphere are determined by a number of different pieces of legislation.

A nested system of strategic development and spatial planning at national, provincial and local levels provides multiple opportunities to embed biodiversity considerations into land-use planning and decision-making processes. This nested system is illustrated in Figure 3.3 on page 50.

Over the past five years, South African local government authorities (municipalities) have come to play an increasingly important role as users and managers of biodiversity, and it is at local government level that many day-to-day, operational decisions about land and natural resource use are made. Integrated Development Plans and their associated Spatial Development Frameworks (see info box on page 50), provide an important strategic opportunity to incorporate biodiversity information into decisions relating to the location of developments (such as housing or mining), the provision of services, environmental management and economic activities that provide employment and alleviate poverty.

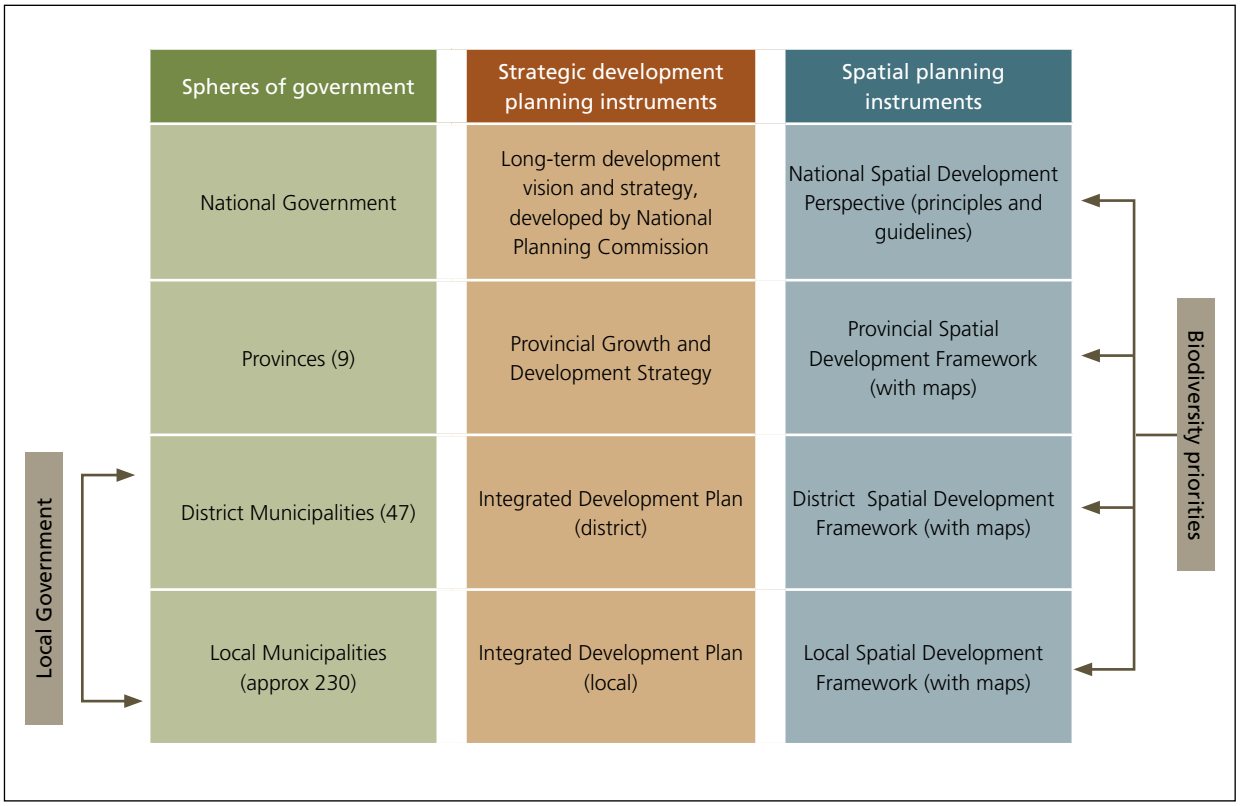


Figure 3.3 Nested system of spatial planning influencing land-use planning and decision-making in South Africa

INFO BOX Development planning in South Africa

The Constitution of South Africa, which came into effect in 1994, provides for values and principles that should underpin development, and also allocates powers and functions to the institutions that are responsible for driving development and development planning.

South Africa is divided into nine provinces, each led by its own provincial government. Each province is divided into a number of district municipalities, which, in turn, are divided into local municipalities. Each district and local municipality is administered by a council that is responsible for development and spatial planning across the entire landscape within its area of jurisdiction (that is, in the rural parts of the municipality as well as the towns).

There are a number of pieces of legislation that govern development planning at national, provincial and local levels and that impose certain obligations on land-use planners and decision-makers. The Development Facilitation Act of 1995 provides detailed land-development principles including that policy, administrative practice and laws should promote integrated land development that is environmentally sustainable.

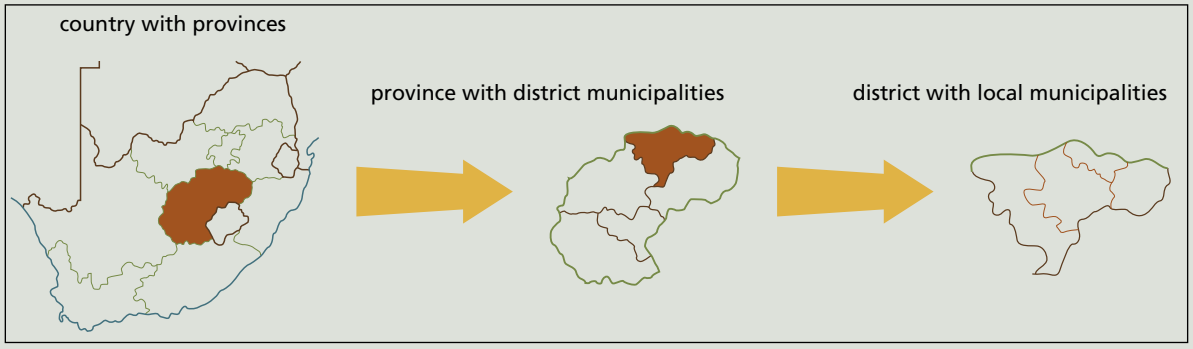


Figure 3.4 The relationship between provinces, district municipalities and local municipalities

Since 2000, all municipalities in South Africa have been required by law to have an Integrated Development Plan (IDP) which must be updated every five years. The IDP is a **strategic development plan**, developed through participatory processes, to guide and inform all planning, budgeting, management and decision-making in the municipal area. Every IDP must be supported by a Spatial Development Framework (SDF), which is an indicative **spatial plan** that reflects the IDP priorities and shows the current and future patterns of land use by all sectors, such as housing, agriculture, conservation and industry. The SDF should also include a strategic environmental assessment, a policy for land use and development, guidelines for land-use management, and a capital expenditure framework showing where the municipality intends spending its capital budget.

The SDF guides and informs all decisions of the municipality relating to use, development and planning of land and provides a strategic opportunity for proactive integration of biodiversity into municipal planning and decision-making. Similar spatial frameworks exist in some other countries.

2 Maps and guidelines for integrating biodiversity into land-use planning and decision-making

This section describes the principal tools that are available in South Africa for integrating spatial biodiversity information into land-use planning and decision-making. It provides examples of how these are used in practice and demonstrates how they can strengthen adaptation to climate change and promote sustainable economic development.

Biodiversity sector plans

The primary tools for mainstreaming biodiversity at the local and district level are biodiversity sector plans (see info box below). These can be used to feed spatial biodiversity priorities into planning and decision-making in other sectors.

INFO BOX What is a biodiversity sector plan?

A biodiversity sector plan provides a map of areas that are important for conserving biodiversity pattern and ecological processes (called critical biodiversity areas and ecological support areas), together with contextual information on biodiversity and land-use guidelines. It is based on a fine-scale systematic biodiversity plan (see Chapter 2 for a more detailed description of the principles and methods of systematic biodiversity planning).

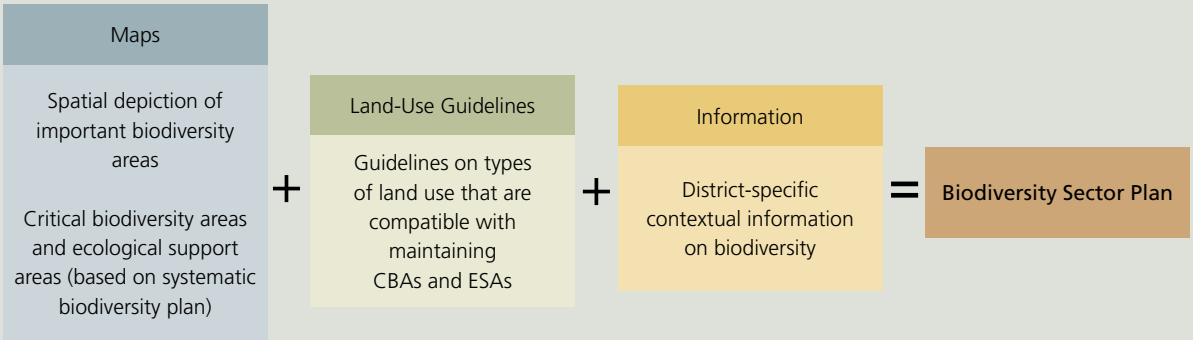


Figure 3.5 Components of a biodiversity sector plan

The primary purpose of a biodiversity sector plan is to guide land-use planning and decision-making by all sectors whose policies and decisions impact on biodiversity. Biodiversity sector plans are produced in compliance with guidelines that have been developed by the South African National Biodiversity Institute.

Biodiversity sector plans must:

- be based on a systematic biodiversity plan at a scale of 1:50 000 or finer
- have boundaries aligned with administrative boundaries (such as district municipality), for ease of implementation

- include maps of critical biodiversity areas (CBAs) and ecological support areas (ESAs) accompanied by descriptions of the CBAs and ESAs, land-use guidelines linked to the CBAs and ESAs, a short biodiversity profile of the region to provide contextual information and, preferably, monitoring and review arrangements and supporting GIS data.

In South Africa, it is possible to publish a biodiversity sector plan formally in terms of the Biodiversity Act. Published plans are called "bioregional plans" and must be taken into account in the development of municipal Integrated Development Plans and Spatial Development Frameworks.

Figure 3.6 Portion of the plan developed for Bitou District Municipality, Garden Route, Western Cape

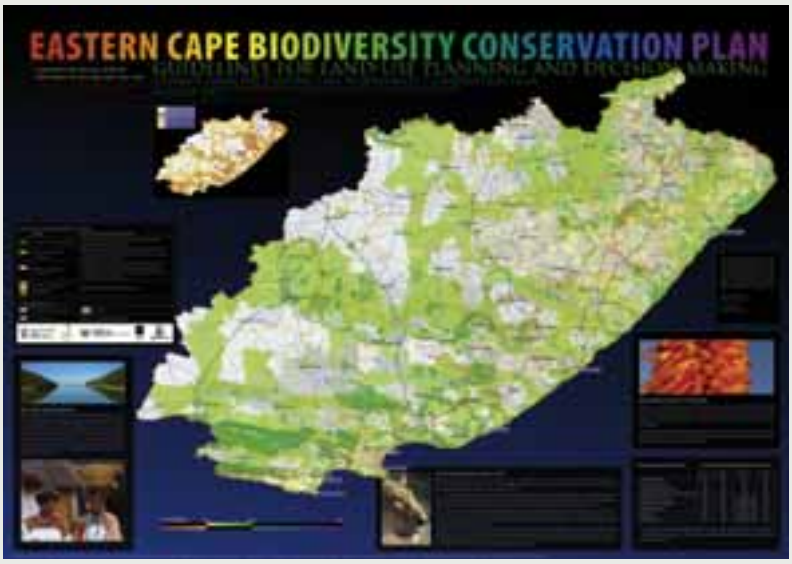
How can biodiversity sector plans be used in planning and decision-making?

Biodiversity plans at various scales can be used in a number of ways by land-use planners and decision-makers. National plans (such as the National Spatial Biodiversity Assessment, see Chapter 2) are usually most useful for securing political buy-in and for informing national or provincial policies and plans, whilst finer-scale biodiversity sector plans (like those produced in the Western Cape province for district municipalities) can be used to inform operational or site-level decision-making at the local level. The important process of securing buy-in from decision-makers to change the way decisions are taken in practice, is both complex and resource-intensive, and South Africa has only recently embarked on this process.

Five of South Africa's nine provinces have developed provincial biodiversity plans, and others are in the process of doing so. One of the provinces has opted not to produce a stand-alone biodiversity plan, but rather to incorporate the outputs of a systematic biodiversity plan (i.e. critical biodiversity areas and ecological support areas) directly into the provincial Spatial Development Framework. Although all of the provincial biodiversity plans have been produced using the same basic methodology, they differ in details of appearance, as some of them were developed before national guidelines were in place. There is a move towards standardisation of the "look and feel" of provincial biodiversity plans, without compromising innovation and advances in the underlying scientific techniques being used. It has taken nearly ten years and a great deal of trial and error to reach this point.

CASE STUDY The Eastern Cape Biodiversity Plan

The Eastern Cape province is situated at the interface of seven of South Africa's nine biomes, and includes parts of three global biodiversity hotspots. This means that any particular municipal area is likely to include a wide variety of habitats and important biodiversity that can be confusing for planners. For this reason, and because many ecological processes operate at a large spatial scale, it was important to develop a provincial biodiversity plan that provided a consistent treatment of the whole province, and that identified a system of ecological corridors that crossed both biome and administrative boundaries.



Features of the Eastern Cape provincial biodiversity plan

- It identifies a network of province-wide critical biodiversity areas located in ecological corridors.
- It provides user-friendly land-use guidelines that can be applied consistently in critical biodiversity areas.
- It used methodology that effectively accommodated both data-rich and data-poor parts of the province.

Figure 3.7 Eastern Cape Biodiversity Plan showing ecological corridors

This provincial biodiversity plan can be used for:

- identifying sites for consolidation and expansion of the provincial protected area network
- flagging areas of biodiversity importance for conservation action outside of protected areas
- indicating areas where finer-scale planning is necessary at the district or local level
- informing province-wide spatial planning and social and economic development planning in all sectors.

The plan is not useful for operational decision-making at the site level, as the spatial scale is too coarse. This is the role of district or local biodiversity sector plans.

Coastal landscape with grassland-forest mosaics, Wild Coast, Eastern Cape

If provincial biodiversity plans have been produced at a fine scale, they can be directly cut to district municipal boundaries, creating new sets of fine-scale district plans. If the provincial biodiversity plans are at a coarser scale, they can inform the development of district municipal plans at a suitable scale (1:50 000 or finer). When accompanied by district-specific land-use guidelines and contextual information, these district municipal plans can be used to inform spatial development frameworks, environmental impact assessments and land-use management decisions.

Fine-scale biodiversity sector plans have been produced for a number of districts in South Africa. These biodiversity sector plans represent the biodiversity sector's input into a wide range of planning processes, frameworks and assessments that are used by land-use planners and decision-makers in many other sectors, as illustrated in Figure 3.8 below.

As explained in Chapter 2, the kinds of spatial data needed to develop a systematic biodiversity plan include both **biodiversity pattern** data (including vegetation or habitat types, river ecosystem types, location of wetlands, distributions of species of special concern) and **ecological process** data (such as corridors along upland-lowland gradients, soil formation or water production areas, and bird nesting sites).

Availability of spatial biodiversity data varies considerably across South Africa. Some parts of the country have relatively comprehensive data sets on ecosystem types and species distributions (such as in the fynbos areas of the Western Cape and in KwaZulu-Natal), and others have only basic ecosystem data and little species-level information. "Rich" data sets would be those that include a large number of observational data points based on specialist field studies of ecosystems or species distributions, or where fine-scale mapping of vegetation

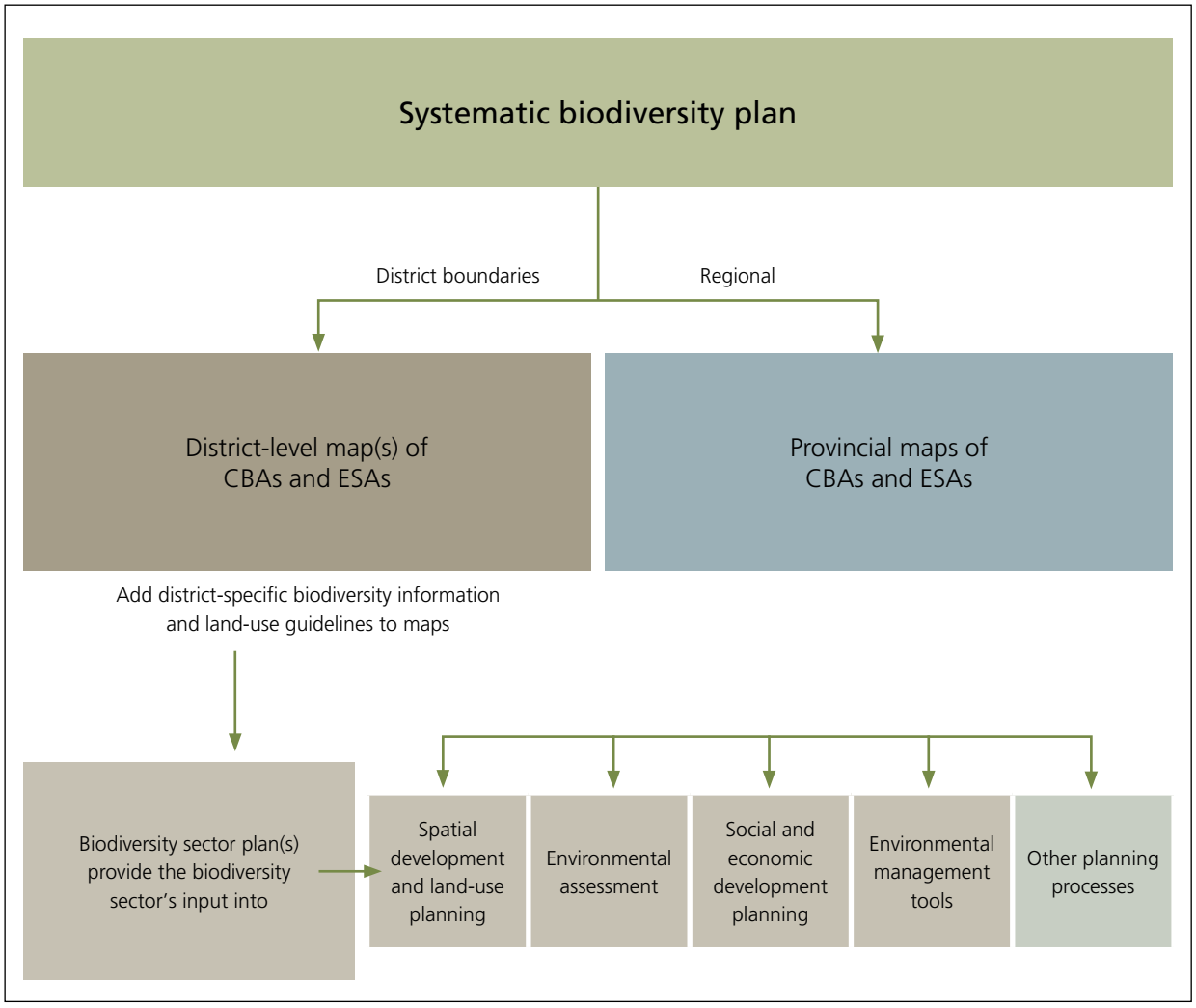


Figure 3.8 How biodiversity sector plans feed into multi-sectoral planning processes

Baviaanskloof landscape, Eastern Cape

INFO BOX Characteristics of data needed to produce a systematic biodiversity plan

Ideally, the data required for a systematic biodiversity assessment should:

- be collected in a consistent manner across the entire planning area
- cover the range of biodiversity features present in the area
- be spatial and in an electronic format, such as a spreadsheet or Geographical Information System (GIS) database
- be at an appropriate spatial resolution for the scale at which the plan is being developed
- be readily accessible to the people conducting the analyses
- be subject to peer review.

Expert knowledge can be used to augment available electronic, spatial data.

types has been carried out and data is available in ideal formats (see info box). In "data-poor" situations there are few direct measurements or field observations of biodiversity and landscape features. In these cases, planners use data gathered through national-scale assessments, or they rely on remote sensing or on generic GIS-modelling of biodiversity and landscape features. In all cases, expert knowledge can also be used to augment whatever spatial data is available.

It is possible to produce a robust systematic biodiversity plan in these varying data contexts, although care needs to be exercised regarding the scale at which the map is applied to land-use planning and decision-making on the ground. An example from South Africa of a systematic biodiversity plan produced despite the limitations of a data-poor context is the systematic biodiversity plan for the Central Karoo District (see case study on page 56).

The resources required and time it takes to develop a systematic biodiversity plan can vary quite widely depending on a number of factors. These include: how much data is available at the start of the planning process; whether it is necessary to commission expert studies to gather additional data on specific features such as wetlands or estuaries; the extent of stakeholder involvement in the planning process; availability of appropriate expertise; and the number of planners and other experts involved in the planning process. In South Africa, the systematic biodiversity plan for the Central Karoo district, which is relatively data-poor (see case study), was completed by two planners at a cost of under R500,000 (US$65,000), within an eight-month period. In the more data-rich Western Cape, where specialist studies were commissioned and experts were involved in the planning process, district-level biodiversity plans have taken about 20 months to prepare, at a cost of R1,2 million (US$162,000) per plan.

CASE STUDY The Central Karoo Biodiversity Plan – planning for enhanced resilience to climate change

The Central Karoo Municipality is the largest, least developed and most sparsely populated district in the Western Cape province. It falls in a semi-arid part of the country and the methods used to produce this biodiversity plan could be replicated in similar semi-arid parts of the world. The Central Karoo systematic biodiversity plan identified a set of critical biodiversity areas and ecological support areas that would meet the targets for underlying biodiversity features in as small an area as possible, and with the least conflict with other activities.

The biodiversity plan was developed quickly, within a reasonably tight budget and with relatively sparse site-specific biodiversity data, yet it still provides a robust assessment of biodiversity priorities. The nature of the available data enabled the explicit inclusion of features that enhance the resilience of ecosystems, such as those habitats and topographic features which provide temperature and moisture refuges that can be colonised by species under threat from changing climates (Skowno *et al.*, 2009).

Features of this biodiversity plan are as follows:

- The critical biodiversity areas were identified in configurations that facilitate the functioning of ecosystems, both currently and in the face of climate change.
- Areas of potential importance for enhancing climate change resilience – such as southern slopes, ravines and areas with a range of microclimates – were explicitly included in the analyses.
- Land-use guidelines that are aligned with land-use categories commonly used in Spatial Development Frameworks in the Western Cape are provided for CBAs and ESAs.

This plan can be used for:

- feeding into a wide range of multi-sectoral plans and assessments including spatial development frameworks, environmental assessments, environmental management plans and integrated development planning.

The use of this plan in site-specific environmental impact assessments is limited because of the sparseness of site-specific biodiversity data, but it provides an important context for site-level assessments and decisions. As with all biodiversity plans, use of the plan does not replace performing a site assessment.

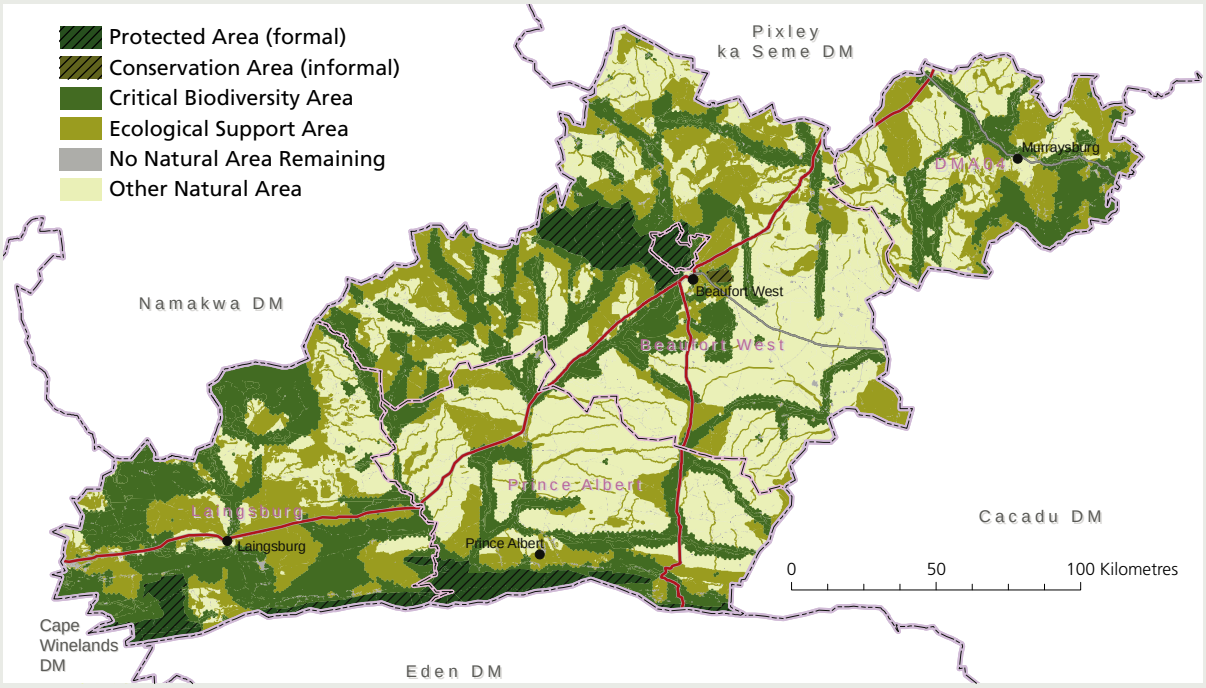


Figure 3.9 Central Karoo Biodiversity Plan

The development of land-use guidelines: making maps useful to planners and managers

Biodiversity sector plans indicate the location of important biodiversity in a particular geographic area. To make these maps meaningful and practically useful to planners and managers of land and natural resources, land management objectives are set, and guidelines are provided on how these objectives can be achieved. The land-use guidelines that accompany a biodiversity sector plan indicate which kinds of activities are appropriate in the CBAs and ESAs identified on the map, and may also include how the land ought to be managed in order to achieve the desired objective for biodiversity (see Figure 3.10). It is important for biodiversity planners to work with planners from other sectors in developing the land-use guidelines.

Map category	Land management objectives	Land uses (examples)
• Critical biodiversity areas	• Maintain as natural or near-natural • Rehabilitate degraded areas to natural or near-natural • Manage for no further degradation	• No-go for intensive development, cultivation or plantation forestry • Low-impact land use permissible e.g sustainable harvesting • Managed primarily for conservation
• Ecological support areas	• Maintain ecological functioning	• Restricted use for certain developments, non-intensive agriculture, infrastructure development • No cultivation or plantation forestry
• Other natural areas • Areas with no natural vegetation remaining	• Areas favoured for development, subject to urban and regional planning principles and practice, municipal by-laws and other applicable planning authorisations	• May be suitable for intensive development (e.g. residential development, industry, cultivation)

Figure 3.10 The development of land-use guidelines

Typical Great Karoo landscape, Northern Cape

Ecosystem guidelines for environmental assessment

The land-use guidelines in a biodiversity sector plan provide general recommendations regarding types of activities that are permissible in broad areas of biodiversity importance shown on a map. They indicate the critical biodiversity and ecological support areas that should be maintained in a natural or near-natural state, as well as areas that are suitable for development. However, each area indicated on a CBA map is ecologically diverse and complex, and a deeper ecological understanding is needed if the land-use guidelines are to be effectively translated into management guidelines that can be applied at specific sites.

In the Western Cape province, a practitioners' manual has been developed to provide detailed ecosystem guidelines for use in environmental assessments (De Villiers *et al.*, 2005). These guidelines help contextualise what practitioners see once they have "walked off the map of CBAs" and onto specific sites in the field. They provide information on the requirements for maintaining ecological integrity and viable populations of organisms in different types of ecosystems across the landscape.

INFO BOX What makes the ecosystem guidelines for environmental assessment useful?

- **The ecosystems are clearly described**: The many vegetation types present in the Western Cape province have been categorised into just seven ecosystem groups, for example, coastal fynbos or thicket ecosystems. These ecosystem groups have clear characteristics and are easily recognisable in the field, even to non-biodiversity specialists. Explicit ecological process information is also provided for each ecosystem group.
- **They provide practical advice on how to maintain ecosystem integrity**: For each ecosystem group, the same set of key questions is presented and practical advice is given regarding site-based decisions that can be taken to avoid loss of ecosystem functioning. The guidelines provide useful information on the key drivers operating in each ecosystem group, the critical components that need to be retained and the issues on which trade-offs or compromises can be made.
- **They can be applied across the entire Western Cape landscape**: Although these guidelines are especially effective when used in conjunction with biodiversity plans, they apply to all ecosystems in the Western Cape, whether or not the ecosystems fall into critical biodiversity areas.
- **They facilitate a proactive approach:** Early reference to these guidelines and available biodiversity plans can support informed planning and decision-making through proactive identification of environmental constraints and opportunities to development. This can avoid obstacles and delays to development projects later on in the environmental assessment process.

Key questions against which each ecosystem group is assessed:
• What are the key ecological drivers?
• What are the issues and threats?
• What are the bottom lines and non-negotiables?
• What is the best spatial approach to development and disturbance?
• What are the critical elements to maintain?
• What indicators can be used to monitor ecosystem health?
• How reversible are impacts?
• What are acceptable trade-offs or offsets for biodiversity loss?

3 From planning products to implementation

Having state-of-the-art biodiversity planning products does not guarantee that they will be effectively used to guide appropriate development or wise biodiversity management. Generating the visible products of the biodiversity planning process – the maps and guidelines – is a critically important step, but it represents a small part of the process required to put the planning outputs into practice.

Effective mainstreaming requires that considerable time, effort and resources be invested in:

- Making the maps, guidelines and associated information available to a wide range of end-users
- Building workplace-based capacity for effective use of the products
- Working with end-users in multiple sectors, providing day-to-day assistance to ensure that the products are actively used in a range of planning and decision-making processes
- Ongoing improvement of the science and strengthening the community of practice for development and mainstreaming of these types of tools.

A combination of government and donor resources is currently being used to generate systematic biodiversity plans in South Africa. It is not clear in all cases, however, where resources will come from to ensure that these plans are updated regularly and used effectively in development planning and decision-making.

Making biodiversity information available through web-based technology

To encourage appropriate development that takes biodiversity and ecosystem functioning into account, biodiversity information must be made available and useful to a wide range of end-users. SANBI has established a Biodiversity-GIS (BGIS) website (http://bgis.sanbi.org), managed by a small specialist team, which provides spatial biodiversity information in the form of interactive maps and Geographical Information System (GIS) data layers and a wide range of supporting databases, reports and other literature. In addition, an exciting online service has been developed in the form of the Land-Use Decision Support (LUDS) tool, which gives users quick access to all the spatial biodiversity information available for a particular site and generates a short summary report highlighting its key biodiversity features.

The success of BGIS has led to the development of the Biodiversity Advisor (see website at http://biodiversityadvisor.sanbi.org), which is a portal providing access to additional datasets such as species and specimen data, and well defined data that can be used alongside the BGIS data and online tools. The BGIS team also provides a range of value-added services including: data and information analysis, interpretation and application, and specialist advice on information management practices.

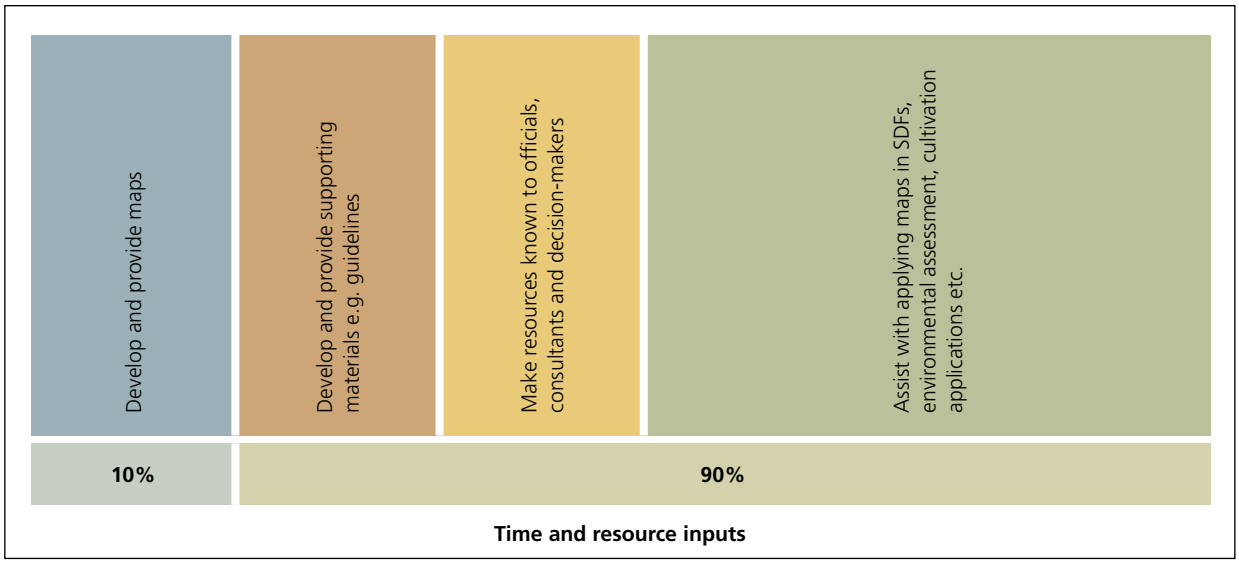


Figure 3.11 Putting biodiversity products into practice is 10% about the maps, and 90% about supporting the use of the maps

INFO BOX Who uses BGIS?

Since the establishment of the BGIS website, there has been exponential growth in the number of registered users to 2,934, and in 2009 the site recorded an average of over 300 hits per day. The user profile has expanded to include a wide range of practitioners from fields as diverse as systematic biodiversity planning, tourism, agriculture and environmental assessment. The single largest category of users consists of environmental consultants who undertake environmental impact assessments for proposed developments and who prepare many of the Integrated Development Plans and Spatial Development Frameworks for municipalities.

Why is BGIS proving so useful?

Easy access to data: Having a central database of spatial biodiversity information, as well as standardised systems that enable people to interact with this information, has made it possible for practitioners in any field to access biodiversity plans, land-use guidelines and other supporting reports and information. Making this information freely available, rather than treating it as a commodity to be sold, has dramatically increased the number of users and the potential for biodiversity plans to impact on decision-making.

Effective presentation: The BGIS team has combined use of clear language with a minimum of specialist jargon, extensive graphics and logical website design to ensure that the information is comprehensible to a wide range of end-users, including members of the public.

Practical and meaningful organisation of the information: The BGIS website uses both administrative (municipal) and ecological boundaries for organising information; this means that, whilst a scientist may prefer to access information using ecological criteria (e.g. an ecosystem or biome), a land-use planner or farmer can call up a map of a municipality, identify the administrative or farm boundaries and pinpoint, for example, threatened habitat types.

Provision of online GIS functions: GIS software is expensive and this creates a potential barrier to use of spatial biodiversity data. BGIS overcomes this problem by enabling certain GIS functions to be carried out online. Even without GIS software, users can access online maps and databases and perform basic GIS functions.

BGIS facilitates information exchange: The BGIS team does not generate most of the data that is served on the BGIS website; many of the datasets are generated by partner institutions. The BGIS team manages and standardises this data from multiple sources, makes it available on the website, develops on-line tools for use of the data, and also provides relevant training.

Landscape in Marakele National Park, Limpopo province

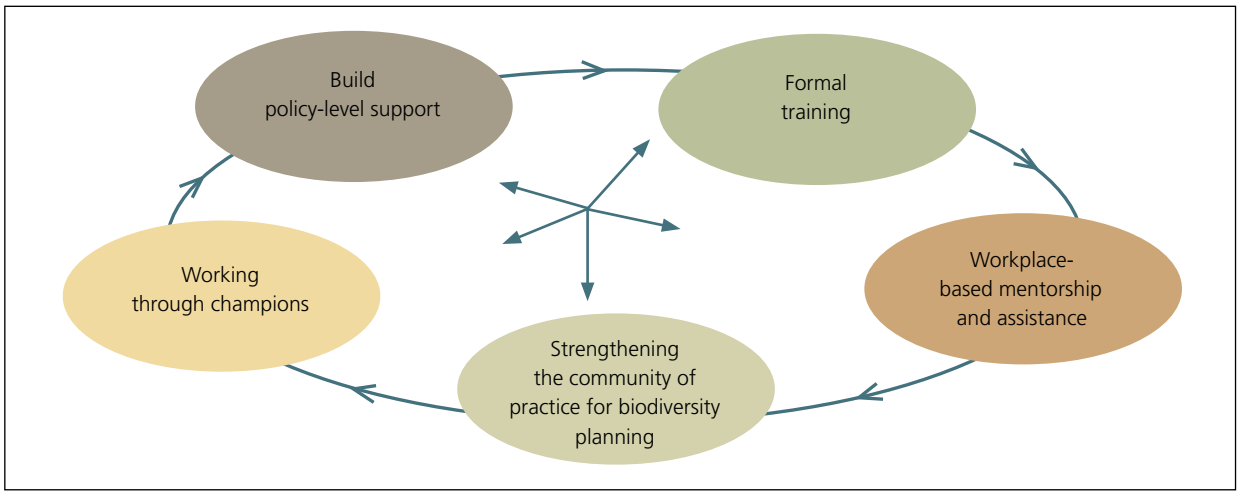


Figure 3.12 Strategy for building capacity and support for use of biodiversity planning products

Building capacity and support: investing in people and relationships

Investing in people and relationships has been the key ingredient for success in ensuring that biodiversity planning products and tools are meaningfully taken up in other sectors. This requires the full spectrum of engagement, summarised in Figure 3.12.

Securing buy-in for use of biodiversity planning tools

Political decision-makers and senior managers in economic and social development sectors need to be made aware of the positive links that exist between better biodiversity management, development and improved human well-being. Securing support for use of a biodiversity sector plan at policy level can enable mainstreaming at the operational level, although it is no guarantee of this. The South African experience has been that top-down and bottom-up approaches need to be adopted simultaneously, and that the earlier one engages with the implementers of the plan, the more likely it is that biodiversity priorities will be taken up in day-to-day decision-making. This was demonstrated in the development of the Biodiversity Sector Plan for the Namakwa District Municipality, which included an intensive stakeholder engagement process.

CASE STUDY Securing support for biodiversity: the launch of the Namakwa Biodiversity Sector Plan

The Namakwa District Municipality in the Northern Cape province is the biggest district in South Africa, and includes components of the Succulent Karoo, Nama Karoo and Fynbos Biomes. It is an area of exceptional biodiversity, including Namaqualand (famed internationally for its impressive displays of spring flowers) and the Richtersveld (a semi-desert region bordering on the Namib desert, and increasingly impacted upon by mining activities). Due to its aridity, the area is sparsely populated, mostly rural and presents few economic opportunities to its mostly poor population.

The Namakwa Biodiversity Sector Plan was developed to inform land-use planning, environmental assessments, decision-making, and natural resource management in order to promote ecologically sustainable development. The Plan was also developed to raise awareness of the unique biodiversity of the region, the value this presents to people and the management mechanisms that can ensure its conservation and sustainable use.

The developers of the plan invested large amounts of time in developing relationships with the implementing agencies (such as the district and local municipalities) and developing promotional materials (including posters) that could be used to raise awareness of the plan and promote its use. The plan was launched publicly at a two-day, high-profile gathering at which the leaders of the Northern Cape provincial government were present to endorse the plan. As a result of the intensive stakeholder engagement process, the plan was quickly taken up in the Integrated Development Plan and Spatial Development Framework of the Namakwa District.

Working through champions

Planners and decision-makers have numerous and often conflicting imperatives to which they must respond, and safeguarding biodiversity is seldom an explicit requirement of their jobs. Provision of basic services (such as housing, sanitation and garbage removal) and poverty alleviation occupy top priority on most municipal agendas in South Africa, as in other parts of the world. Mainstreaming biodiversity products in this context has been most effective when at least one or two people based in the implementing agency have been closely involved in the development of the tools and are centrally involved in their implementation. These people play the role of champions, who understand the purpose of the tool, and are committed to finding ways through which it can be integrated in the organisational systems and procedures of the implementing agency.

Champions working in this way can effectively build awareness and develop willingness to put the biodiversity planning tools into practice. In the Namakwa District, a Biodiversity Advisory Forum (see Chapter 7 for a case study) has been formed to bring together planners and decision-makers from organisations in different sectors to develop a learning network and build their capacity for using the Biodiversity Sector Plan to inform planning and decision-making more effectively. Those who participate in the Forum can then serve as champions for the plan within their relevant organisations.

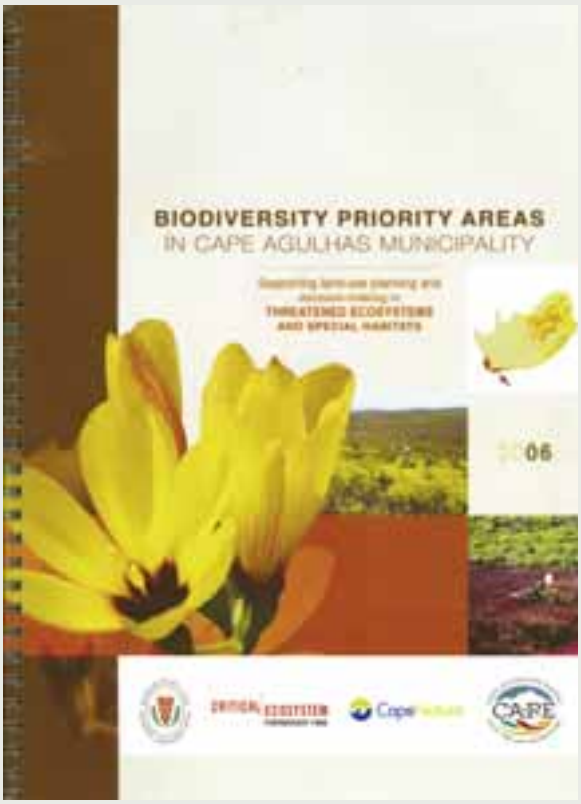
Training and workplace-based mentorship

Biodiversity plans are specialised products. Despite efforts to make the maps and guidelines user-friendly, it cannot be expected that spatial planners or decision-makers in other sectors will be instantly well versed in their use. For this reason, explicit programmes need to be put in place to build capacity in the use of these products, right from the beginning of the planning process. This is most effectively achieved through formal training combined with ongoing workplace-based mentorship and support.

CASE STUDY Putting Biodiversity Plans to Work – the importance of providing workplace-based mentorship and support

The Putting Biodiversity Plans to Work project, which was piloted in four district municipalities in the Western Cape, was one of the earliest interventions through which the importance of providing workplace-based mentorship and support was clearly demonstrated. The project recognised the strategic importance of the municipal Spatial Development Framework planning process, and the positive impact that municipal officials can have on biodiversity as a result of wise development planning. The initial focus of the project was to make the results of spatial biodiversity planning available to municipal land-use planners through the provision of a "biodiversity package". This included maps, GIS data and a set of guidelines to help interpret the map and GIS information.

These materials were intended to help municipal officials assess land-use applications in terms of their potential impacts on threatened ecosystems, special habitats and ecological corridors. They also provided biodiversity information needed to develop Spatial Development Frameworks and other documents such as State of Environment Reports. Although the importance of the products making up the "biodiversity package" cannot be underestimated, it emerged quickly that these products on their own had little



impact. The real impact of the Putting Biodiversity Plans to Work project was made through the focus it placed on interaction with people. Conservationists spent time fostering sound working relationships with officials in the pilot municipalities. This involved understanding what type of biodiversity information is needed to strengthen spatial planning and the most useful way of presenting this, and helping municipal officials to interpret and use the maps and guidelines effectively in natural resource management and spatial development planning.

This two-year pilot project, which was made possible by donor funds, provided the platform for development of an entire programme of work funded by SANBI and the relevant provincial government department. Through this intervention, which now operates out of SANBI in partnership with the provincial government, ongoing workplace-based support is provided to land-use planners and decision-makers in the Western Cape to integrate biodiversity into spatial planning, local economic development and environmental assessment processes.

Strengthening the community of practice

Systematic biodiversity planning is a young and dynamic science in South Africa. Although the number of people well versed in the techniques of spatial biodiversity planning has increased rapidly over the last five years, the community of practice is still relatively small and is unevenly spread both geographically and institutionally. To develop a critical mass in this field and maintain the progress that has been achieved to date, it has been necessary to develop capacity in the biodiversity planning sector through sharing of experiences, introducing technical innovations, building networks for better communication among the various biodiversity planning initiatives in the country, identifying training needs and sharing lessons learnt. The Biodiversity Planning Forum, co-ordinated by the South African National Biodiversity Institute, has been developed to play this role (see case study).

CASE STUDY The Biodiversity Planning Forum – improving practice

The Biodiversity Planning Forum was established in 2004 to provide an opportunity for individuals, agencies and departments involved in spatial biodiversity planning to share and synthesise valuable lessons from biodiversity planning projects across South Africa. The Forum is intended primarily for those involved in the technical aspects of biodiversity planning and the production of systematic biodiversity plans and associated products. This includes people from conservation agencies, provincial environmental and conservation departments, conservation NGOs, universities and research institutes (national and international), and biome programmes, as well as independent biodiversity planning consultants. The core focus of the Forum is on systematic biodiversity planning, with a key theme being "planning for implementation" or planning that lays the basis for implementation of the planning outputs.

The annual Forum is held in a different province each year and is co-hosted by SANBI and the provincial conservation authority, and sometimes by the provincial environmental department. This provides an opportunity for particular provinces to showcase their biodiversity planning work.

The Biodiversity Planning Forum has grown substantially since its inception in 2004, from 40 people to 184 in 2010. The benefits of a Forum of this type include providing knowledge sharing opportunities for biodiversity planners in the country, and creating an effective interface between the few scientists who do the systematic biodiversity planning and the practitioners who implement the resulting biodiversity planning tools.

Participants at the Biodiversity Planning Forum

4 Why these tools work in South Africa

The South African experience has been that systematic biodiversity planning has provided a powerful platform for mainstreaming biodiversity in planning and decision-making across a range of sectors including agriculture and other production sectors, urban and rural development, municipal development planning and environmental assessment. In some provinces and districts there has been significant progress in making the transition from planning to implementation, resulting in real integration of biodiversity priorities into the policies, programmes and day-to-day work of other sectors.

At the same time, this area of work faces a number of challenges, key amongst which is the uneven spread of technical capacity across the country, which means that some provinces and districts are only just beginning this type of work. Another challenge is that systematic biodiversity plans could lose their value if they are not updated regularly. The updating process, and building capacity to implement the plans, will require ongoing commitment of resources by government in partnership with civil society and donor institutions.

There is still much to be achieved, but the reasons for success so far include the following:

- Adhering to the principles of systematic biodiversity planning has enabled the development of biodiversity sector plans that provide clear maps of areas important for biodiversity based on best available science, and guidelines that can be implemented to achieve biodiversity targets, whilst supporting appropriate development. Maps are powerful tools for interacting with other sectors, and the principles of biodiversity planning, including setting explicit biodiversity targets, provide a rational, constructive platform for engaging with sectors whose interests are different from those of the biodiversity sector.
- Explicit incorporation of climate change design principles at a landscape scale into systematic biodiversity plans provides land-use planners and

Low-cost housing development, Oudtshoorn, Western Cape

View from Helderberg, Western Cape, showing a mix of land-use types

decision-makers with real opportunities to make spatial decisions that maximise risk-avoidance, reduce biodiversity loss, enhance ecosystem resilience and maintain ecosystem services – even in the face of climate change.

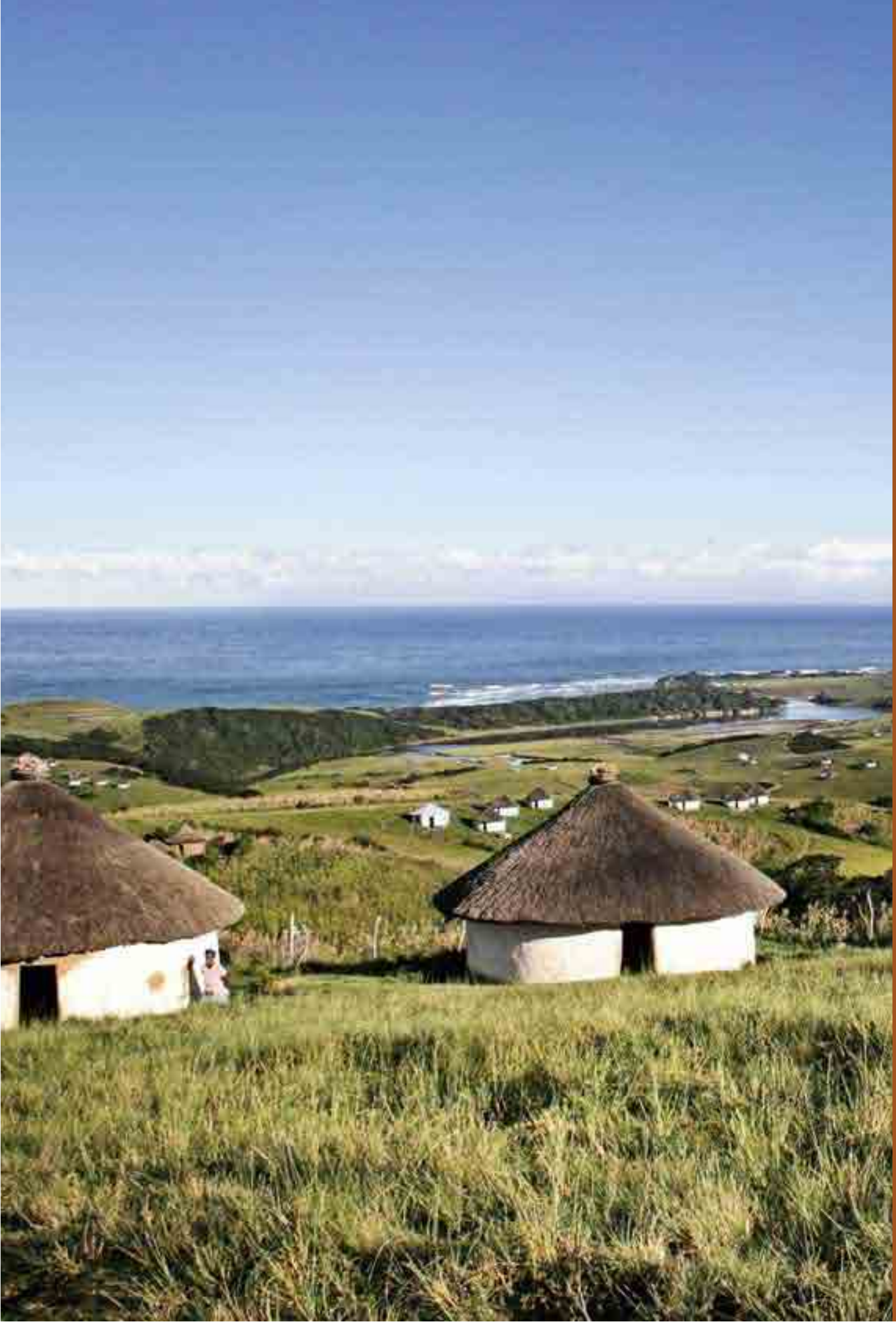
- Although the use of systematic biodiversity plans is not unique to South Africa, the country's biodiversity planners have placed considerable emphasis on interpreting the scientific results of biodiversity planning for a wide range of end-users. The provision of practical land-use guidelines that accompany the maps of biodiversity priority areas makes them meaningful and useful to practitioners in other fields, and the move towards standardising terminology (CBAs and ESAs) and the "look and feel" of the maps increases their usefulness.
- The outputs of biodiversity planning processes have been geared for ease of use in a range of operating environments, including the biodiversity sector and many other sectors. Stakeholders from sectors other than biodiversity have been included as partners in the planning process. Considerable time and effort have been invested in setting up and maintaining innovative cross-sectoral partnerships that enable ongoing follow-up with practitioners who are using the planning tools on a day-to-day basis.
- The legal requirement for all municipalities to have an integrated development plan and spatial development framework has provided probably the single most strategic opportunity for building biodiversity opportunities and constraints into land-use planning and decision-making at the local level.
- Promoting maximum availability of biodiversity data (including spatial biodiversity plans) by making it freely available through web-based technology has contributed significantly to ensuring that biodiversity planning tools are accessible to a wide range of end-users. The provision of on-line support services such as the Land Use Decision Support Tool, means that users can readily obtain workplace-based support in the use of biodiversity data.
- Availability of land cover data and information on vegetation types for the whole country has meant that these two data layers can be used as a starting point for systematic biodiversity planning in any part of the country. It is possible to perform rapid biodiversity assessments even with only a few key data layers, and it is sometimes best to do this rather than waiting for large volumes of detailed biodiversity data to be available. A simple, rapidly generated plan is better than having no plan at all, especially in areas requiring urgent action.
- The existence of national guidelines for producing biodiversity sector plans, and the Biodiversity Planning Forum that enables effective information exchange and lesson sharing, promote greater consistency in the planning tools that are generated.
- The time that has been dedicated to setting up effective working relationships has made the difference to the effectiveness with which biodiversity has been integrated into land-use planning and decision-making in South Africa. Maps and guidelines alone have little impact. Successful outcomes on the ground require ongoing involvement and commitment from a range of scientists, NGOs and implementers working in multiple sectors. Cross-sectoral partnerships, locally-based champions, ongoing capacity building and workplace-based support are needed to ensure successful transition from planning to implementation.

4

Tools for biodiversity stewardship

Included in this chapter:

- Expanding protected areas through partnerships with landowners and communities
- The enabling legal and policy framework for biodiversity stewardship
- The South African model of biodiversity stewardship
- Biodiversity stewardship programmes in South Africa
- Biodiversity stewardship, land reform and rural development
- Incentives for biodiversity stewardship
- Why these tools work in South Africa



1 Expanding protected areas through partnerships

Expansion of the protected area network is one of the key strategies available for stemming the loss of biodiversity, and for retaining the functions of ecosystems that promote resilience and reduce vulnerability to the impacts of climate change. In South Africa, biodiversity stewardship is emerging as an important tool for expanding protected areas. The model of biodiversity stewardship that has been adopted provides a hierarchy of conservation categories to private and communal landowners who wish to conserve land of high biodiversity importance, through entering into contractual agreements with conservation authorities. This model of biodiversity stewardship is the subject of this chapter.

The need for expansion and consolidation of the protected area network

The existing formal protected area network in South Africa currently covers about 7% of the total land surface. Because early approaches to protected area establishment were fairly *ad hoc,* South Africa's current protected area network was not originally designed to conserve a representative sample of biodiversity, or to take climate change or measures to improve resilience into account. It is unsurprising, then, that nearly half the country's terrestrial ecosystems have no or extremely low levels of protection (Driver *et al*., 2003). This means that much of the important biodiversity that is needed to meet national biodiversity targets (see Chapter 2), and many of the ecosystems that are relied on for critical ecosystem services, occur in unprotected landscapes that are either privately or communally owned.

Given the pressing development needs in South Africa, there is a high risk that currently unprotected land might be developed in ways that bring about short-term gains, but that increase pressures on natural resources and accelerate loss of natural habitat. These risks come from competition for physical space between different land-use types, consumptive or extractive use of biodiversity resources, and an increase in unsustainable and biodiversity-incompatible land-management practices that result in loss of functional connectivity and reduced landscape resilience.

To meet biodiversity targets and maintain the ecological infrastructure of the country, it is essential that the protected area network be expanded to incorporate areas of high biodiversity importance. Expansion and consolidation of the protected area network needs to

Wetland in Mpumalanga province

be sensitive to the rights of landowners and communities to own, live on or benefit from land that is rightfully theirs. This is particularly important in South Africa, as the establishment of protected areas in the past often led to communities being dispossessed of their land.

It is neither socially desirable nor financially feasible for government to purchase all sites of high biodiversity importance for inclusion in an expanded, state-owned protected area network. South Africa's model for biodiversity stewardship has provided a new, cost-effective way for government, in partnership with civil society, to carry out its conservation mandate, by entering into contractual agreements with landowners in which they commit to conserving and managing the biodiversity on their land. These agreements can apply on private farms, communal lands, and land owned by national or provincial government departments, municipalities, public institutions, non-governmental organisations and private companies or entities.

Biodiversity stewardship creates a mechanism for establishing and expanding protected areas and creating connectivity across landscapes, thereby securing ecological (or climate change) corridors through partnerships with private and communal landowners.

INFO BOX Biodiversity stewardship: win-win partnerships for landowners and conservation authorities

"Stewardship", in the general sense, means the wise use, management and protection of that which is entrusted to someone. In the context of biodiversity conservation, this concept, taken broadly, incorporates a "duty of care" ethos and a wide range of actions, including best-practice farming measures and direct conservation actions.

In South Africa, however, a very specific and tightly defined concept and model of "biodiversity stewardship" has been developed, with the purpose of safeguarding land of high biodiversity importance and creating connectivity within production landscapes. In this model, sites of high biodiversity importance, identified through systematic biodiversity planning (see Chapter 2), are secured by putting in place a range of voluntary contractual agreements with landowners. These agreements provide long-term conservation security for sites of greatest biodiversity importance and promote wise use and management of the natural resources and biodiversity at those sites.

Biodiversity stewardship agreements recognise landowners and communities as custodians of their land and the ecosystem services it provides, and acknowledge their commitment to conservation and management of biodiversity. In return for this commitment, landowners benefit through the provision of technical advice and management support from the conservation authorities, and they may qualify for certain tax-based incentives that have been put in place in South Africa. Under this system of biodiversity stewardship, land of high biodiversity importance is managed and protected through win-win partnerships between landowners or communities and conservation authorities.

Conservation agency staff member and landowner discussing sites of biodiversity importance on landowner's land

2 Enabling legislation and policy for biodiversity stewardship

The Protected Areas Act (2003) and Biodiversity Act (2004) together provide the legal framework for ensuring sound biodiversity conservation and management in South Africa (see Chapter 2). The two key provisions in the Protected Areas Act that have enabled the development of biodiversity stewardship are: (i) that any land (including private or communal land) can be formally declared as a protected area, and (ii) that protected areas may be managed by landowners, communities, or any other suitable person or organisation. These provisions, in combination with the protected area categories in the Act (see info box on page 71), provide a powerful set of tools for conserving biodiversity across landscapes through biodiversity stewardship.

Biodiversity stewardship as a tool for protected area expansion

South Africa's National Protected Areas Expansion Strategy (NPAES) aims to increase the extent of land under formal protection over the next 20 years, with priority placed on the protection of connected landscapes that enhance ecological sustainability and resilience to climate change. The NPAES includes quantitative, ecosystem-specific protected area targets that are a subset of the national biodiversity targets determined by the National Spatial Biodiversity Assessment (2004). Provincial breakdowns of the national protected area targets are also provided in the NPAES.

The strategy has a strong focus on building resilience to climate change, allowing for protection of climatic and altitudinal gradients along which species can migrate, conservation of a greater variety of microhabitats, and the establishment and maintenance of intact dune, coastal and river corridors.

The main mechanisms identified for expanding the land-based protected area network are acquisition of land, and contract agreements with private and communal landowners, including through biodiversity stewardship programmes. The NPAES recommends that contractual agreements should play an increasingly important role in protected area expansion, partly because the costs of meeting protected area targets through acquisition alone would simply be too high.

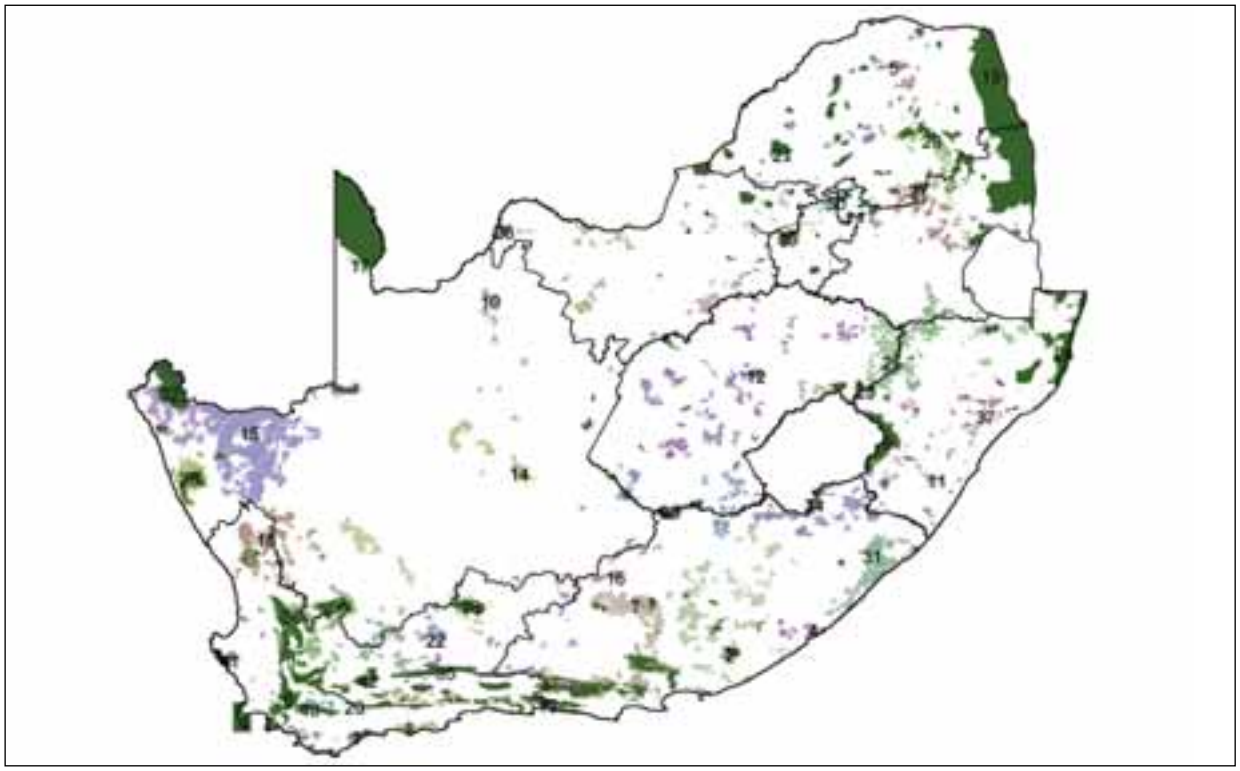


Figure 4.1 The 42 priority areas for expansion of the protected area estate, identified in the NPAES

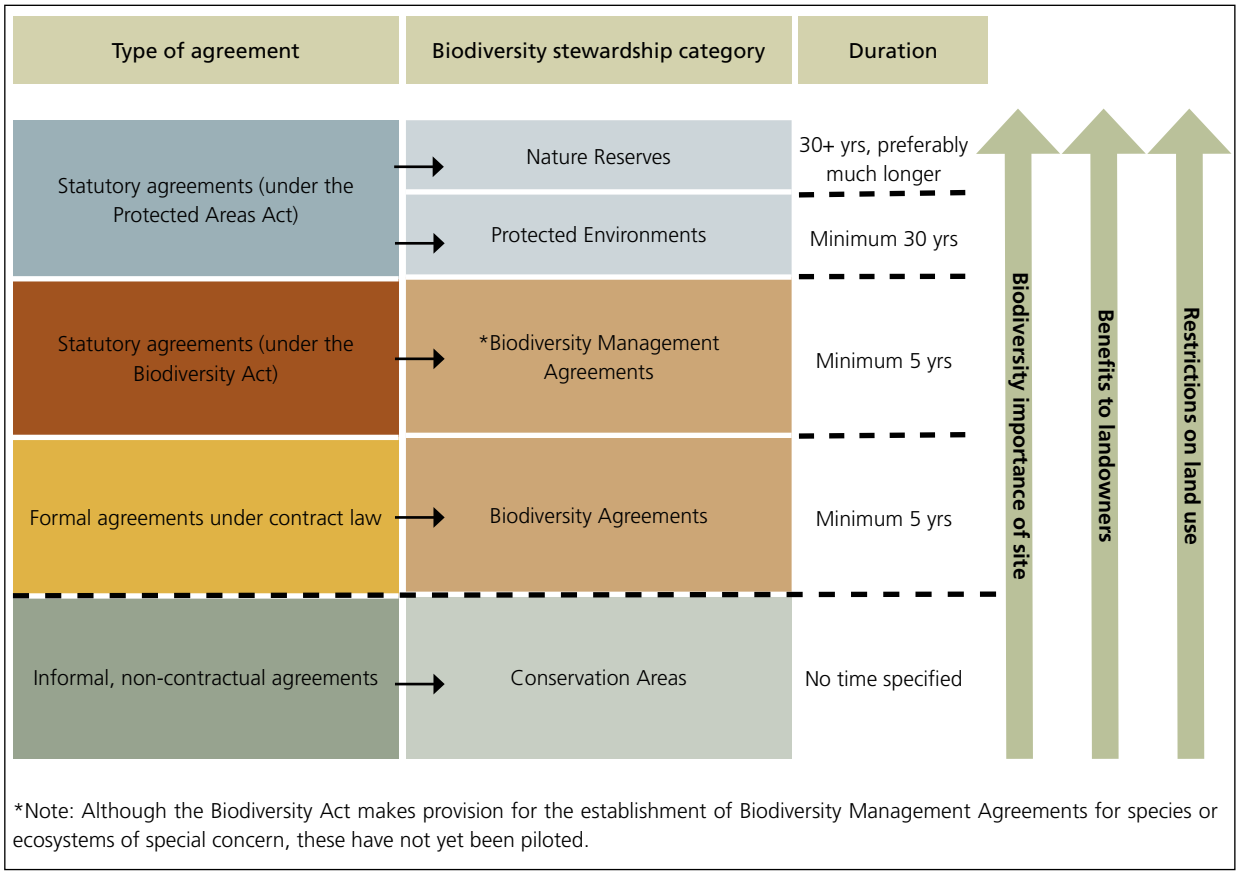


Figure 4.2 Schematic representation of the biodiversity stewardship model being implemented in South Africa

INFO BOX Defining protected areas

The National Protected Areas Expansion Strategy defines a protected area as an area of land or sea that is formally protected by law and managed mainly for biodiversity conservation. This definition is narrower than that adopted by the IUCN, which recognises many "protected area" categories, distinguished largely by land management objectives, with no requirement for formal legal status.

The Protected Areas Act establishes a streamlined set of four categories for protected areas, including:

- Special Nature Reserves
- National Parks
- Nature Reserves
- Protected Environments.

Further conservation categories are provided for by the Biodiversity Act, by contract law, and through informal arrangements. These are explained further in Section 3 of this chapter.

Biodiversity stewardship is already playing a central role in the implementation of the NPAES and the achievement of South Africa's protected area targets in a number of provinces. It can also play a critical role in securing threatened ecosystems, which are often highly fragmented and difficult to protect, through the establishment of large, traditional, state-owned protected areas. In this context, biodiversity stewardship agreements over smaller parcels of land offer a practical solution and have a critical role to play. Further, biodiversity stewardship contributes to broader socio-economic goals such as rural development and the creation of nature-based work opportunities, and has the potential to make significant contributions to land reform and the livelihoods of land reform and land redistribution beneficiaries.

3 South Africa's biodiversity stewardship model

Early landowner engagement programmes in South Africa had limited long-term success because they involved a cumbersome and confusing system, with over 25 "stewardship" categories that had no legal security. A loose concept of stewardship was also applied, incorporating a range of approaches from informal, "duty of care"-type approaches, through to establishing formal nature reserves on private land.

Today, biodiversity stewardship programmes in South Africa are generally implemented by provincial conservation authorities, often working in association with NGOs. They use a clear hierarchy of categories provided for in the Protected Areas Act, the Biodiversity Act and contract law to secure important land for conservation. These categories are presented in Figure 4.2, and include Conservation Areas, Biodiversity Agreements, Biodiversity Management Agreements, Protected Environments and Nature Reserves.

Biodiversity stewardship categories

The categories of biodiversity stewardship agreement relate to each other in a hierarchical manner, beginning with informal, flexible agreements, and working up to contractual agreements of longer tenure and that confer greatest conservation security on the site. The degree of biodiversity importance of the site, the degree of site security associated with the contract, and the benefits to landowners all increase as one moves through the hierarchy of conservation categories from Conservation Areas to Nature Reserves. Biodiversity importance is determined through systematic biodiversity planning, followed by site assessments. Each biodiversity stewardship category sets a minimum duration for the contractual agreement between the landowner or community and the relevant conservation authority.

Conservation Areas provide for informal, quickly established agreements that can be applied in a wide range of circumstances where the biodiversity importance of the land is relatively low. They provide flexible and non-binding recognition to landowners or communities who conserve or manage their properties in biodiversity-compatible ways.

Biodiversity Agreements, Biodiversity Management Agreements, Protected Environments and Nature

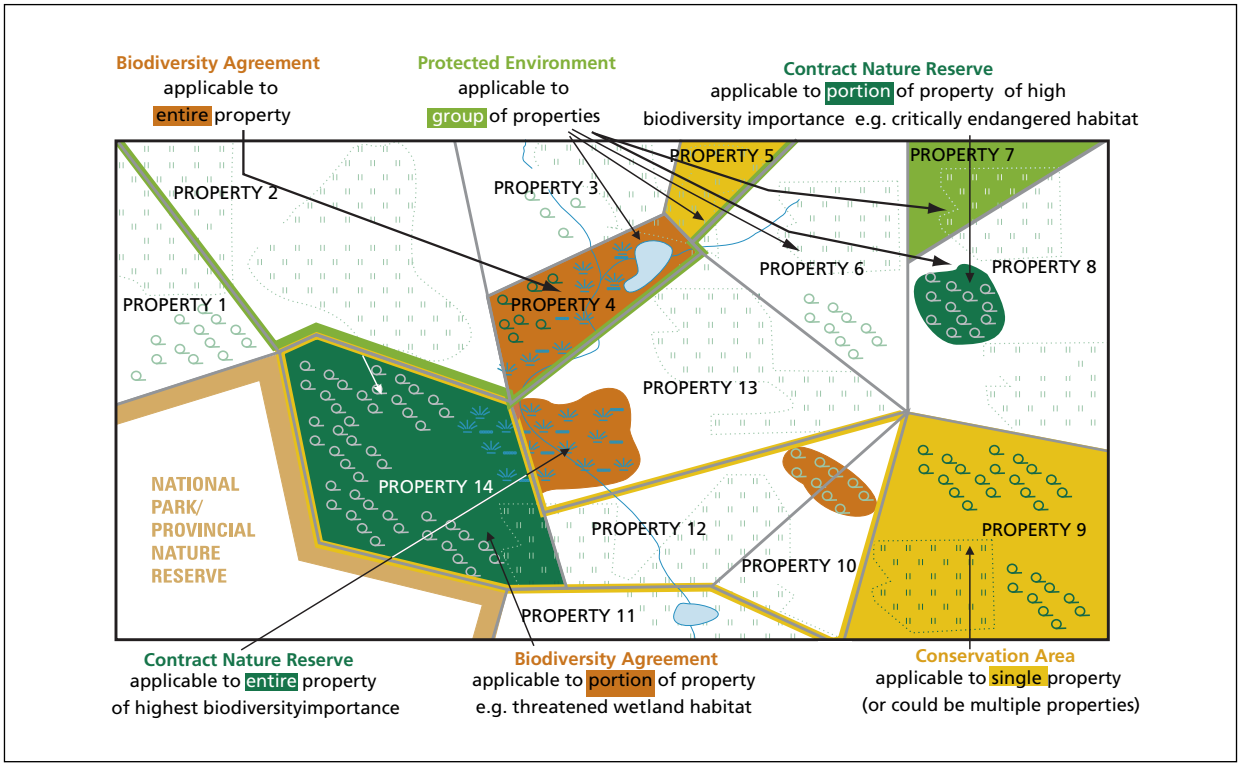


Figure 4.3 Hypothetical map showing how biodiversity stewardship agreements could be implemented in a landscape

Reserves provide greater conservation security because they have legal standing, either under contract law or national legislation relating to biodiversity, but they take longer to put in place.

Biodiversity Agreements are entered into under contract law and, as a result, can be more flexible than the other categories, and they do not require the lengthy process of declaration under the Protected Areas Act. For these reasons, it has been possible to set up many Biodiversity Agreements in a relatively short period of time. Biodiversity Management Agreements are provided for by the Biodiversity Act, but none have been set up yet, as they require a fairly complicated and time-consuming process to put in place.

Protected Environments provide a relatively high degree of site security, and provide a suitable option when the biodiversity importance of the site is high but where a range of other land-use types, in addition to conservation management, is in place.

Nature Reserves provide the greatest degree of protection, and are of longest duration, but they place the greatest restrictions on land-use options and take a longer time to be finalised. They should only be declared on land of the highest biodiversity importance.

Although the biodiversity stewardship categories fit together in a tiered approach, a landowner or community with land of biodiversity importance can enter a biodiversity stewardship programme at any point in the hierarchy, although it is preferred if they enter at the highest level that is appropriate. In some cases, landowners do not feel ready to place the necessary trust in the provincial conservation authority to conclude an agreement at the higher levels, or over a long time period. If they enter at a lower level, such as a Conservation Area or Biodiversity Agreement, they have the option to move into a more formal agreement at a later stage, if the land is of high biodiversity importance. If the biodiversity importance of the land is relatively low, however, it is not possible to take part in the programme at higher levels in the hierarchy.

The biodiversity stewardship category that is most appropriate for a particular site will be determined by a number of factors including biodiversity considerations, land tenure arrangements and landowner willingness. A biodiversity stewardship agreement can apply to a portion of a property, an entire property or group of properties, and different stewardship categories can be implemented side by side in any particular landscape, as illustrated in Figure 4.3 on page 72 and discussed in the Umgano case study.

CASE STUDY The Umgano Community Project – providing multiple options for conservation and livelihoods

The Umgano Community Project in KwaZulu-Natal province provides an example of biodiversity stewardship involving a rural community. This is an initiative of the Mabandla Traditional Authority, which is administered by a legal entity (a community trust) established by the authority to further its business interests.

Umgano community stewardship site with grasslands and pockets of forest, KwaZulu-Natal province

Women of the community celebrating conclusion of the biodiversity stewardship agreement

The primary aims of the project are to:

- benefit the people of the Umgano region through promotion of sustainable land uses and the creation of business and employment opportunities
- conserve the natural environment, biodiversity, scenic beauty and cultural resources of the area and sustain the provision of ecosystem services such as water production, natural products and other benefits.

The Umgano biodiversity stewardship site is some 7,000 hectares in extent in the deeply rural Umzimkhulu region of southern KwaZulu-Natal. Most of the area is government-owned land, on lease to the local community, but some of it is under direct communal ownership. The site lies within the Maloti-Drakensberg Transfrontier Conservation Area on the border of the Ukhahlamba-Drakensberg World Heritage Site, and is situated between two provincial Nature Reserves and two protected indigenous forests. The Umgano landscape is important for water production, and dominant habitat types include high altitude grasslands, wetlands and indigenous forests that are home to large numbers of endemic birds.

The biodiversity in the area was assessed by the provincial conservation authority and found to be of exceptional importance, and mostly in good condition. A land-use zonation plan has been drawn up in consultation with the community for different land-use types including agriculture, livestock management, commercial afforestation and conservation management, thus providing a range of livelihood options for the Umgano community.

Long-term protection of those portions of the land with highest biodiversity importance has been secured through the conclusion of a Nature Reserve agreement with the community leadership, pending the transfer of land ownership from the government to the community. Once this area has been legally declared in terms of the Protected Areas Act, it will enjoy the same status as the existing state-owned provincial Nature Reserves, but ownership will remain with the community.

A Biodiversity Agreement is being put in place for another portion of the land, to enable the conservation of important biodiversity whilst allowing the community to put the land to commercial use. Grasslands surrounding commercial timber plantations are being used by the community for a sustainable commercial livestock project, which complies with conservative stocking rates specified by the Department of Agriculture.

In all categories of biodiversity stewardship, a management plan must be drawn up and implemented by the landowner(s) with ongoing support from the conservation authority, which also audits adherence to the management plan. This, in itself, is an important tool for improving general landscape management and provides opportunities for more effective management of important biodiversity and threatened ecosystems. In southern Mpumalanga province, 18 commercial farmers in the Luneberg district have agreed to their properties being declared as a Protected Environment. On the Agulhas Plain, 23 landowners and communities have also applied for Protected Environment status for their Nuwejaars Wetland Special Management Area. Establishing Protected Environments has allowed these farmers to build a sustainable production landscape and protect their livelihoods, at the same time as contributing to the protection of critically important grassland biodiversity and wetland ecosystems (see case studies on pages 75 and 154).

CASE STUDY Establishing a Protected Environment in a working landscape – the Luneberg demonstration area

Luneberg occurs in southern Mpumalanga province, in an area where the economic mainstay is livestock farming, with small-scale forestry and crop cultivation as secondary sources of livelihoods. The Mpumalanga Tourism and Parks Agency, in partnership with a non-governmental organisation (WWF-SA) and the Grasslands Programme (see Chapter 7), has been working with the Luneberg commercial farming community to develop biodiversity stewardship agreements on their land, in order to secure the protection of priority land of high biodiversity importance.

Most of the Luneberg region is still natural grassland, but the area is under severe pressure from unsustainable land-use types, principally coal mining. The Luneberg commercial farmers have indicated their willingness to establish a Protected Environment in an area covering about 24,000 hectares. This biodiversity stewardship agreement, which will apply to multiple properties, will provide secure long-term protection for this area of high biodiversity importance. Improved management of the grassland areas located within the Protected Environment will support a sustainable livestock management system.

Declaration of the Protected Environment is also seen as an emergency measure to avert land-use change from current sustainable livestock farming practices to unsustainable and incompatible practices such as mining, although declaration of a Protected Environment does not necessarily mean that mining cannot take place. It is envisaged that, in time, proclamation of key properties as Nature Reserves will provide even more secure long-term protection in areas of greatest biodiversity importance.

Benefits accruing to landowners who are part of the Protected Environment include supportive training, assistance with management, and implementation of good practice guidelines for agriculture and tourism.

Luneberg landscape with cattle, Mpumalanga province

Although the primary purpose of biodiversity stewardship is to conserve important biodiversity, it is also making an important contribution to rural development at a number of sites involving beneficiaries of South Africa's land reform programme. The South African government seeks to address historical racial inequalities in ownership of land, and to promote the establishment of sustainable rural communities in parts of the country where few economic development opportunities exist. Where the land in question is of high biodiversity importance, biodiversity stewardship provides opportunities for generating a range of livelihoods based on conservation management and other biodiversity-compatible land uses. The Somkhanda Game Reserve project in northern KwaZulu-Natal demonstrates how biodiversity stewardship in the context of land reform can successfully deliver both conservation and socio-economic benefits to communities (see case study on page 76).

CASE STUDY The Somkhanda Game Reserve project – land restitution with conservation benefits

Somkhanda Lodge, Somkhanda Game Reserve, KwaZulu-Natal

In the northern parts of KwaZulu-Natal province, close to the Mozambique border, the Gumbi community opted to conclude a Nature Reserve agreement on conservation-worthy land it owns. The area to be conserved, which is called the Somkhanda Game Reserve, is part of a land restitution project in which the community successfully reclaimed 21,500 hectares of land. The Gumbi tribe has a long history of settlement in northern KwaZulu-Natal. At the end of the 1800s, the people were forcibly removed from the land and settled elsewhere.

In the early 1990s, under the leadership of their traditional Chief, the tribe initiated land negotiations as part of South Africa's land reform process, and secured a small area of land in the region. By the mid-1990s, the Gumbi had successfully reclaimed their former land in terms of land reform legislation introduced by the new democratic government. The tribal authorities formed a legal entity, the Emvokweni Community Trust, which allowed them to take ownership of the land. Negotiations between the provincial conservation authority, Ezemvelo-KZN Wildlife, and the community commenced in July 2008, and a biodiversity site assessment was conducted. This indicated that the Somkhanda project area included land of very high biodiversity importance and that it was eligible for the Nature Reserve category in the biodiversity stewardship model. One year later, following extensive consultation between a biodiversity stewardship facilitator (employed by Ezemvelo-KZN Wildlife) and the community, the biodiversity stewardship agreement to establish the Somkhanda Game Reserve was signed. The Reserve includes a tourist lodge and a residential estate, benefits of which will be transferred to the community. The bulk of the land was set aside for the Reserve, but a small portion was retained for settlement and for cattle grazing.

How will the community benefit from biodiversity stewardship?

Sustainability is the key to successful management of important biodiversity on communally owned sites. Key elements for success in the case of Somkhanda include:

- **Strategic business partnerships**: A private property development company came on board as a partner in this project to develop a residential estate linked to the game reserve. Monetary benefits accruing to the community as a result of this development will provide the necessary resources for management of the game reserve, the development of tourism opportunities and the provision of housing and accommodation for the community.
- **Planning and management support**: Both the provincial conservation authority and a well capacitated conservation NGO, the Wildlands Conservation Trust, are assisting the community with development of a management plan, mapping of invasive alien plants, development of an invasive alien species strategy and the donation of game to stock the reserve.
- **Training and capacity building**: The community is being empowered to manage the game reserve through a range of training programmes, including accredited law enforcement training and use of a Global Positioning System-based patrolling system.

Gumbi community leaders sign the Somkhanda biodiversity stewardship agreement

Principles of biodiversity stewardship

Biodiversity stewardship is underpinned by a number of key principles relating to biodiversity importance of the site, site security, voluntary commitment, landowner-focussed extension, co-operation and monitoring and evaluation, as follows:

- **Biodiversity is the bottom line**: Decisions on conservation investment must be defensible and based on the biodiversity importance of the land (drawing on systematic biodiversity plans and science-based site assessments), not on ownership, political affiliation or economic status.
- **Site security**: In order to maximise use of the state's limited resources and guarantee ongoing conservation, land of high biodiversity importance must be secured through formal agreements and legal contracts. Every effort should be made to implement the most secure biodiversity stewardship category appropriate to the biodiversity importance of the site.
- **Voluntary commitment**: Landowners or communities cannot be forced to enter into biodiversity stewardship agreements with a conservation authority; the decision to enter into the agreement must be voluntary, but may be based on extensive consultation and negotiation.
- **Landowner-focussed extension**: Proactive extension services are essential to secure buy-in from landowners, and biodiversity stewardship agreements must be backed up by resources and capacity to provide ongoing extension support to inform and support landowners.
- **Acknowledging people's needs**: Biodiversity stewardship can only be effective if the needs, motivations and expectations of those who own, live on and work on the land are clearly understood, and efforts are made to meet their needs.
- **Building co-operation**: In landscape-scale conservation management, strong partnerships based on mutual trust are needed across property boundaries (for example, for clearing invasive alien plants or flood mitigation), involving the state, conservation authorities, NGOs, private and communal landowners.
- **Monitoring of implementation**: Ongoing monitoring is important not only to determine the effectiveness of the programme in reaching set goals, but also to justify the resources used by conservation authorities for the programme, and to motivate for the provision of incentives.

Selection of biodiversity stewardship sites

The selection of biodiversity stewardship sites in South Africa is guided primarily by systematic biodiversity planning. In addition to biodiversity importance, the urgency for protection and landowner or community willingness are critical criteria in the selection process. The systematic biodiversity plan underpinning the National Protected Areas Expansion Strategy indicates broad focus areas for protected area expansion using means including biodiversity stewardship. At the regional and local scale, finer scale biodiversity plans are used to prioritise particular sites for biodiversity stewardship, with threatened ecosystems being an important criterion. The exact criteria used to govern site selection may vary from one part of the country to another, depending on other contextual factors, such as land tenure arrangements, ecology and existing land-uses.

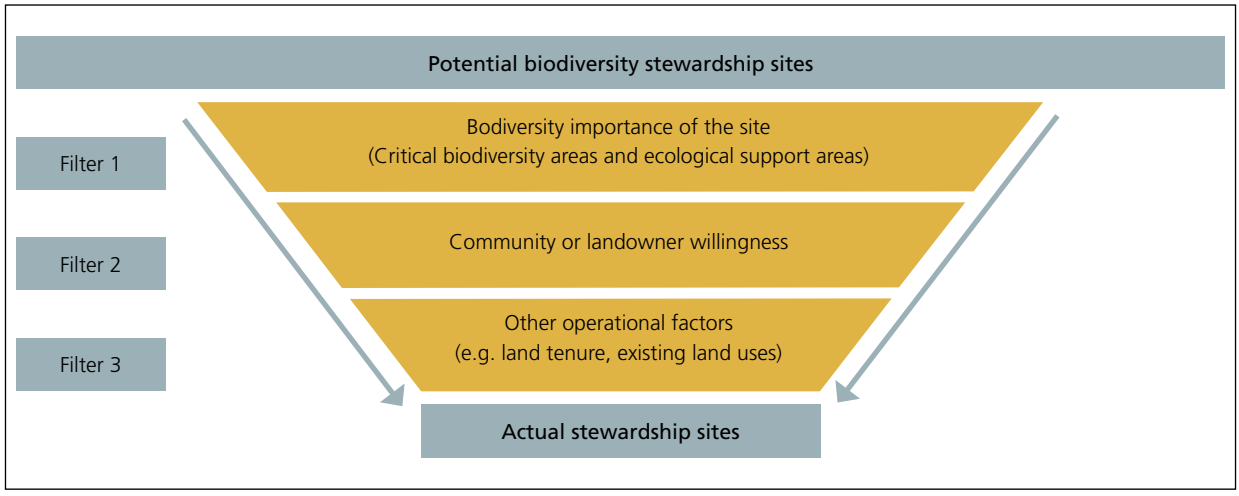


Figure 4.4 Filters used for selecting biodiversity stewardship sites

For all biodiversity stewardship categories except Conservation Areas, it is necessary for the relevant conservation authority to conduct a site assessment to determine the importance of the site in terms of biodiversity pattern and ecological processes. This assessment involves both desktop and field components and is intended to identify important biodiversity features of the site. Although species of special concern are noted in the assessment, it is the ecosystems and the ecological role of the site in its landscape or regional context that are most important. Table 4.1 on page 79 summarises the type of land to which each biodiversity stewardship category can apply, the qualifying criteria, legal status and duration of the agreement, benefits to landowners, and the types of land-use limitation that apply in each case.

Biodiversity stewardship programmes operating in South Africa

The biodiversity stewardship model described in this chapter has been implemented in South Africa over the past several years, and in that time has gained importance as a key mechanism to expand the protected area network through securing important biodiversity on land outside of state-owned protected areas. Some provinces have well developed biodiversity stewardship programmes, and others are in the process of initiating or establishing them. A national Biodiversity Stewardship Policy and a Biodiversity Stewardship Guideline Document have been developed by the Department of Environmental Affairs, in partnership with SANBI.

INFO BOX Provincial biodiversity stewardship programmes

Provincial biodiversity stewardship programmes are currently being implemented by the relevant conservation authority in five of the country's nine provinces: the Western Cape, KwaZulu-Natal, the Northern Cape, Mpumalanga and the Eastern Cape. A biodiversity stewardship programme is currently under development in Gauteng province.

These biodiversity stewardship programmes:

- identify suitable sites for biodiversity stewardship
- engage with landowners and communities to introduce the concept of biodiversity stewardship and discuss the biodiversity stewardship categories
- draw up contracts and conclude biodiversity stewardship agreements
- facilitate the protected area declaration process
- provide an extension service to participating landowners and communities, including assistance with the development and implementation of management plans
- audit the implementation of management plans.

Conservationist meeting with herdsmen living in high altitude grasslands, Matatiele district

Table 4.1 Biodiversity stewardship categories

(Note: Biodiversity Management Agreements are not included in this table as this category has not yet been used in South Africa)

Biodiversity stewardship category	Informal agreements (Conservation Area)	Agreements under contract law (Biodiversity Agreements)	Formal protected areas	
			Protected Environments	Nature Reserves
Degree of conservation security	Weakest	Intermediate	Intermediate to strong	Strongest
Purpose	Informal, flexible agreements that enable landowners or communities to conserve and manage their properties; may provide a platform for greater site security later	A formalised partnership between a landowner or community and the conservation authority, to improve management of specific biodiversity features or elements of landscape	Flexible category providing medium to long term protection of important biodiversity, but allowing some other land-use types that are compatible with wise biodiversity management	Provides long-term protection and management of important biodiversity on private or communally owned land; this category is preferred for sites of highest biodiversity priority
Qualifying criteria	Any natural land (If rare or threatened ecosystems or species are present, rather progress to higher level of conservation security) Applicable to portion of a property, whole property or groups of properties	Land of at least moderate biodiversity importance Applicable to portion of property, whole property or group of properties	Landscapes that include areas of biodiversity importance that require conservation management; other biodiversity-compatible land uses acceptable Applicable to an individual property or group of properties	Areas of highest biodiversity importance; contain critically important ecosystems, habitats and species and conservation management is the primary land use Applicable to portion of a property or a whole property
Legal status	No legal status Voluntary Memorandum of Agreement (non-contractual), registered with conservation authority	Legal status under contract law Contract between landowner and a conservation authority	Declared in terms of national legislation governing protected areas (Protected Areas Act)	
Duration	Flexible, no fixed period of commitment	Minimum period of 5-10 years preferred. May be longer (even in perpetuity)	Minimum 30 years preferred (may be in perpetuity)	Minimum 30 years, but preferably 50 or more or in perpetuity
Land-use limitations	Few limitations but area must retain its overall natural character. Invasive alien plant clearing plan must be put in place	Few land-use limitations; the property or properties to which the agreement applies must be kept in a natural or near-natural state and must be managed in accordance with the agreed management plan	Biodiversity-compatible land-uses permissible (determined by provisions in the declaration notice), area should be kept in a natural or near-natural state and must be managed in accordance with the agreed management plan	Land use restricted by provisions of the Protected Areas Act governing Nature Reserves; to be kept in a natural or near-natural state and must be managed in accordance with the agreed management plan
Benefits to landowners	Basic extension services (e.g. advice on habitat management) Guidance on management plans and farm maps	Advanced extension services (e.g. planning for invasive alien clearing)] Specific agreements for fire, invasive alien species, plant and animal management	Advanced extension services Use of the landscape regulated through co-operation between landowners Some income tax deductions	Advanced extension services and practical assistance with habitat management Increased recognition and marketing exposure Income tax deductions and municipal property rates exclusions

4 Incentives for biodiversity stewardship

In order to make biodiversity stewardship more attractive to private and communal landowners, the conservation sector has facilitated the development of incentives and other mechanisms to support landowners who enter into these agreements. A range of mechanisms is needed, both to match various biodiversity stewardship categories and to meet the needs of the wide range of stakeholders who could potentially be involved. These mechanisms provide incentives that range from financial and tangible, practical benefits to non-financial and less tangible benefits, relating to social, cultural or moral factors.

Fiscal or tax-based incentives

The extent of the incentives which may be applicable to a particular landowner depends on the degree of security of the biodiversity stewardship agreement. More secure agreements, demanding a higher level of commitment and cost from the landowner, usually qualify for more substantial incentives. Fiscal incentives for biodiversity stewardship are currently limited in South Africa; however, an innovative income tax deduction for private landowners who have entered into statutory biodiversity stewardship agreements was included in new legislation from 2009.

In introducing these income tax deductions, National Treasury has recognised that landowners who make a commitment to securing biodiversity on their land have foregone use rights with inherent value, and also that they often incur substantial costs in managing their land under these agreements. This follows years of research and lobbying undertaken by a non-governmental organisation, the Botanical Society of South Africa, in partnership with the Department of Environmental Affairs, and establishes an excellent new tool to further biodiversity stewardship work.

These tax-based incentives are only relevant for those landowners who have important biodiversity on their land and who are making significant taxable income from this land.

A further incentive is provided by the Municipal Property Rates Act (2004) which stipulates that Nature Reserves are excluded from paying property rates. These exclusions apply only to land that has been declared under the Nature Reserve biodiversity stewardship category, and only to the parts of the property that are not used for commercial, business, agricultural or residential purposes.

Beyond this clause, local municipalities may implement a number of mechanisms to encourage biodiversity stewardship. These include offering property rates rebates or exemptions for various biodiversity stewardship categories or adjusting property valuations. The income tax deductions and property rates exclusion that might be applicable under different biodiversity stewardship agreements are summarised in Figure 4.5. Most often, though, it is the management-related and social benefits that attract landowners to biodiversity stewardship programmes.

INFO BOX Examples of incentives for biodiversity stewardship

Fiscal incentives	• Tax deductions • Municipal rates exclusions and rebates
Management related benefits	• Technical and professional advice, such as assistance with development of management plans • Management assistance and support and access to public works funding, such as clearing of invasive alien plants, fire management, law enforcement, habitat rehabilitation
Social benefits	• Partnerships and co-operation among landowners, between landowners and the authorities, and with nature-based commercial ventures • Access to marketing resources • Public recognition • Training opportunities to landowners

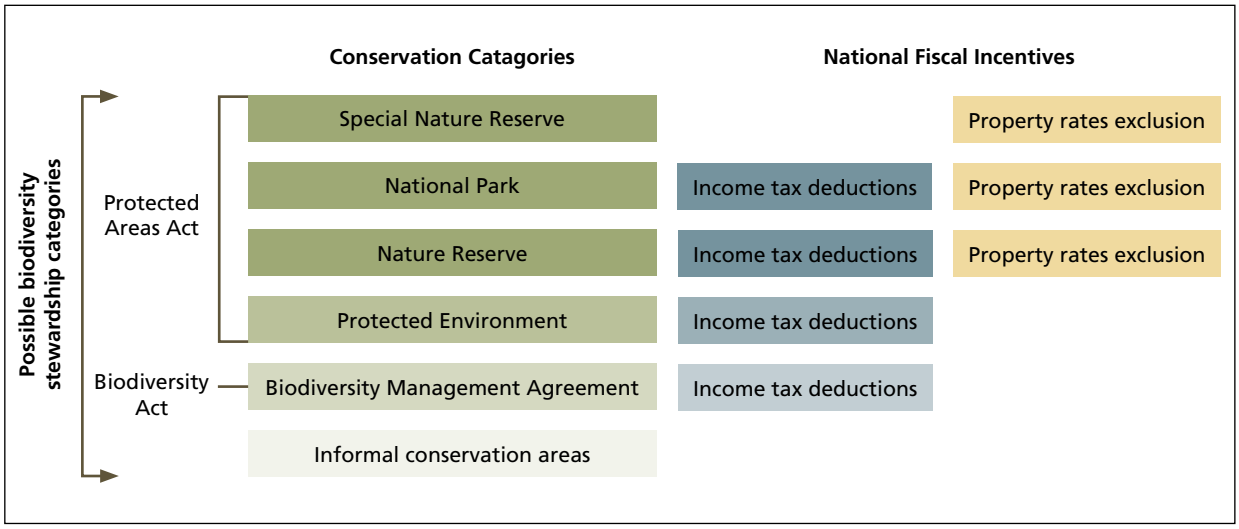


Figure 4.5 Tax-based incentives applying to different biodiversity stewardship agreements

Management-related and social incentives benefits

Financial incentives to landowners to enter biodiversity stewardship agreements are currently few, but there has been no shortage of willing participants in biodiversity stewardship programmes in South Africa. The factors that motivate landowners to enter these agreements vary widely depending on individual circumstances – land-tenure arrangements, livelihoods and the purpose for which the land has traditionally been used, and numerous other socio-economic and personal factors, will all have bearing on the decisions landowners take about their land.

In many cases, private landowners feel a strong sense of responsibility towards those who might inherit the land from them, and are most interested in ensuring that their land will be protected into the future. In general, once the biodiversity importance of the land has been understood by the landowner, there is strong interest in protecting it. The recognition afforded to them for the important contribution they are making towards national conservation goals often emerges as a strong motivating factor. This recognition also helps landowners with branding their product, be it niche farm products such as cheese or wine, or tourism.

On communal land, where poverty is a serious issue, the community needs to gain tangible economic benefits from a biodiversity stewardship agreement. These could come from assistance with sustainable use of the land and natural resources, or assistance with a conservation-related business initiative, such as game farming.

Landowners sharing learning in the field

There are numerous management-related and social benefits to be gained by landowners and communities who enter into biodiversity stewardship agreements, the degree of benefit increasing as site security increases, as indicated in Table 4.2.

Table 4.2 Benefits to landowners

	Conservation Areas	Biodiversity Agreements	Protected Environments	Nature Reserves
Management assistance and social benefits	Primarily motivational and recognition-based Basic extension support "Feel-good" incentives: Memoranda of Agreement, plaques, certificates	Specialist advice from provincial authorities Assistance with development of management plans Specific agreements for fire and invasive alien (plant and animal) management	Advanced extension services Assistance with management of natural habitat and development of management plans Regulation of landscape use through co-operation between landowners	Advanced extension services Assistance with habitat management Increased recognition and marketing exposure Greater support from conservation authorities (e.g. with lobbying for rates exemptions)
Financial incentives			Possible income tax deductions	Exclusions from municipal property rates Possible income tax deductions relating to management plan expenses and land values

For commercial farmers, one of the strong incentives for entering into these programmes is the assistance received from the relevant conservation authority with sustainable land management. Also important are other management and service-related benefits such as the development and implementation of management plans that are needed for meeting certification requirements for particular agricultural products. Examples from the wine industry are provided in the case study below.

CASE STUDY Factors motivating farmers to enter into biodiversity stewardship agreements – examples from the wine industry

The factors that motivate landowners to enter biodiversity stewardship agreements may vary widely, depending on land-tenure arrangements, the purpose for which the land is used and other socio-economic and personal circumstances.

In the Western Cape province, many of the biodiversity stewardship agreements that have been concluded involve commercial wine farmers. Through the Biodiversity and Wine Initiative (see Chapter 5) over 100,000 hectares of important biodiversity has been placed under conservation management through biodiversity stewardship and other landowner agreements. Some of the reasons why these landowners have entered into biodiversity stewardship agreements areas as follows:

Assistance with sustainable land management: One of the most important incentives for wine farmers has been assistance with sustainable land management.

A Biodiversity and Wine Initiative farm

Grape-pickers in the Western Cape

In some cases, landowners may be motivated by the direct benefits to them of sustainable land management – for example, management of invasive alien plants reduces fire risk and increases water availability, and natural pest control provided by adjacent natural areas is cost-effective. Usually this happens when these ecosystem services are meaningful for agriculture from a financial perspective, or can promote income generation from natural veld, through tourism or wildflower harvesting.

Farmers who enter into biodiversity stewardship agreements are assisted by the conservation authority, CapeNature, to secure funding for the implementation of management plans on sites that are top priorities for conservation. In 2010, funding was secured for support teams to undertake clearing of invasive alien plants and fire break maintenance. It is hoped that private and government funds can be sourced to provide permanent teams, and assistance with fencing of important areas.

Assistance with management plans for meeting certification standards: For those farmers who sign formal biodiversity stewardship agreements, CapeNature draws up a detailed management plan for the landowner, saving a cost of some R20,000 (about US$3,000) which would be spent if the farmer had to contract the services of a consultant. These management plans are required for the farmer to meet certification standards for their produce, and to link with associated marketing schemes, but they also provide for improved conservation management such as integrated management of invasive alien plants, fire and wetland systems. CapeNature stewardship officers provide ongoing support to maintain and implement these management plans, with one stewardship officer for 15 farmers.

In addition to these benefits related to land management, landowners in the Cape winelands have decided to set aside land for conservation for a range of social and economic reasons, including that they believe it is important to play a role in safeguarding biodiversity whilst sustaining economic growth and development.

Natural vegetation on Mooiplaas wine estate

5 Why these tools work in South Africa

Progress with concluding biodiversity stewardship agreements is currently advanced in only two provinces, and is limited by a shortage of capacity in terms of staff and operating budgets. The biodiversity stewardship model allows for the costs of biodiversity conservation to be shared between the state and landowners, and is a much more cost-effective model of protected area expansion than acquisition of land. Even so, biodiversity stewardship is resource-intensive, as all agreements must continue to be serviced by the provincial conservation authority, and this requires ongoing support to landowners. The challenge is not only to increase human capacity and financial resources for rolling out biodiversity stewardship countrywide, but also to ensure that adequate time can be given to build and maintain the positive relationships on which biodiversity stewardship depends.

Despite these challenges, biodiversity stewardship programmes are gaining momentum rapidly in South Africa. In the Western Cape alone, 38 Nature Reserves, 19 Biodiversity Agreements and 24 informal Conservation Areas, collectively accounting for nearly 70,000 hectares of important biodiversity, have been concluded in the space of the last five years. Although the biodiversity stewardship model has been in place for only a few years, it is well established as a key mechanism for protected area expansion, and the reasons for this success include:

- The biodiversity stewardship model being applied in South Africa provides a small number of straightforward categories aligned with national legislation, which can be applied nationwide, with clear benefits to landowners from their participation.
- The model provides multiple ways of achieving site security, and it has proved most effective to employ a variety of these, depending on landowner preferences and on the biodiversity importance of the land.
- The model is being implemented strategically, focussing on sites that have been identified through systematic biodiversity planning as most important for expanding the protected area estate. This means that the limited resources available for implementing biodiversity stewardship can be deployed as effectively as possible.
- Although the practice in this area of work developed from the ground up, with the development of national policy and guidelines following later, the enabling provisions in the Protected Areas Act laid a crucial basis for the piloting and development of the model.
- Application of the model in large parts of the country is made relatively simple by the fact that much of South Africa's land (some 80%) is under private ownership; however, the model is equally applicable in areas under communal land tenure. Declaring a Protected Environment or Nature Reserve on communal land requires that the holder of the title deeds, which may be the community or the state, agrees to the land being declared as a protected area. If the title deed holder is the state, then it is still possible to proceed with the declaration with the agreement of all parties, but this can take a long time. In such cases, it is possible to enter into either an informal agreement (a Conservation Area) or an agreement under contract law (a Biodiversity Agreement) to provide some site security in the interim.
- Considerable time and effort is spent on ensuring a strongly participatory and transparent process at every step in setting up a biodiversity stewardship agreement. Biodiversity stewardship facilitators, who are employed by the conservation authority, serve as "honest brokers" in the negotiations with landowners and communities and ensure that there is effective communication throughout the process. The facilitators require good ecological knowledge as well as strongly developed interpersonal and facilitation skills.
- Availability of systematic biodiversity plans has greatly assisted in the identification and assessment of potential biodiversity stewardship sites. This is particularly important when considering the establishment of a Protected Environment or Nature Reserve, as these categories only apply to land that is of high biodiversity importance.
- The availability of catalytic donor funding has been important in helping biodiversity stewardship programmes gain critical mass in a relatively short space of time. It also made it possible for conservation authorities to explore innovative models that were potentially risky, and which might not have been possible to pilot with state funding.
- Involvement of well capacitated NGOs has played

Golden Gate Highlands National Park, Free State province

a critically important role in the development and implementation of biodiversity stewardship. Effective partnerships between these organisations and government departments with a mandate for biodiversity conservation have facilitated effective implementation, where action by either side alone would not have succeeded.

- The approach was piloted initially in only one province to establish "proof of concept", before being taken up by other provinces.

Biodiversity stewardship provides a powerful tool for placing critical biodiversity on privately or communally owned land under greater protection, whilst recognising the rights of landowners and communities to live on and benefit economically from their land. For this reason, biodiversity stewardship is emerging as a key tool for achieving sustainable production landscapes in South Africa, and has provided the basis for engagements with producers of important agricultural products such as wine, potatoes and red meat. For biodiversity stewardship to be most successful, it needs to be nested within a landscape approach to biodiversity management that includes interventions to improve the production practices employed by key economic sectors such as agriculture, forestry, fisheries and mining. Tools for conserving biodiversity and promoting sustainability in production landscapes are discussed in Chapter 5.

5

Tools for working in production landscapes

Included in this chapter:

- Working towards sustainable production landscapes
- Tools for working in production landscapes
- Best practice production tools for: potatoes, sugar, red meat and wildflowers
- Tools for protecting biodiversity in production landscapes: biodiversity stewardship (wine-farming); planning and regulatory tools (plantation forestry)
- Tools for creating markets for biodiversity-compatible products: eco-labelling and certification (wildflowers, rooibos tea), and consumer awareness campaigns (fisheries)
- Implementation, outcomes and impacts on biodiversity
- Why these tools work in South Africa

1 Working towards sustainable production landscapes

Adopting a landscape approach to biodiversity conservation involves working within a mosaic of land uses that take place in production areas, developed areas, and natural areas, some of which may be formally protected. Inevitably, any form of land-use other than formal protection impacts to some extent on biodiversity, as ecosystems are modified for human use. Achieving sustainable production landscapes (see info box) involves identifying natural areas that can be conserved or protected within a matrix of other land uses, and putting into practice interventions that improve the biodiversity-compatibility of production, reduce negative ecological impacts, and enhance livelihoods.

Over 75% of terrestrial landscapes in South Africa are managed by farmers, and many critical biodiversity areas lie within these agricultural landscapes. For this reason, the primary focus of work with production sectors in this country has been on agriculture. Through these engagements, key lessons have been learnt and applied to other economic sectors such as plantation forestry, fisheries and mining.

The primary concerns of conservationists in South Africa have been to stem the loss of natural habitat in production landscapes, and to reduce the negative environmental impacts of unsustainable production practices. In a landscape approach, a variety of tools is necessary for simultaneously sustaining production and conserving biodiversity. Land-use planning and decision-making and law enforcement need to be combined with formal protection of important biodiversity, and proactive engagements that can raise awareness of the value of biodiversity, bring about voluntary changes in attitudes and the adoption of more biodiversity-compatible production methods.

Approaches are needed that: (i) recognise the land-use rights of landowners; (ii) address the challenges faced by agriculture and other production sectors; (iii) respond to broader environmental concerns as well as social and economic factors; (iv) are applicable across entire sectors and value chains, and (v) can be implemented alongside other activities that influence land-use practices in production landscapes.

In any economic sector there is a value chain that provides multiple opportunities for engagement to achieve greater biodiversity-compatibility (see Figure 5.1 on page 89). Real penetration within an economic sector requires a combination of tools that shift production practices to be more biodiversity-compatible, establish markets for the resultant products and guide the choices that consumers make (Petersen and Huntley, 2005). Working in partnerships that span industry, the public sector and civil society, complementary tools can be implemented with the overall purpose of reducing biodiversity loss and maintaining healthy ecosystems, whilst maintaining the profitability of enterprises and delivering benefits to broader society.

These principles and approaches have been adopted in a number of business and biodiversity initiatives that have

INFO BOX What is a production landscape?

In this book, the term "production landscape" is used to refer to landscapes in which land use is directed primarily towards economic activities that modify natural ecosystems to generate products for human consumption or use. These landscapes span those in which potentially biodiversity-compatible land uses, such as grazing of livestock, take place in combination with some form of conservation management, through to heavily modified landscapes that are used primarily for intensive production, such as large-scale crop monoculture or mining. Production landscapes also include those that support subsistence or commercial wild-harvesting of natural products to provide livelihoods for local communities.

Agricultural landscape, Upper Breede River, Western Cape

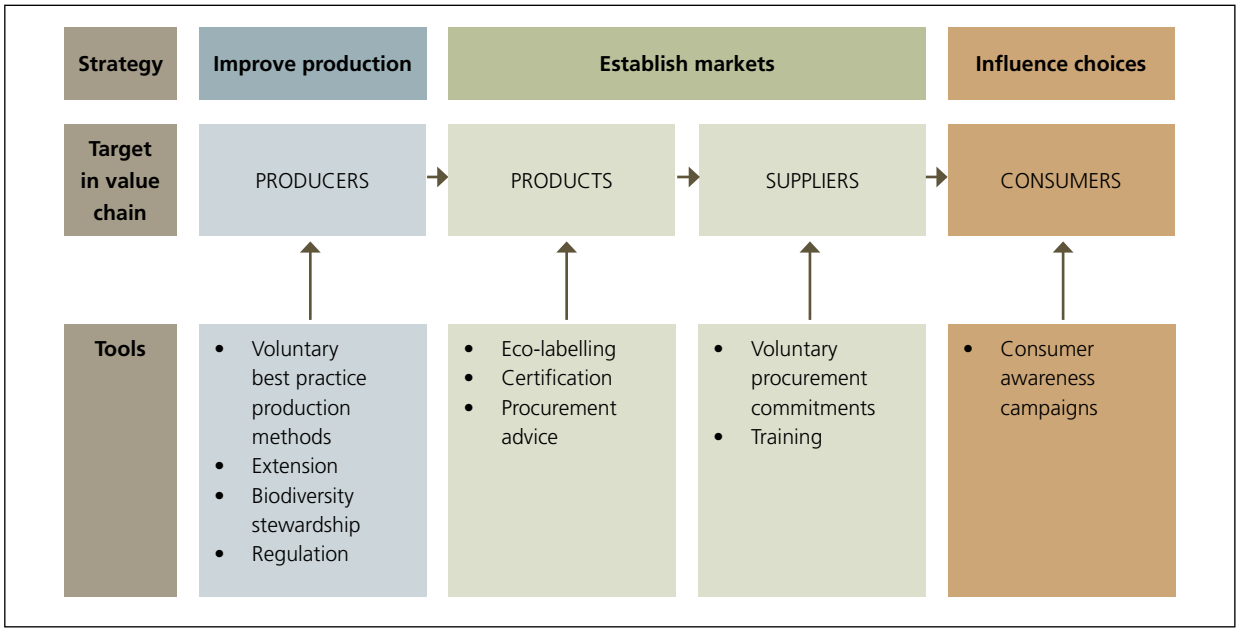


Figure 5.1 Interventions can be targeted at different points along the value chain

emerged in South Africa in the last decade involving agriculture, commercial wild-harvesting of natural resources, plantation forestry, fisheries and mining. Some of the key tools that have been developed and used in these initiatives are showcased in this chapter.

Although it is generally too early to assess the impact that implementation of these tools is having on biodiversity, they do enable a new approach for working in production landscapes and it is in this context that they are presented below.

2 Tools for working in production landscapes

This section describes the tools that have been developed in South Africa for achieving sustainable production landscapes, principally in agriculture, but also using examples from other sectors. These tools include best practice production guidelines, regulatory and planning tools, biodiversity stewardship, eco-labelling and certification, procurement advice and consumer awareness campaigns. In certain sectors, such as the wine industry, this full spectrum of tools is being used across the entire value chain (see Figure 5.1), whilst in others, like fisheries, the focus has been on tools that target particular parts of the value chain (see Table 5.1).

Table 5.1 Summary of the types of tools that have been developed in various production sectors

Sector	Types of tools currently available
Agriculture	Best practice guidelines, biodiversity stewardship agreements and extension services, agricultural extension to promote sustainable farming, eco-labelling, procurement advice and consumer awareness, proactive planning using maps of critical biodiversity areas
Wild-harvesting	Guidelines for sustainable harvesting, training, eco-labelling and certification
Plantation forestry	Biodiversity stewardship, biodiversity planning tools, certification and guidelines for small-grower forestry expansion
Fisheries	Procurement advice and training (working with retailers and suppliers), consumer awareness campaigns, ecosystem approach to responsible fisheries
Mining	Biodiversity offsets, guidelines for rehabilitation, advisory forums, enforcement of compliance

The need for new production practices

The population of South Africa is currently about 48 million, and is expected to double in the next 25 years (Scotcher, 2010). Production sectors are under increasing pressure to intensify their outputs to meet rising food, product and development demands in domestic and global markets. This, and the need to sustain profitability, has led, in some instances, to the use of unsustainable production practices that impact negatively on biodiversity and ecosystems. For example, in the agricultural sector, some farmers have expanded the area of land used for production and increased the use of pesticides, fertilisers and water. Uncontrolled, these practices can lead to declining soil health, worsening soil erosion, water pollution, ecosystem degradation, and changes in biodiversity including significant loss of natural habitat. These processes also degrade farmland, reducing its productivity and resilience to climate change (see info box).

Centre-pivot irrigation used for intensive commercial crop cultivation

INFO BOX Agriculture and climate change

Agriculture contributes to climate change and is also vulnerable to its anticipated effects. Modern farming contributes over 30% of global greenhouse gas emissions. Carbon dioxide is emitted in huge quantities when forest or grassland is converted to agriculture and again when soil is ploughed. Nitrous oxide (which is 300 times more potent than carbon dioxide as a greenhouse gas) is emitted by nitrogen fertilisers, which inefficiently release much of their nitrogen into the atmosphere. Livestock produce both nitrous oxide and methane, making them responsible for more greenhouse gases than are released from vehicles that run on fossil fuels (Scotcher, 2010).

In general, climate change is expected to be harmful to farming in South Africa, as agriculture is heavily dependent on climatic variables (as seen during the 1994/95 droughts when the maize harvest dropped by 42% in one year). Less water, declining water quality and growing water demand are amongst the biggest threats to agriculture in South Africa. The country's rain-fed croplands and rangelands are the most vulnerable to climatic changes, with irrigated farms cushioned against rainfall variability by having a substitute for rainwater. South Africa's rangelands are also at risk due to increased aridity and declining productivity. In addition to reduced water, greater infestation by invasive alien species and pathogens is expected to impact severely on agricultural productivity (Vitousek *et al.,* 1997).

Both gains and losses are expected as a result of climate change, specific to each farming system and each province. The challenge is for South African agriculture to adapt fast enough to a changing climate, and to shift production practices to reduce their carbon footprint and their impact on the resilience of natural ecosystems. Adaptation activities align well with sustainable land-management practices and include using different crop varieties, more efficient use of water, reduced stocking rates, restoration of wetlands and catchments, using composted manures rather than synthetic fertilisers and reducing tillage (Scotcher, 2010).

INFO BOX A profile of the agricultural sector in South Africa

South Africa's agricultural sector is characterised by a dual economy with a well-developed commercial sector and a predominantly subsistence-orientated sector in communal areas. Water availability, climatic factors and soil quality limit agricultural expansion, and although nearly 86% of the land is zoned for agricultural use, only 13% of total land area is arable and suitable for commercial crop production (*SA Yearbook*, 2008/9). The bulk of agricultural land in South Africa is used as rangeland for grazing cattle, sheep, goats and game.

Farmworkers in the Baviaanskloof, Eastern Cape

Water availability and quality are amongst the most significant factors limiting agriculture in South Africa. Although the majority of agricultural lands are rain-fed, approximately 90% of wine, fruit and vegetables and nearly 50% of all agricultural products are produced under irrigation (GreenChoice, 2009). The agricultural sector already consumes just over 60% of the country's water (the largest proportion consumed by any one sector), and is expected to increase its demand for water substantially in the coming years, especially if temperatures rise and rainfall variability increases, as is expected due to climate change. Given that South African water resources are already under severe pressure, improving water-use efficiency in the agricultural sector is an issue of serious concern, and, in many cases, has provided the stimulus to improve production practices.

Socially, agriculture is important as it has traditionally been the primary source of employment in rural areas. The agricultural sector contributed nearly R37 billion to the South African economy in 2007 (*SA Yearbook*, 2008/9) and although primary commercial agriculture contributes only 2.5% to Gross Domestic Product (GDP), the overall contribution of agro-industry to GDP is closer to 12% (*SA Yearbook*, 2008/9).

A key challenge facing agriculture is the skewed pattern of land ownership, a legacy of the apartheid political system that has proved difficult to address. In addition to ensuring that its growing population can be fed without compromising the natural resource base, South Africa needs to create a stable and prosperous rural population that is well serviced and that includes thriving cultivation and livestock businesses run by emerging farmers and by beneficiaries of land reform programmes.

Only a small proportion of South Africa's agricultural land is suitable for commercial crop production (see info box). Farmers are faced on the one hand with increasing pressure to intensify their output to improve food security, and on the other hand with the likelihood of decreased crop yields due to the expected impacts of climate change. According to predictions by the Intergovernmental Panel on Climate Change, the area suitable for crop cultivation, the length of growing seasons and yield potential will all decrease, particularly along the margins of semi-arid and arid areas. In the face of these threats to productivity, farmers need to find ways of sustaining or even intensifying agricultural production, without weakening ecosystem resilience through loss of critical biodiversity and ecological functioning.

It is well understood in the South African farming sector that conserving soil and natural habitat can contribute to improved soil fertility, more water capture, enhanced production and greater resilience to drought and other extreme environmental situations. The concept of "sustainable agriculture" builds on traditional ways of farming practised by many indigenous farmers before they were dispossessed of their land. Sustainable farming is also promoted through the LandCare programme (see Chapter 6) and agricultural extension.

Through the kinds of "business and biodiversity initiatives" described in this chapter, it has been possible to raise awareness amongst farmers of the importance of conserving intact biodiversity on farms, maintaining functional connectivity for the sustained provision of ecosystem services. These initiatives have also involved working with producers to direct production activities away from areas of highest biodiversity importance, and adopt production practices that are more resource-efficient.

3 Best practice production guidelines

Strong scientific research, backed up by legislation, has enabled the development of sustainable production and biodiversity best practice guidelines in a number of South African agricultural sectors, including wine, potatoes, sugar, wildflowers, mohair, rooibos tea and honey. Sustainable product options continue to grow in response to consumer demand and environmental necessity, and further best practice initiatives are currently being developed in a range of other agricultural sectors such as citrus, wool, red meat, ostrich and pecan nuts.

The development of best practice guidelines over the past decade has arisen from the dual efforts of conservationists concerned about loss and degradation of natural habitat, and producers concerned about sustaining their operations and profits. In some cases, best practice production guidelines have been developed as stand-alone products for a specific sector, such as mohair producers, or for farming a particular crop in a specific geographic region, like citrus farming in the Gamtoos River Valley. In many cases, though, best practice guidelines have been produced as part of a broader conservation programme in a region, and are implemented alongside other tools such as biodiversity stewardship agreements or eco-labelling and certification. In all cases, the best practice guidelines promote the idea that biodiversity conservation and ecosystem management should form an integral part of sustainable agricultural production (see Table 5.2 on page 93).

INFO BOX What is "best" practice?

This chapter describes "best practice" guidelines that are aimed at improving production practices in line with greater biodiversity-compatibility. In using this term, it is acknowledged that these guidelines represent best practice in terms of current knowledge, and that there are likely to be further improvements that can be made in the future to arrive at the best possible practice.

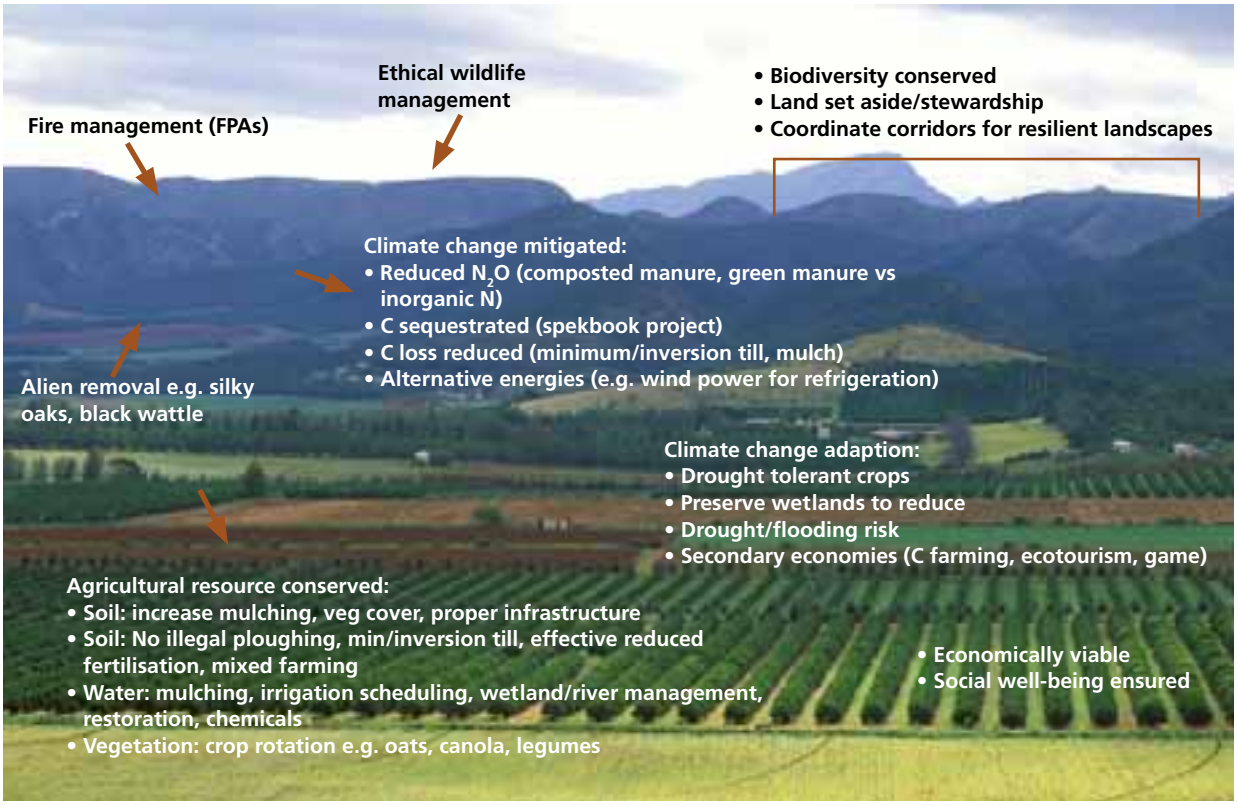


Figure 5.2 Production landscape showing agricultural best practices

Table 5.2 Types of criteria included in best practice production guidelines

Agricultural sector	Criteria included in best practice guidelines
Cultivation	Sustainable farming and biodiversity best practice, management of invasive alien plants, use of pesticides and weed management, soil management, management and conservation of threatened species and ecosystems, irrigation and river/wetland management, fire management, set-asides
Livestock (rangelands)	Stocking rates; grazing cycles, fire management; management and conservation of threatened ecosystems, erosion control, river and wetland management
Wild-harvesting	Harvesting techniques, off-take rates and harvesting cycles, fire management, species selection and determining standing stock

Although many farmers in South Africa are environmentally aware, commercial crop cultivation has resulted in extensive loss of natural habitat and has had negative ecological impacts overall. Simply increasing the use of current methods of production to respond to rising food or product demands is not desirable, and there has been a move towards promoting greater sustainability in cultivation practices, and conserving agricultural and natural resources. Two projects that have developed biodiversity best practice guidelines for the production of particular crops are showcased in this chapter – the Sandveld Potatoes Best Practice Farming Project, and the Sustainable Sugarcane Initiative.

Cultivation of potatoes in the Sandveld

The Sandveld region in the Western Cape province is an area of high biodiversity importance in which removal of natural vegetation for new potato fields is the single most important activity causing biodiversity loss. Potatoes enjoy popularity in South Africa as one of the most affordable staple foods, and potato production is the core economic activity in this arid region. Historically, the natural vegetation of the Sandveld was used mainly for cattle grazing, but when it was discovered that the soils were suitable for potato growing, large-scale conversion took place rapidly and vast tracts of land were ploughed and placed under centre-pivot irrigation for potato cultivation. This is because the economic returns from grazing were a fraction of those realised from potatoes (Ashwell *et al.*, 2006).

The total turnover for the potato industry in this region is about R400 million (about US$60 million) per year, providing employment opportunities to some 3,250 people. The input costs to farmers for maintaining these levels of production are high, and environmental and other farming conditions pose many challenges. With the exception of two growing areas that are situated along rivers, almost all of the irrigation draws

Potatoes

on groundwater which is being extracted at rapid rates and which is of unknown reserve volume and deteriorating quality. In recent years, dropping groundwater levels have posed a serious threat to the sustainability of potato farming, as well as to other livelihoods and biodiversity in the Sandveld – a situation that is expected to worsen as the drying effects of climate change are felt (Knight, Conrad and Helme, 2008).

The Sandveld is an area of high biodiversity importance for numerous reasons, including that:

- the core potato production area falls within an important ecological corridor, linking the Cederberg Mountains with the lowlands and the coast
- the area includes a coastal lake, Verlorenvlei, which is recognised as a Ramsar site (the water levels of which have been dropping alarmingly)
- there are many endemic, rare and threatened species and habitat types in the area and many that have already been lost to cultivation.

Working through multi-stakeholder partnerships, the Sandveld Potatoes Best Practice Farming Project (or Sandveld Potatoes Project) developed a set of guidelines as a tool to promote more biodiversity-compatible production practices and greater water-use efficiency in this region (see case study on page 94).

CASE STUDY Biodiversity Best Practice Guidelines for potato farming in the Sandveld

By 2006, the sustainability of potato farming and its impact on biodiversity and ecosystem services in the Sandveld had become a matter of concern for both the potato industry and conservationists. In response, key stakeholders including potato growers, industry associations such as Potatoes South Africa, NGOs, government departments and retailers, formed a partnership to address key issues and develop viable solutions. Potatoes South Africa and the provincial conservation authority, CapeNature, joined forces to develop a set of biodiversity best practice guidelines to stimulate greater awareness amongst producers, in favour of responsible farming practices.

Potato cultivation circles across the Sandveld landscape

The guidelines are not intended as a technical, step-by-step guide to the production of potatoes, but aim to limit the impact of potato production on natural resources, and to promote ecological sustainability and biodiversity conservation. They include information on general farming and biodiversity-compatible production practices, rehabilitation of degraded land, soil management, irrigation, use of fertilisers and integrated pest management. Biodiversity-related practices recommended in the guidelines include: leaving corridors of natural vegetation along rivers and between fields, keeping livestock out of natural areas for part of the year, removing invasive alien species, implementation of fire plans and leaving a certain proportion of the farm in a natural state (Knight *et al.*, 2008).

Participation in the scheme, although strongly encouraged by industry associations and the conservation authority, is entirely voluntary. The Sandveld Potatoes Project is currently working with 33 potato producers , who represent about one third of all producers in the region, but whose land collectively accounts for 65-70% of the potato-growing area in the Sandveld.

Farmers assess their own performance by completing an annual scorecard, and the scores are audited by an auditing officer appointed by Potatoes South Africa and CapeNature. Points are awarded for all best practices followed by the producer, with higher scores assigned to actions considered to be progressive and biodiversity-compatible. Additional points are assigned to producers who comply fully with all legislation governing ploughing and water use, and to those who have signed biodiversity stewardship agreements for areas greater than 100 hectares. Upon each successful audit, farmers are issued with a producer membership certificate. A consolidated audit completed recently has shown a steady improvement in scores on 14 out of 18 farms that were evaluated. The Sandveld Potatoes Project has also assisted in bringing approximately 10,000 hectares of land under formal protection on potato farms, mostly on the properties of project members (Ranger, 2010).

Despite the progress made through this project, new areas of land are still being placed under cultivation in the Sandveld, and monitoring and evaluation has been identified as an area requiring urgent attention. In addition to on-farm self-assessments carried out by individual producers, the project has collaborated with research institutions both locally and abroad, to develop a monitoring tool that sets sustainability thresholds based on the efficiency of resource use. Landscape-scale monitoring is also being introduced through mapping agricultural development that has occurred since 2006, using GIS and remote-sensing imagery. In addition, a multi-stakeholder task team, which includes political decision-makers at the highest levels, has been established to pay particular attention to resolving the ongoing problem presented by unauthorised agricultural development in the Sandveld (Ranger, 2010).

Sustainable cultivation of sugarcane

Best practice guidelines are most attractive to producers if their use enables them to sustain satisfactory yields and if they address a range of other challenges that producers face, including maintenance of the ecosystem services on which production depends. This has been demonstrated in the development of a farm management tool for sustainable production of sugarcane.

The South African sugar industry, which is located along the eastern seaboard of the country in the warm, high rainfall areas of KwaZulu-Natal and the lowveld of Mpumalanga, is one of the world's leading cost-competitive producers of high quality sugar from sugarcane. It is a diverse industry combining the agricultural activities of growing sugarcane with the industrial activities for production of raw and refined sugar and a range of by-products. The industry makes an important contribution to the national economy through agricultural and industrial investments, foreign exchange earnings, employment opportunities and linkages with many supporting industries (SA Yearbook, 2008/9).

Cultivation of sugarcane, like other monocrops, has significant ecological impacts at the farm level, as well as in the broader landscape. Planting of this crop results, unavoidably, in outright loss and fragmentation of extensive areas of natural habitat, it disturbs catchment hydrology and requires high inputs of both water (for irrigated cane) and agrochemicals. Sugarcane is sometimes planted too close to rivers, estuaries, wetlands and forests, leading to habitat loss, soil erosion and degradation of water and terrestrial ecosystems. In parts of the Grasslands and Savanna Biomes, large tracts of land have been converted to sugarcane fields, with further conversion possible as the demand for sugar and ethanol (for biofuel) grows (Scotcher, 2010).

These issues are not only of concern to conservationists, but also to sugar farmers, as they compromise the sustainability of sugar farming. In response to these pressures, a group of concerned and motivated cane growers from the Noodsberg area of KwaZulu-Natal, working together with WWF and WESSA's Mondi Wetlands Programme, initiated the development of a Sustainable Sugarcane Farm Management System (see case study). The farmers were motivated by:

- the possibility of needing to comply in the future with environmental standards for sugarcane, in order to remain competitive in markets that may demand products that are more biodiversity-compatible
- concern over water supply, compliance with national legislation and the impact of inappropriate land-management on biodiversity, water and natural resources in general (Koopman, 2010).

Because farmers have played a direct role in championing the development of this system, the time it has taken to secure uptake by producers and the industry as a whole, has been significantly reduced.

Sugarcane around a patch of coastal forest, KwaZulu-Natal

Harvesting reeds in wetlands next to sugarcane fields

CASE STUDY A tool for sustainable management of sugarcane farms

The Sustainable Sugarcane Farm Management System (SusFarMS) is a management and extension tool based on three principles (economic, social and environmental), underpinned by a number of criteria and indicators against which performance can be measured using specific verifiers. The verifiers are legal requirements for biodiversity and agronomic best practices, or a combination of these. The SusFarMS guidelines address issues such as maintaining ecosystem services, protecting threatened species and ecosystems, management of invasive alien plants, soil conservation, use of agrochemicals, control of pests and diseases, social considerations, the development of farm plans and financial management systems (Scotcher, 2010).

Sugarcane in KwaZulu-Natal

The aim of SusFarMS is to ensure that economically viable sugarcane production is maintained and enhanced, that the rights of employees and the local community are upheld, that natural assets are conserved and critical ecosystem services are maintained, and that agricultural resources are used sustainably. Farms are audited and growers are provided with corrective actions, where necessary, to introduce a culture of continuous improvement. A number of sugarcane supply areas have exhibited an interest in participating in SusFarMS, and discussions are underway to determine how the system can be rolled out to these other areas, and even in other production sectors (Hurly, 2008).

The SusFarMS tool is currently being applied by commercial farmers on a voluntary basis in a pilot phase, and the long-term hope is to provide the market with environmentally better sugar. The system is also being made available to all South African farmers, which in the longer term may include small-scale farmers who are beneficiaries of the government's land restitution programme.

As with all tools of this type, there are still some aspects of SusFarMS that need further development, including:

- SusFarMS was developed for dry-land cultivation of sugarcane and still needs to be tested, and possibly modified, for application to irrigated conditions.
- The system needs to be adapted for small-scale growers.
- A cost-benefit analysis is needed to reassure growers that adopting the SusFarMS system is optimal for economic reasons and because it also satisfies social and environmental criteria (Hurly, 2008).

Improving rangeland management in grasslands

The bulk of South Africa's agricultural landscapes are used as rangeland for grazing of cattle, sheep and goats that are farmed commercially. In addition, in many communal areas livestock are kept for subsistence consumption or for cultural purposes. Almost 70% of South Africa's rangelands have been subjected to excessive grazing pressure caused by various factors over long periods, starting with apartheid legislation early in the last century, which forced black farmers off their land and into overcrowded "homelands". Rangeland productivity is also expected to decline as the effects of climate change are felt. Despite this, a land-use compatibility assessment conducted in the Grasslands Biome (O'Connor, 2005) showed that rangelands can be highly compatible with sustaining biodiversity, if appropriately managed (see Figure 5.4).

Grassland ecosystems have evolved with grazing by indigenous herbivores as part of their natural functioning. Research has shown that if livestock farmers use sustainable stocking densities and land management systems that give holistic consideration to production and biodiversity, it is possible to maintain functioning ecosystems and minimise biodiversity losses in grassland habitats (Steyn, 2009).

The Grasslands Biome is the largest of the nine biomes recognised in South Africa, and covers almost a third of the country's land surface, extending across the boundaries of several provinces and presenting a complex array of socio-economic conditions. The biome incorporates the heavily urbanised and industrialised province of Gauteng (which includes the city of Johannesburg) with a population of some 9 million people, and provides a home and livelihoods to the majority of South African people. Because this biome contains the economic heartland of the country, it is under extreme pressure from development, principally from mining, urban development, plantation forestry and agriculture. Like other temperate grasslands of the world, the biome is critically threatened. Studies indicate that 40% of natural grasslands in South Africa have been irreversibly modified, and less than 3% of the biome is formally protected (UNDP, 2006).

The floristic biodiversity of the Grasslands Biome is second only to that of the Cape Floristic Region, and the biome is home to many of South Africa's rarest and most threatened mammals, birds, reptiles and butterflies. It contains a high proportion of the country's wetlands, including five Ramsar sites. Grasslands also deliver many critical ecosystem services estimated to have a value of at least R9.7 billion or about US$1.25 billion per year (Steyn, 2009).

Approximately 60% of the Grasslands Biome is used as rangeland for grazing (Steyn, 2009). Through close engagement with the red meat sector, a model for good management practice in rangelands has been developed, in tandem with other tools, including biodiversity stewardship, eco-labelling and certification.

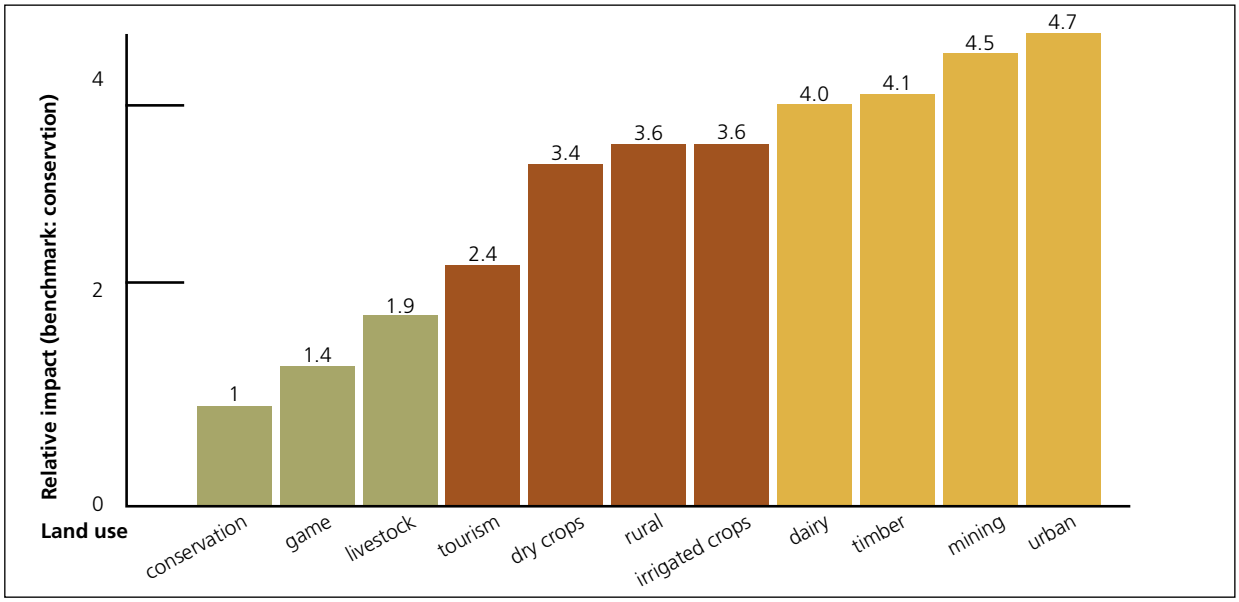


Figure 5.3 Relative impact of different land-use types on grassland biodiversity (from O'Connor, 2005)

CASE STUDY Tools for improving rangeland management in the Grasslands Biome

The grasslands "good practice model" promotes the implementation of a number of rangeland management practices that, in combination, can lead to optimisation of biodiversity, ecosystem services (soil, water, carbon) and rangeland productivity. These practices include:

- the development and implementation of biodiversity-compatible management practices, incorporating ecologically sustainable stocking rates, appropriate grazing cycles, fire management and protection of threatened ecosystems
- application of biodiversity-compatible game and livestock production standards by the retail sector, through a system of labelling and certification
- securing sites of highest biodiversity importance for conservation through biodiversity stewardship agreements
- incorporating biodiversity considerations into agricultural policy, guidelines and decision-making.

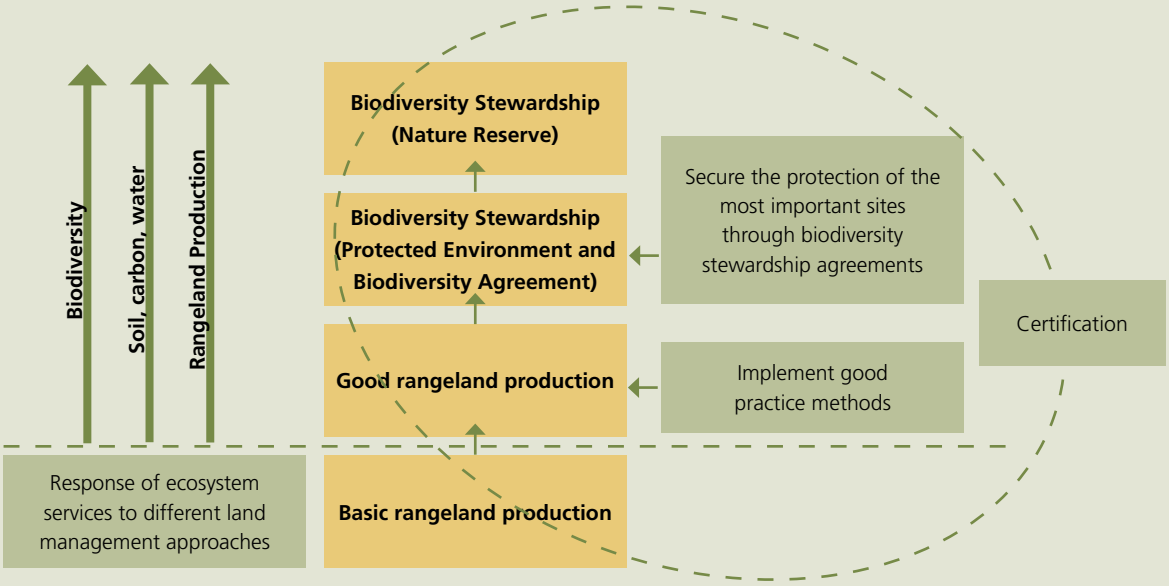


Figure 5.4 Conceptual framework for good practice in rangelands

Demonstration projects of rangeland management strategies that promote both biodiversity conservation and economic prosperity are critical to raising awareness of the importance of biodiversity to agricultural sustainability. The grasslands model is initially being implemented in the Wakkerstroom/Luneberg demonstration area in southern Mpumalanga, and will then be replicated more widely through incorporation into relevant policies.

The Wakkerstroom/Luneberg area of Mpumalanga province was chosen as a demonstration site for implementing the good practice model because it is:

- of high biodiversity significance and much of the biodiversity is still intact
- the primary land uses are currently the production of red meat and wool, which are relatively compatible with biodiversity conservation
- there are growing pressures from other, unsustainable land-use practices such as coal mining
- there is institutional capacity and willingness to implement the model.

In addition to the Luneberg site being chosen for the implementation of improved rangeland management practices, 18 farmers in this district have elected to have their properties declared as a Protected Environment under the biodiversity stewardship model described in Chapter 4. This affords the biodiversity and ecosystems of this site greater protection, and safeguards the cattle-farming livelihoods of these farmers.

Other demonstration sites for implementation of the grasslands good practice model, focussing specifically on water-related issues, have been identified in the Free State province.

Sustainable harvesting of wildflowers

Many local communities in South Africa rely on harvesting of wild resources such as fynbos flowers, medicinal plants, thatching grass and wild herbal teas for their livelihoods. The growing commercial market for wild-harvested products, both locally and abroad, has had the dual effect of placing increasing pressure on wild populations of certain species, whilst providing the stimulus to place these populations under conservation management. Although wild-harvesting is generally thought to carry a smaller ecological footprint than commercial cultivation of wild species, it can also have negative impacts if harvesting methods and off-take rates are not sustainable.

In the Western Cape province the flowers of selected fynbos species, such as proteas, are harvested from the wild for commercial purposes. This activity is a critically important source of employment for local communities, with the wildflower industry generating nearly R150 million per year (US$20 million) from exports and local sales, R86 million (US$11 million) of which derives from wild-harvested fynbos flowers.

The highly diverse Agulhas Plain at the southern-most tip of Africa is home to the Flower Valley sustainable flower harvesting project, which was established to create an incentive for better practice in this industry. Like most coastal lowlands, the exceptionally diverse vegetation of the Agulhas Plain is threatened by invasive alien plants, as well as conversion for commercial farming and development.

In 1999, one of the important flower farms in the area, Flower Valley, was up for sale and under threat of conversion to vineyards. With the support of various donors, Fauna and Flora International (FFI) purchased the property on condition that it would be used to pilot – and ultimately demonstrate – how the triple bottom line of income, social sustainability and conservation can be achieved through sustainable wildflower harvesting. Flower Valley Conservation Trust was set up by FFI as a South African public benefit organisation to hold title to Flower Valley farm, and to implement the pilot study under the umbrella of the UNDP-supported Agulhas Biodiversity Initiative (ABI).

The Agulhas Plain is an excellent location for this industry role-model because the wildflower harvesting here is considered to be more intense and to generate more work and income than in any other part of the Fynbos Biome. Flower Valley has developed sustainable harvesting guidelines, and has improved the entire industry by developing a sound permitting system enforced by the conservation authority, and by influencing suppliers to go beyond the legal requirements to meet triple bottom line targets. The project has also had numerous social and economic influences, as described in the case study on page 100.

Protea bunches for export, Flower Valley, Western Cape

CASE STUDY Guidelines for sustainable harvesting of wildflowers at Flower Valley

Flower Valley farm, Agulhas Plain, Western Cape

The goals of the Flower Valley project are to conserve biodiversity, promote the sustainable use of fynbos and assist local communities to improve their quality of life. It achieves this through:

- supporting research into sustainable harvesting and improving production practices
- providing training and improving skills in the sector
- creating commercial incentives through secured markets
- improving social and economic conditions for communities on the Agulhas Plain.

An important activity has been the development of guidelines for sustainable harvesting based on local knowledge combined with scientific research. When the project started, there were no comprehensive guidelines on how to harvest wild fynbos flowers sustainably, even though the flower harvesting industry had been active for decades. Key threats to sustaining the biodiversity in the area were identified as potentially unsustainable harvesting techniques, excessive off-take and poor recovery after fire. Research conducted by Flower Valley Conservation Trust, on its farm and on other properties nearby, informed the development of the first comprehensive guidelines on sustainable wild flower harvesting. This has been done in partnership with various organisations including CapeNature, the University of Stellenbosch, SANParks and the Department of Agriculture and, more recently, with the newly formed Protea Producers' Association of South Africa (PPSA), which represents fynbos producers.

These guidelines provide information on preferred harvesting techniques, off-take rates, fire management, and lists of species that can be harvested in different seasons. Training in the use of these techniques has been provided to pickers and sorters of wildflowers and accredited training modules on sustainable harvesting have been developed. One of the ongoing challenges associated with developing sustainable harvesting practices is that it requires ongoing monitoring and research to assess the impacts of harvesting in order to verify the claim that it is sustainable. This takes considerable time, resources and expertise on an ongoing basis.

Annual audits are undertaken of suppliers in the Flower Valley pilot project. Those found to be operating according to the code of best practice, receive a certificate of compliance, which gives them the advantage when retailers seek an assured supply of product for the long term. An approved list of species and harvesting methods is being built into the harvesting licensing system run by CapeNature for the industry as a whole, extending the code of good practice into the broader landscape beyond the borders of the Flower Valley project.

A social challenge presented by the wildflower industry has been the seasonality of the work, as peak flowering times are not distributed evenly throughout the year. With assured markets for certified product all year round in the UK and a local retail chain, this problem has been reduced considerably. A new initiative to develop high quality charcoal from cleared invasive alien plants will also provide more options for employment in the area, whilst addressing the threat posed to fynbos by infestation by invasive alien plants.

Apart from the employment opportunities Flower Valley has generated, the project provides lifeskills training and has developed a variety of educational and health care programmes for the local community. Although there are still many social challenges to address, a recent audit has shown that significant progress has been made in the area of social development at Flower Valley and amongst its certified supplier network.

In 2003 a private company, Fynsa Pty Ltd, was established by private investors to act as the marketing and sales partner for the Trust. Through a partnership agreement with the Trust, Fynsa sources and processes wild fynbos from Flower Valley's certified suppliers for bouquets for export and for the domestic market. The goal is to create a financial incentive for suppliers to meet certification criteria and to secure premium prices for wildflowers that can be certified as sustainably harvested. One of the challenges to overcome in this regard is that there is not yet a groundswell of demand for certified products in the industry, and that marketing these products takes time and is costly.

Preschoolers at Flower Valley educare centre

Protea harvesting on the Agulhas Plain

Generic guidelines for sustainable farming

In addition to sector-specific initiatives to promote biodiversity-compatible production, a need was identified for a single tool that brings together current knowledge on sustainable farm management in South Africa, including improved land management, climate change, challenges facing agriculture, certification systems, social and economic criteria and applicable legislation. In response, the GreenChoice Alliance (a WWF-SA and Conservation International-SA partnership, with various alliance members in conservation and industry) has funded and produced a generic guideline called the "GreenChoice Living Farms Reference".

The Living Farms Reference is part of a package of products that includes a poster illustrating principles of "living farms" and a monitoring and evaluation

Apricot harvest, Langkloof, Eastern Cape

Mango pickers, Limpopo province

framework to evaluate the efficacy of on-farm interventions. The Reference is intended to provide a starting point for greater collaboration between government, farmers, consumers and industry, leading to the adoption of improved and efficient farm management principles. It is not intended to be a technical farming guideline, but rather a generic sustainable farming framework that can be customised for specific agricultural sectors.

Requirements for successful implementation of best practice tools

Regardless of the sector for which they have been produced, the South African experience has shown that effective implementation of best practice guidelines depends on there being:

- **demonstration activities** to test and adapt production systems to conserve biodiversity better, while maintaining economic viability
- **strategic partnerships** with industry and industry associations to promote systemic adoption of better practice guidelines and protocols
- **specialist support** to adapt existing production systems in order to strengthen biodiversity-compatibility
- ongoing, **integrated support** to industry role-players, across the value chain
- appropriate **recognition and reward** for producers who adopt the guidelines
- strong **market-related incentives** for producers who participate in best practice initiatives.

Meeting these criteria demands ongoing inputs of time and resources and requires the involvement of a wide range of professionals with specialised skill-sets. Other challenges facing biodiversity best practice initiatives include how to deal effectively with non-compliance, particularly with regard to unauthorised clearing of land and water-use, and the development and implementation of effective monitoring systems.

4 Protecting biodiversity in production landscapes

In addition to biodiversity best practice guidelines, other tools are available for slowing down the loss of natural habitat in production landscapes, and for protecting sites of greatest biodiversity importance. These include biodiversity stewardship and a range of biodiversity planning and regulatory tools.

Biodiversity stewardship on wine farms

Biodiversity stewardship is the focus of Chapter 4 so will not be covered in detail here, but it is important to note that this tool plays an important role in achieving sustainable production landscapes in South Africa, and that it forms a key component of engagements with production sectors.

Because biodiversity stewardship agreements can be applied to portions of properties, farmers can continue farming some parts of their land while other parts are protected and managed according to an agreed management plan. Putting these types of agreements in place has provided the basis for engagements between conservationists and wine farmers in the Fynbos Biome, because areas of critically important fynbos vegetation on wine farms could be placed under formal protection, without farmers having to give up their wine farming livelihoods.

South Africa is the seventh largest wine producer in the world, contributing 3.5% of global production. Most wine is grown in the Fynbos Biome where approximately 3,800 wine farmers, 585 private cellars and 66 co-operatives produce 90% of the country's wine and provide much needed employment to thousands of people.

The winelands of the Western Cape are as embedded in the region's culture, identity and economy as its natural landscapes and remarkable fynbos vegetation. However, the expansion of the wine industry has resulted in extensive modification of natural habitat with resulting biodiversity losses, and other negative ecological impacts, particularly through water demands associated with intensive irrigation. Over the last 15 years there has been significant growth in the wine industry, resulting in a 15% increase in the area under vines. Whilst this has been good for the economy, the steady spread of vineyards has seen further biodiversity losses occurring in already severely threatened ecosystems, especially lowland fynbos ecosystems.

Engagement with the wine industry grew out of an NGO-led research project that indicated the need for urgent action to stem the loss of fynbos habitats to vineyards. Open-minded and informed approaches to the industry by conservationists led to the development

Cape winelands landscape

of the Biodiversity and Wine Initiative (BWI) partnership. Negotiations to set up biodiversity stewardship agreements led to broader dialogue between biodiversity conservationists and the wine industry around production methods, branding and marketing. Today the industry association, Wines of South Africa, has taken full ownership of the programme. It has become self-regulatory, has broadened its mandate to include biodiversity management and sustainable farming practices and employs extension officers from industry budgets. This initiative laid the foundation for other developments in this area of work and provides an example of how a range of tools can be put into practice across the entire value chain (see case study).

CASE STUDY The Biodiversity and Wine Initiative – using tools across the value chain

The Biodiversity and Wine Initiative (BWI) was established in 2004 as a partnership between the wine industry and the conservation sector, to minimise further loss of natural habitat in threatened ecosystems and to contribute to sustainable wine production. Over the years, what began as a problem and a challenge – maintaining good productivity and profitability whilst conserving biodiversity – has become an international selling point for South African wines, and BWI has become an integral part of the identity of many wine producers.

BWI has adopted a multi-faceted approach, involving a range of tools that are used across the value chain. Biodiversity and Wine extension officers work closely with farmers and wine producers, encouraging them to adopt more biodiversity-compatible production practices around the use of chemicals, waste water treatment, water use, soil conservation and management of natural vegetation on their farms with appropriate fire and invasive alien clearing strategies. The initiative encourages wine growers to commit portions of their land to formal protection through biodiversity stewardship agreements. It engages with industry associations to integrate biodiversity as a unique selling point into their marketing strategies and to reflect on their sustainability throughout the entire value chain from producer to consumer.

Waverly Hills Organic Wines, a BWI champion estate

Key tools developed through this initiative have included:

- The development of **biodiversity guidelines** that have been taken up in the industry's own certification system, the Scheme for Integrated Production of Wine: These guidelines enable industry associations to promote biodiversity-compatible wine farming methods amongst more than 98% of all growers in the industry.
- The **recognition** of wine farmers and producers who choose to participate in the initiative as BWI Members or Champions: A BWI Member signs a statement of intent to set aside an area of natural habitat on the farm for conservation and to implement the Integrated Production of Wine guidelines for farmers and cellars. To be recognised as a BWI Champion, a member must commit at least 10% of the land for conservation, preferably under a formal biodiversity stewardship agreement, and must demonstrate a two-year track record of good biodiversity practice, implementing conservation actions according to agreed management plans. There are currently 17 BWI champions, 16 producer cellar members and 155 individual members.

- **Protection of threatened fynbos ecosystems**: Over 127,000 hectares of valuable fynbos vegetation has been placed under conservation management, including, in some cases, land that is known to be of high viticultural potential. On BWI farms, areas under conservation now exceed the total area of planted vineyards. Some BWI champions, such as Vergelegen Wine Estate, have spent millions of rands on clearing invasive alien plants and other environmental projects and even employ staff specifically to implement their conservation management plans.
- Providing a **unique selling point**: Wines of South Africa, the official marketing body of the industry, has been able to use BWI as a unique marketing angle for South African wines, emphasising that both the wine and flora of the fynbos region are unusually diverse and special. With the slogan "Variety is in our nature" the fynbos is providing a unique selling point for South African wines in a highly competitive global market.
- Clearly identifiable **branding**: Consumers can identify BWI members by looking for the BWI label displayed on the wine bottles from participating wineries.

Cloof wines

Despite the enormous strides gained through implementation of these tools, compliance with environmental and agricultural legislation remains a concern in the wine-farming sector. Due to weak enforcement by government authorities, the BWI has worked closely with the wine production sector to reach a point where the industry plays a strong self-regulatory role. Both BWI and industry-certification have developed a policy whereby the membership of growers with reported transgressions is suspended with immediate effect, pending investigation. With the wine industry now linking environmental minimum standards (IPW certification) with their "wine of origin" export verification seal, there is strong market pressure ensuring that the industry is legally compliant.

Regulatory and planning tools used in plantation forestry

Existing planning and regulatory tools that can be used to avoid loss of critical biodiversity and maintain ecosystem functioning in production landscapes are:

- maps of critical biodiversity areas that can be applied proactively in land-use planning and decision-making, ensuring that production activities are steered away from areas of greatest biodiversity importance
- environmental impact assessment, to ensure that harmful impacts of proposed production activities are minimised or off-set in some way
- regulation of production activities and their impact on biodiversity through the enforcement of laws that govern activities such as clearing of natural vegetation, ploughing and water use.

Although plantation forestry has historically had negative ecological impacts, the sector has a strong regulatory framework and is environmentally aware. It is open to mainstreaming biodiversity management in its operations because there is an existing market incentive for this in the form of certification according to the international Forest Stewardship Council. Forestry companies, particularly large growers, own extensive tracts of unplanted land of high biodiversity value, which the industry has indicated an interest in protecting through formal biodiversity stewardship agreements.

About 90% of South Africa's commercial forestry plantations occur within the Grasslands Biome, mostly in catchments with high rainfall and runoff. Areas under plantation forests account for 18% of commercially cropped or planted land within the biome (Steyn, 2009). The sector is well organised under the industry

association, Forestry South Africa (which includes small, medium and large growers), and makes a significant contribution to the national economy.

Since 1994, the government of South Africa has introduced changes to the management of plantation forests in order to achieve goals including:

- the privatisation of publicly owned commercial forestry operations
- providing increased support for out-grower schemes, allowing smallholders to grow trees with support from companies who commit to buying their produce for pulp
- introducing changes in the forestry licensing system.

Because of their heavy consumption of scarce water resources, commercial plantations became a declared stream flow reduction activity in terms of the National Water Act of 1998, which meant that no new plantations could be established without the granting of a water licence. This has significantly reduced the rate of expansion of commercial plantations, although there is currently demand for growth in the small-grower part of the industry (see Table 5.3). The Department of Water Affairs aims to limit the expansion to 200 000 ha over the next 20 years, and Forestry SA expects only half of this target to be realised.

Table 5.3 Changes in extent of new plantations and old plantations removed (Scotcher, 2010)

Period	New plantings (ha)	Old plantings removed (ha)
1980	157,000	33,400
1990	185,000	26,700
1998	New water licensing implemented	
2010	37,500	28,700

The plantation forestry sector has also recognised the need to use planning tools to ensure that new plantings are located away from areas of highest biodiversity importance, wherever possible. The Eastern Cape chapter of the Accelerated and Shared Growth Initiative of South Africa (AsgiSA), Forestry South Africa and the National Grasslands Programme have partnered on the development of a biodiversity screening tool to avoid areas of biodiversity importance in future expansion of plantations. This has helped to streamline and increase the efficiency of the forestry authorisation process, and has been very well received by the forestry sector. The Forestry Biodiversity Prioritisation Tool (see case study) has been developed using the principles and methods of systematic biodiversity planning, and helps to align forestry planning tools with the national biodiversity monitoring and reporting framework.

CASE STUDY A biodiversity planning tool for the plantation forestry sector

The Forestry Biodiversity Prioritisation Tool is being applied across approximately 600,000 hectares of unplanted land within the plantation forestry estate in the Grasslands Biome. This tool has been designed to allow the systematic and scientific identification of forestry land-management units that have important biodiversity features. The tool includes:

- GIS-based maps of the forestry estate showing biodiversity scores for unplanted lands
- spatially-explicit management goals that would contribute to conservation of important biodiversity on the forestry estate

Timber harvested from commercial pine plantations

- an interaction process that mainstreams the prioritisation tool in the management systems of forestry companies.

The results of the spatial analyses are used by the forestry sector to identify where to focus their conservation and management budgets (such as for weed and fire management), and to select priority sites that can become the focus of biodiversity stewardship and other external conservation programmes. The results can also be used to understand the contribution of various landholdings to the provincial biodiversity targets.

All eight commercial forestry companies have had the tool demonstrated to them, and have agreed to implement it. In using this tool, it is important for the companies to bear in mind that some of the input data was not ideally suited for fine-scale analysis or was difficult to work with, and site visits may be necessary in order to verify the outputs of the analysis. Further potential drawbacks of the tool include that some of the plantation forestry companies may not be big enough to warrant having in-house GIS and conservation specialists who could maintain the tool, and that there is a risk that "low" priority sites may become neglected in the company management systems.

Granite mining in Mpumalanga province

The Grasslands Programme has adopted a multi-pronged approach to engaging with the plantation forestry sector that includes formal protection of unplanted, high priority landholdings through biodiversity stewardship agreements, in combination with:

- improving the management of unplanted forestry-owned land, by integrating biodiversity management into industry-led certification systems and standards
- assisting expansion of small-grower plantation forestry through integration of biodiversity considerations into plantation establishment and management, as well as capacity-building to meet industry-led certification standards.

Emerging tools for engaging with the mining sector

Mining and prospecting applications are on the increase in South Africa, and it is a matter of particular concern that mining companies are applying for prospecting rights in areas of high biodiversity importance, some of these without any formal protection. The mining industry in South Africa has not, until recently, viewed biodiversity management as a priority, and it has often been overlooked in favour of other issues that are considered to be more directly relevant to a company's licence to operate. Some of the larger mining companies that operate globally are starting to include biodiversity

issues in their environmental management systems, in light of operational and reputational risks, and access to capital. But this is not the case with the many smaller companies that are operating in the country.

Mining is not featured in detail in this publication, as the biodiversity sector is still in the early stages of developing tools for engaging with the mining industry. The current focus is on enforcing compliance with environmental legislation, which is particularly complex in the case of mining as there are many different jurisdictions regulating activities of this sector. In addition, as is the case in other production sectors such as agriculture, the government does not have the capacity at present to enforce compliance.

A Mining and Biodiversity Forum, led by the South African Chamber of Mines and the International Union for the Conservation of Nature (IUCN), met in 2005 and 2008 to explore issues relating to terrestrial mining around legacies, trade-offs, legislative gaps and technological advancements to reduce environmental impact and promote biodiversity conservation.

The Grasslands Programme is working with key stakeholders to mainstream biodiversity in the coal mining sector, including through biodiversity offset schemes such as wetland mitigation banking, and the use of biodiversity planning tools to minimise loss of critical biodiversity areas to mining operations. Using tools such as the Mpumalanga Biodiversity Plan, the Grasslands Programme is working with mining companies and state role-players responsible for environmental impact assessment, land-use planning and decision-making and conservation, to identify areas earmarked for coal mine expansion that overlap with biodiversity priority areas, and to develop mitigation measures. These include off-site mitigation and biodiversity offsets, ensuring no net loss of biodiversity through prioritised *in situ* conservation outcomes.

Another area receiving attention is the development of tools for use in post-mining rehabilitation. Generally, rehabilitation schemes focus on stabilisation of mined areas, but not on restoration of agricultural potential or biodiversity. In Namaqualand, research has been conducted to develop "restoration packs" containing seeds, soil ameliorants and equipment for planting that can be used to stabilise the tailings of diamond mines. The restoration packs can be tailored for each site so that they contain the correct balance of species suited to the conditions of each area.

5 Creating markets for biodiversity-compatible products

Creating markets for biodiversity-compatible products requires that retailers be made aware of them, understand their value and market them appropriately. If these products are reliably available in sufficient quantities and within acceptable price ranges, then consumers will be more likely to purchase them, creating a greater demand and encouraging further production of such products (Hawkins *et al.,* 2010). Procurement advice, consumer awareness campaigns, eco-labelling and certification systems are all tools that can be used to create markets for biodiversity-compatible products.

Labelling and certification

Labelling and certification are tools that can be used to secure market share and price premiums. This is based on the assumption that consumers who are environmentally and socially aware are more likely to purchase products that are certified to comply with environmentally and socially acceptable production standards, and will be prepared to pay more for them. Trade organisations exist in many countries to accredit producers in various sectors if their produce has been produced according to established codes of good practice, as denoted by eco-labels such as Fair Trade or EcoCert. These certification systems, however, do not consider biodiversity *per se,* and do not necessarily indicate that the products on which they appear have been produced in a biodiversity-compatible or ecologically sustainable way.

Meaningful certification systems take a long time to develop and can be costly to audit. Although large commercial sectors in South Africa such as plantation forestry have been able to adopt internationally recognised certification systems (for example, through the Forest Stewardship Council), this can be difficult for local-scale South African producers, especially if

initiatives are still in an early developmental stage. In cases where local producers have been able to secure such certification, it has enabled them to penetrate international niche markets in which consumers prefer to buy certified products. Wild-harvested rooibos tea sold by communal farmers in the Bokkeveld district provides an example of this (see case study).

One of the lessons learnt in the Flower Valley initiative (see earlier case study on page 100), is the importance of assessing and publicising the cost-benefit analysis of a certification scheme to the industry, weighing up the benefits of obtaining higher prices and receiving more regular orders against the costs – including the direct costs of joining the scheme and the indirect cost of compliance. A net benefit to producers needs to be explicitly demonstrated to give them an incentive to participate. Where markets are not yet demanding sustainably-produced goods, it is difficult to interest producers in adopting new production or harvesting methods that lead to certification.

In many South African business and biodiversity initiatives, there is a move towards introducing industry-related certification systems for more biodiversity-compatible production, but these are mostly still at an early stage of development. Existing eco-labels may be proof that a product is of organic origin, or has been fairly-traded, but they might not reflect biodiversity-compatibility.

CASE STUDY Sustainable rooibos tea – the Heiveld story

Heiveld co-operative members havesting rooibos tea

Tea made from the "rooibos" (red bush) plant, which grows only in a small region within South Africa, has an expanding market locally and globally because of its health-giving properties. Because of this, many farmers are ploughing large areas of natural habitat for commerical cultivation of rooibos. The rapid expansion of the footprint for cultivated rooibos threatens many rare and endemic plant and animal species, including sub-species of wild rooibos that are more resistant to pests and drought than the cultivated variety. Although the South African Rooibos Council is attempting to address these issues by developing an industry-wide sustainable rooibos production strategy, interest in wild harvesting of rooibos as an alternative to cultivation is growing. As harvesting and trading of wild rooibos is an important source of income to local communities, the conservation of this resource has also risen in importance.

Wild rooibos has been harvested for domestic use by many generations of the rural communities living in the Cederberg and Bokkeveld regions of the Western and Northern Cape. In the past, wild rooibos was not marketed separately, although the product was still sought after to mix with cultivated rooibos to enhance its flavour and quality. In an effort to combat desertification and support sustainable agriculture in marginalised communities, the government of the Northern Cape provided assistance to a group of small-scale farmers in the Heiveld district who produce rooibos tea through a combination of cultivation and wild-harvesting.

In 2002, these farmers started marketing wild rooibos as a distinctive product and achieved notable success. The wild-harvested product of the Heiveld farmers was certified organic in 2001 and as a Fair Trade product in 2004. Since the sales of this tea benefit marginalised farmers, it also carries Ecocert and Naturland certification. The Heiveld Co-operative now supplies a niche market of consumers in nine European countries who are willing to pay a premium price for organic, fairly traded products.

Although certification helped the Heiveld producers to penetrate niche markets, other measures are necessary to address biodiversity-compatibility and ecosystem resilience, such as collaborative research into conserving wild rooibos varieties and the development and use of best practice harvesting guidelines. Today, the 40 members of the Heiveld Co-operative are working with scientists to increase the yields from wild rooibos, exploring which varieties are longer-lived and more drought- and fire-resistant, and monitoring the effects of harvesting practices. A guideline for sustainable wild-harvesting of rooibos has also been produced, although ongoing research and monitoring are needed to assess the impacts of harvesting using these methods.

Procurement advice and consumer awareness campaigns

Procurement advice and consumer awareness campaigns can be used to help create markets for goods that are produced or harvested in ecologically sustainable ways. When these types of tools are implemented alongside others that target different points in the value chain, they can create the "pull factor" needed to bring about a shift in production practices. This is demonstrated in South Africa by the Responsible Fisheries Programme and its sister project, the South African Sustainable Seafood Initiative.

South Africa's marine ecosystems are extremely diverse and play a critically important role in sustaining livelihoods, through both commercial and subsistence fisheries. As in many other parts of the world, South Africa's marine ecosystems are seriously threatened, and there is growing concern about the depletion of marine fish stocks. Although stocks of some fish species are in a healthy state and are well managed, others – particularly line-fish species – are currently over-exploited. The commercial fisheries operating along the coast are managed by stringent regulations, but enforcement along a 3,000 km coastline presents many challenges. Demand for fish and seafood has increased, and technological advances in the fishing industry have made it easier to find and catch fish. In addition, some fishing methods impact negatively on the health of marine ecosystems and populations of threatened species. This situation has been compounded by a lack of awareness within the industry and amongst wholesalers, retailers and consumers of the conservation status of marine species being traded or offered at restaurants.

The South African Sustainable Seafood Initiative (SASSI) is an example of a project that uses consumer awareness and procurement advice as principal tools to change the way fish are traded, influence the purchases consumers make, and promote market mechanisms that bring about improvements in the way South African fisheries operate (see case study).

CASE STUDY Tools for promoting responsible fisheries in South Africa

Building on a long history of research into marine ecosystems, South Africa has adopted an Ecosystems Approach to Fisheries (EAF) that seeks to protect and enhance the health of marine ecosystems, in balance with the diverse needs and values of present and future generations. The Responsible Fisheries Programme, an initiative led by WWF-SA, is dedicated to the successful implementation of an EAF in South Africa and Namibia, and attempts to influence the way fish are caught. Its sister programme, the Southern African Sustainable Seafood Initiative (SASSI), aims to promote responsible fisheries by working with suppliers and consumers to:

- create awareness of marine conservation issues
- shift consumer demand away from over-exploited species
- ensure that seafood retailers use their position in the supply chain to contribute to the restoration of over-exploited fish stocks

- promote compliance with the law through education and awareness across the fisheries value chain
- ensure that an appropriate regulatory framework for responsible trade in seafood is in place and that the capacity exists to implement it.

To encourage voluntary compliance with laws that protect endangered fish species, SASSI has developed a colour-coded species list in which fish are grouped into three categories: green (relatively healthy and well managed populations); orange (already overexploited or originating from problematic fisheries); and red (may not be legally bought or sold in South Africa). To spread this information, SASSI has introduced two novel tools so that consumers can make informed choices:

1. FishMS

Making innovative use of mobile-phone technology to promote conservation, the SASSI green-orange-red fish list has been made available to consumers as a short messaging service called "FishMS". A shopper or restaurant patron who is unsure about whether or not to buy or order a particular type of fish, can send the name of the fish species to the FishMS number and receive an immediate response that gives the status of this fish. Further information is available from a database with images on the SASSI website, and in a "Know your Seafood" booklet. Since the introduction of FishMS the number of users has climbed dramatically, with the added benefit of providing marine conservationists with useful information about which fish species are being traded.

2. Wallet-sized lists

The SASSI fish list is distributed widely in the form of a handy, fold-up pocket or wallet guide that summarises the green, orange and red lists of fish species.

In addition, SASSI invests considerable time in training targeted restaurants and retailers, to increase their awareness of marine conservation issues, and to influence their procurement and marketing policies. It is becoming more and more common in South Africa to find the SASSI fish list displayed at fish counters in supermarkets, or on labels.

A Restaurant Participation Programme allows two levels of participation – "SASSI Aware" members, which are restaurants that deal in green and orange listed species, and "SASSI Champions", which are restaurants that deal only in green listed species. Participants in this scheme voluntarily agree to adhere to a number of best practice guidelines.

One of the challenges SASSI faces is monitoring its impact on the trade in seafood, and, ultimately, on fish populations, as the factors influencing these are very complex. There is also a need to address value-adding at the level of subsistence fisheries.

6 Implementation, outcomes and impacts

A challenge facing existing and emerging business and biodiversity initiatives in South Africa, is to set in place effective monitoring and evaluation systems that enable the impact of economic sectors and biodiversity initiatives to be measured over time. In order to prevent further loss of conservation-worthy biodiversity and maintain ecosystem services in production landscapes, it is necessary to promote and implement sustainable production practices and other tools for building ecosystem resilience, and to develop monitoring systems to assess their success. Success or failure of an intervention can be measured in terms of *implementation* and *outputs* (activities and products); *outcomes* (how pressures on biodiversity are addressed); or *impacts* on biodiversity (the effects on biodiversity and ecosystems).

GreenChoice has developed a monitoring and evaluation model that is being applied to assess the relative success or failure of the interventions described in this chapter. Measuring effects on biodiversity requires long-term monitoring and is often beyond the scope of individual projects. Assessing how pressures on biodiversity have been addressed provides an intermediate measure of success, and in some cases, can be used to predict ultimate conservation outcomes (Hawkins *et al.*, 2010). An assessment procedure based on this model is currently being developed. It uses similar criteria for all biodiversity initiatives that can be audited independently by one external body.

Almost all of the best practice initiatives discussed in this chapter include a self-assessment audit, performed by producers. These assessments, the results of which are sometimes audited externally, include biodiversity-related criteria which can feed into development of a longer-term monitoring and evaluation framework. It is also important to monitor biodiversity, economic and social impacts at the landscape scale, and to assess the cumulative impacts of a particular sector, or of a number of sectors operating within a region. SANBI is currently developing a fynbos-wide monitoring system that uses remote-sensing to assess biodiversity impacts, with a view to rolling out a similar system countrywide.

Herdsman with goats, Succulent Karoo

7 Why these tools work in South Africa

This chapter has described the development and implementation of a range of tools that is being used in production landscapes in South Africa to achieve the dual outcomes of biodiversity conservation and sustainable economic development. Many of these initiatives are relatively new and their impact has yet to be measured, particularly at the landscape scale. In some areas, natural habitat continues to be lost in favour of agriculture or mining and non-compliance with regulatory legislation remains a problem in many production sectors.

Despite this, early indications are that some significant successes have been achieved in integrating biodiversity and sustainable-use considerations into a number of production systems and landscapes. These successes include that: best practice production guidelines are in place for a number of sectors; several thousand

hectares of important biodiversity on farms have been placed under formal protection through biodiversity stewardship agreements; the plantation forestry sector is using biodiversity prioritisation tools to select which land-holdings will be planted and which will be placed under conservation management; markets are being created for sustainably harvested or managed products; and consumer awareness campaigns are contributing to shifts in consumer choices. In addition, strategic partnerships across sectors have been established, bringing together diverse role-payers with the common purpose of sustaining viable economic enterprises, reducing ecological impacts, maintaining ecosystem services and enhancing resilience to climate change.

Where there have been successes in developing tools and creating a platform for positive engagement in production landscapes, these can be attributed to a range of factors, including that:

- Substantial research into the industry has been carried out, prior to engagement, in order to understand the core business of the sector, its market drivers, key role-players, production approaches and to identify opportunities for effective intervention.
- Substantial research into biodiversity and ecosystems in the relevant production landscapes has been carried out, and spatially explicit areas of biodiversity importance have been identified. This has allowed conservationists to approach the relevant sector with a clearly formulated, scientifically defensible case for conserving biodiversity and building sustainable landscapes.
- Conservationists have realised that focussing on biodiversity alone is ineffective in penetrating economic sectors; strong economic arguments need to be made and there has to be a willingness from both sides to make trade-offs. Although biodiversity targets remain the bottom line, a broader focus on sustainable production, maintaining ecosystem services, strengthening adaptation to climate change and addressing other socio-economic issues is more effective.
- Much time has been invested in setting up relationships with stakeholders, and conservationists have been prepared to listen to and empathise with industry players in order to understand their perspective. The greatest success has been achieved when people with business skills, or experience in the relevant sector, have been included as part of the "conservation team" in engagements with economic sectors.
- Stakeholders have been actively involved in the project from conceptualisation, allowing them to take ownership of the initiative and for it to become self-driven and self-regulating.
- Projects have worked through existing industry associations or structures that have legitimacy and credibility, rather than attempting to create new institutions. This also reduces implementation costs and time.
- The practice of working with biodiversity champions in a sector, that is companies or individuals who lead the way in incorporating biodiversity considerations in their work, has been successful in bringing about a ripple effect, and developing energy and momentum.
- Effective communication that cuts across sectors and landscapes is facilitated by a "neutral broker" that provides a common platform for addressing issues and sharing lessons. In South Africa, GreenChoice has played this role and, since its inception, there has been significant progress in the development of new biodiversity-compatible products.

Sector-specific engagements have provided valuable opportunities to begin building sustainable production landscapes (for example in the wine industry), often in a particular geographic area (as in the case of potatoes in the Sandveld). These engagements are particularly effective when they form part of broader conservation partnerships that operate at a larger scale and across various economic sectors. For example, the Sandveld Potatoes Project forms part of an initiative called the Greater Cederberg Biodiversity Corridor, which addresses land-use planning (see Chapter 3), biodiversity stewardship (see Chapter 4) and creating work opportunities (see Chapter 6), in parallel with sustainable production of both potatoes and rooibos tea.

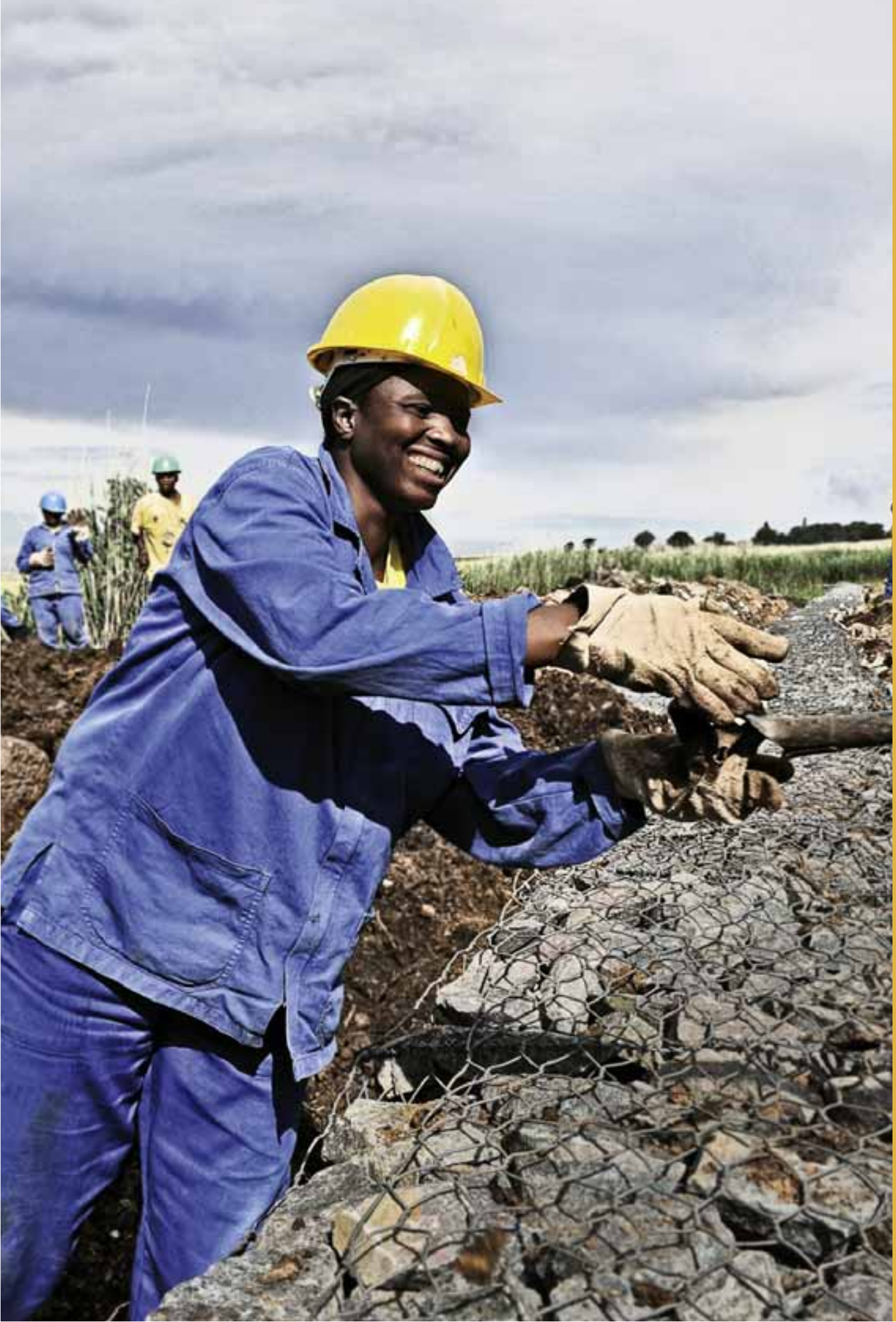
An example of a conservation partnership operating across multiple economic sectors in a whole biome is the Grasslands Programme. In this biome, mining, plantation forestry, rangeland use and urban development place cross-cutting and cumulative pressures on biodiversity and need to be addressed in an integrated way. A common approach also helps because these sectors often have common requirements for effective integration of biodiversity, such as an enabling policy environment, institutional capacity and the need to create markets for biodiversity goods and services. Conservation partnerships are the topic of Chapter 7.

6

Environmental public works programmes

Included in this chapter:

- Nature-based environmental approaches to creating work opportunities and supporting livelihoods
- South Africa's environmental public works programmes
- Removing alien invasive plants – Working for Water
- Restoring wetlands – Working for Wetlands
- Managing fire – Working on Fire
- Land restoration – Working for Land
- Why these tools work in South Africa



1 Nature-based approaches to the green economy

The terms "green economy" and "green jobs" are used increasingly in both the economic and environmental sectors. The major focus of the discussion on the green economy, both in South Africa and globally, has been on developing and building the necessary clean-energy technology and infrastructure for climate change mitigation, such as innovations for reducing carbon emissions. This is critically important for South Africa, which emits disproportionately large quantities of greenhouse gases and is simultaneously under pressure to increase its capacity to generate energy.

Another component of the green economy is often overlooked: restoring and conserving natural ecosystems can stimulate rural economies, create rural and urban jobs and help maintain critical ecosystem services that are vital to the economy, such as water supply. In addition, these activities can strengthen the resilience of ecosystems to climate-induced change. Enhancing the resilience of ecosystems is necessary to help ensure the economic and social well-being of communities, particularly the rural poor who are amongst the most vulnerable to the impacts of climate change.

Ecosystem-based solutions to adaptation and resilience can aim either to maintain the functionality of ecosystems or to restore functionality where it has been lost. In South Africa, there are a number of innovative nature-based, environmental public works programmes that have created much needed work opportunities linked to restoration and maintenance of natural ecosystems. These programmes are the topic of this chapter.

Building gabions to restore a degraded wetland

INFO BOX What are "green jobs"?

"Green jobs" are those that aim to reduce the environmental impact of enterprises and economic sectors, ultimately to levels that are sustainable; or jobs that conserve or rehabilitate the environment. Specifically, but not exclusively, this includes jobs that: reduce energy, materials and water consumption through high-efficiency strategies; reduce the carbon footprint of the economy; minimise or avoid all forms of waste and pollution; protect ecosystems and biodiversity; restore degraded lands and combat erosion (definition based on ILO, 2008 and Lieuw-ke-Song, 2009).

In this Primer, the term "nature-based jobs" (or work opportunities) is used to refer specifically to work opportunities that relate to the conservation, restoration and maintenance of natural ecosystems. These work opportunities are a subset of "green jobs".

The South African context: the need for sustainable livelihoods

Now, as in 1994, poverty and unemployment are amongst the biggest challenges facing the South African government. With current unemployment figures falling in the range of 25-27 % (Statistics SA, 2010), and job losses in "mainstream" economic sectors continuing due to the effects of global economic trends, there has been a pressing need for innovative interventions and collective effort across sectors to develop sustainable employment opportunities. Of particular concern is the need to build viable livelihoods for economically marginalised communities, especially in rural areas where the skills base is generally low, and stable employment opportunities are few. Although agriculture provides employment to some rural communities, the nature of this work is often seasonal, and additional income streams are required to meet basic needs.

Alongside these challenges, the South African government is also concerned about strengthening environmental sustainability, addressing future energy and water needs, reducing carbon emissions and building economic, social and environmental resilience to the predicted impacts of climate change. In May 2010, government held a Green Economy Summit, a high-profile event that laid the basis for the development of a green economy strategy and action plan for South Africa. The programmes described in this chapter demonstrate win-win solutions for addressing dual socio-economic and environmental challenges, and could form an important component of a broader green economy strategy.

How biodiversity supports livelihoods

In South Africa, terrestrial, freshwater and marine ecosystems and their associated biodiversity are widely used for commercial, semi-commercial and subsistence purposes, through both formal and informal markets. Biodiversity provides the basis for employment in industries such as fisheries, game and livestock farming and the wildflower industry, and the formal conservation sector is also a significant employer. In addition, many rural communities depend on subsistence use of wild biodiversity and natural resources for their livelihoods, even if this does not create formal employment.

Sound natural resource management, particularly the maintenance of healthy wetlands and river systems, underpins many other economic sectors and the employment that these provide. Public works programmes that enhance natural capital and secure water supplies provide many work opportunities to poor, rural and marginalised communities; they also enhance the natural resilience of ecosystems to the impacts of climate change and protect livelihoods in sectors such as agriculture that depend on the ecosystem services provided by healthy ecosystems.

Biodiversity supports sustainable livelihoods in South Africa in multiple ways which are summarised in the info box on page 118.

Women collecting thatching grass

INFO BOX How biodiversity helps create sustainable livelihoods

Biodiversity helps create sustainable livelihoods through the direct creation of livelihood opportunities, and through the ecosystem services that underpin the many economic activities that provide employment opportunities in South Africa.

Direct creation of livelihoods

Formal conservation: People are employed in a wide range of technical and management posts that relate to biodiversity in government departments, provincial nature conservation agencies, municipalities, tertiary education and research institutions and non-governmental organisations. In 2007/8 there were 65,000 public sector jobs in diverse fields related to biodiversity conservation, such as conservation scientists (botanists, zoologists, marine biologists), climate change scientists, protected area managers, field rangers, forestry advisors, agricultural extension officers, biodiversity stewardship officers, conservation planners, GIS technicians, project managers and environmental educators.

Game farming: The game industry depends heavily on biodiversity for both the animals that form the basis of the sector, and the habitats where they live and feed. Game farming (or wildlife ranching as it is called elsewhere), is an important provider of employment in the provinces of Limpopo, Northern Cape and Mpumalanga, and is a rapidly growing sector in the Eastern Cape. These provinces are characterised by largely rural populations who are mostly poor, with few other viable economic and employment opportunities. The sale of wild game has grown substantially in the last two decades and in 2007 the hunting industry was estimated to employ some 70,000 people.

Tourism: South Africa's biodiversity, scenic beauty, mild climate and cultural diversity have made it one of the world's fastest-growing tourist destinations, with over 9 million foreigners visiting the country in 2007. The tourism industry has exceeded the growth of virtually all other sectors in the economy in the post-apartheid era, and is an important employer in both the public and private sectors, accounting for approximately 7% of employment in South Africa, and contributing approximately 8.5% to GDP. The government is committed to expanding national parks and provincial nature reserves, broadening tourism opportunities to include historically disadvantaged communities and using wise land-use planning to maintain scenic beauty in production landscapes.

Fisheries: About 600,000 tons of marine resources worth over R2.5 billion (about US$325 million), are harvested annually by 27,000 fishermen and women. The value of the entire fishing industry, incorporating commercial, recreational and subsistence fishing, was estimated in 2007 to be R4.5 billion (about US$584 million) per year.

Harvesting of natural resources: In many rural economies, where the cash economy is very limited, biodiversity and ecosystems contribute significantly to people's daily consumption needs (through the provision of food, water, fuel wood and building material) and income generation (through activities such as the selling of reed mats, baskets and medicinal plants). The number of people using non-timber forest resources is in the millions, including rural and urban populations, and the direct use of forest resources amounts to about R8 billion per year (about US$1 billion). This contribution from the natural environment (referred to as an "ecological wage") is seldom considered, yet holds substantial value.

Restoration projects: In addition to land restoration achieved through a public works approach (see Section 6) there are numerous small-scale, NGO-led restoration and reforestation projects taking place within protected areas and on communal and privately owned land. These are an important source of livelihoods for rural communities. The projects involve people in activities such as collecting seeds, growing and planting trees, and removal of invasive alien plants, in return for which they receive payments that provide a baseline level of income for their communities.

Environmental public works programmes: Public employment programmes that restore and maintain natural ecosystems are an important source of short-term work opportunities for poor, rural and marginalised communities. These programmes are discussed in detail in the body of this chapter.

The contribution of ecosystem services to the economy and sustainable livelihoods

Many of the benefits derived from biodiversity and ecosystems are public goods that appear to be "free" – such as clean air, pollination of crops, or flood control. In recent decades the field of environmental resource economics

has grown in South Africa, producing estimates of the contribution of biodiversity to the country's Gross Domestic Product, and monetary values for the many ecosystem goods and services that were previously taken for granted. Understanding their real value is an important first step towards capturing these values in markets and prices, and considering their value, or its potential loss, in decision-making. Resource economics studies that have been carried out in South Africa estimate the total value of ecosystem services at R73 billion (about US$9.5 billion) per year.

	Ecosystem service	Value in millions of South African rands per year	Value in millions of US dollars per year (US$1 = R7.7)
Goods (Provisioning)	Grazing	18,094	2,349
	Natural resources	4,895	635
	Bioprospecting	178	23
Services (Regulation)	Carbon sequestration	8,649	1,123
	Pollination	5,684	738
	Erosion control	8,319	1,080
	Regulation of water flows	440	57
	Water treatment	202	26
	Blackfly control	77	10
	Crop pest control	4,380	568
	Nursery value of estuaries	976	127
Attributes	Ecotourism	21,000	2,727
	Scientific value	15	2
	Total value of selected ecosystem services	73,000	9,465

Figures from Turpie, *et al.*, 2009

In addition to these ways in which biodiversity contributes to livelihood creation, there has been a shift towards finding other mechanisms for solving the dual socio-economic and ecological challenges faced by the country. These include market-based interventions, payments for ecosystem services and environmental public employment programmes, the last of which is the subject of the rest of this chapter.

INFO BOX Payments for Ecosystem Services in South Africa

Payments for Ecosystem Services (PES) could play a key role in conserving biodiversity and sustaining ecosystem health, but this mechanism is only in the early stages of development in South Africa. PES involves payments to landowners or land users for well defined ecosystem services delivered by the landscapes they manage, or for land uses that are likely to secure ecosystem services. PES has an advantage over many other conservation tools because it is both an incentive and a financing mechanism, and is potentially very efficient. Feasibility studies for the implementation of PES have been carried out in two major water-production areas in South Africa, the Maloti-Drakensberg Mountains and the Tsitsikamma-Baviaanskloof region in the Eastern Cape. Building on lessons learnt through environmental public works programmes, pilot sites for implementation of PES are currently being selected, focussing on the establishment of institutional arrangements that can be rolled out more widely.

Mutale falls, Limpopo province

2 Environmental public works programmes

Since 1995, environmental public works (or public employment) programmes that maintain, rehabilitate or restore natural landscapes and ecosystems, have become an important creator of work opportunities in South Africa. The programmes provide opportunities for poor, unemployed and under-employed people to be involved in paid work, often for the first time. In the 2007/2008 year programmes of this type collectively spent R1.3 billion and, based on previous performance, it is anticipated that they will provide some 1.2 million work opportunities between 2009 and 2014, and potentially up to 6 million work opportunities (averaging 100 days each) over the next 15 years.

The first government-led public employment programme in South Africa with a specific focus on environmental rehabilitation was Working for Water, which was conceived to address two political priorities: job creation and water scarcity. The programme (see Section 3) uses labour-intensive methods to clear invasive alien plants, creating many short-term work opportunities in the process. Within its first five years of operation, the Working for Water programme demonstrated convincingly that activities beneficial to the environment could also address the challenges of poverty alleviation and unemployment. Following on this success, several other environmental public employment programmes have been developed based on the Working for Water model or a modification of it. These include: Working for Wetlands, Working on Fire, Working for Land and Working for the Coast, with two new programmes dealing with Energy and Waste currently in development (see the info box below for a profile of each programme).

INFO BOX South Africa's environmental public employment programmes

Working for Water: This programme creates work opportunities through the removal of invasive alien plant species from infested landscapes.

Working for Wetlands: This programme facilitates the conservation, restoration or rehabilitation and sustainable use of wetland ecosystems.

Working on Fire: Working on Fire aims to enhance sustainability and protection of life, livelihoods, ecosystem services and natural processes through integrated veld and forest fire management.

Working for Land: This emerging programme seeks to create livelihood opportunities for rural communities through restoration of degraded landscapes.

Working for the Coast: This programme works towards the creation of sustainable coastal livelihoods, protecting marine and coastal resources and unlocking the potential value of coastal goods and services. It has various components ranging from beach clean-ups to restoration of the coast and environmental education.

In addition to these, new "Working for" programmes are currently being developed relating to Energy and Waste.

Firefighters from Working on Fire

Youth conducting a beach clean-up at Wolfgat, Cape Town

The "Working for" programmes are collaborative initiatives involving a range of national and provincial departments and agencies, municipalities, industry and civil society organisations. They receive core funding from National Treasury, channelled through specific government departments, under the umbrella of South Africa's Expanded Public Works Programme (see info box). In keeping with the guiding principles of the Expanded Public Works Programme, the "Working fors" make a conscious effort to benefit the most marginalised communities and to target the employment of women, youth and people with disabilities. Training is provided to programme beneficiaries in the technical skills associated with restoration as well as a range of life skills that are intended to assist workers with exit opportunities beyond the programme.

INFO BOX South Africa's Expanded Public Works Programme

The Expanded Public Works Programme (EPWP), launched by the government in 2004, is a nationwide initiative that seeks to draw significant numbers of unemployed people into the productive sector of the economy, gaining skills while they work and increasing their capacity to earn an income. Drawing on lessons learnt through Working for Water, and other public works programmes that were established from 1995 onwards, the EPWP promotes the creation of short-term work opportunities, averaging 100 days per year per person, targeting the urban and rural poor.

The EPWP focuses on labour-intensive sectors such as infrastructure development and maintenance, but also includes environmental, cultural, social and economic programmes. In addition to providing work experience, the EPWP aims to make it possible for people to earn an income after exiting the public works programmes either through finding alternative work or starting their own small businesses. Workplace-based skills development is an integral part of the programme and research has shown that a small percentage of EPWP contractors have been able to establish themselves in viable small businesses after exiting the programme.

Clearing invasive alien trees

3 Removing invasive alien plants – Working for Water

Invasive alien plants pose one of the biggest threats to biodiversity and ecosystem functioning in South Africa, particularly in the Fynbos, Thicket and Grasslands Biomes, and it is predicted that invasion by woody invasive alien plants will increase as the effects of climate change are felt (see info box). Numerous studies have indicated that invasive alien plants have a measurable negative effect on stream-flow (Turpie *et al.*, 2008) and this is of great concern as South Africa is a water-scarce country. It is calculated that invasive alien plants consume up to 3,300 million m^3 of South Africa's water resources every year, an amount equivalent to nearly 7% of total natural river-flow (Le Maitre, 2000). Maintaining a steady water supply through the removal of invasive alien species is one of the focus areas of the Working for Water programme, along with conserving biodiversity and improving the the productive potential of land.

INFO BOX Invasive alien plants: how big is the problem?

Invasive alien plants have infested an estimated 20% of the land surface area of South Africa, much of this falling within high water-yield catchments and areas important for the conservation of biodiversity. Invasive alien plants are spreading at an annual rate of 3% (Kotze *et al*., 2010) and the worst affected province is the Eastern Cape, followed by KwaZulu-Natal, Mpumalanga and the Western Cape (see Figure 6.2).

Invasive alien plants grow in environments where their natural enemies do not occur. They are, therefore, able to grow faster, mature earlier, and produce many more seeds than indigenous species. They out-compete indigenous vegetation, and replace it with dense infestations of invasive alien plants; these impact negatively on water resources and on the ecological integrity of natural ecosystems. Invasive alien plants increase fuel loads, resulting in more intense fires that cause greater environmental damage.

Invasive alien plants also invade grazing lands, reducing their value to stock farmers. This is of particular concern since South Africa is a country in which raising livestock on natural rangelands is a widespread form of land use.

There are currently 117 plant species recognised as major invasive alien species, 29 of these as aggressive transformers. Amongst the most problematic of these invasive alien plants are black, silver and green wattles; species of eucalyptus and pine, and jointed cactus.

Infestation by jointed cactus, near Jansenville, Eastern Cape

The Working for Water Programme

In 1995, a group of scientists and conservation managers working in the Fynbos Biome made a presentation to political decision-makers to explain the impact of invasive alien plants on catchments and water supply. The presentation not only described the devastating impacts, but also suggested a revolutionary new way of addressing the problem through creating work for poor communities who had no formal employment – an approach that had been successfully piloted through an NGO-led project on Table Mountain in the City of Cape Town.

This led to the appointment of a leading scientist to work with the then Minister of Water Affairs and Forestry to develop a programme that could improve water supplies through better catchment management in preference to the construction of new dams. Two years later, the Working for Water Programme was launched with R25 million (about US$3,2 million) to be used on labour-intensive clearing of invasive alien plants throughout the country. Today, the Working for Water Programme is managing some 300 projects nationwide, and commands an annual budget of about R500 million ($65 million) received from National Treasury as well as the private sector, water boards, municipalities and international donors.

The Working for Water Programme uses labour-intensive mechanical, chemical and biological methods to remove invasive alien plants. The programme focusses on areas identified as priorities using a number of factors, including water, biodiversity, the productive potential of unmodified agricultural land (such as that used for grazing or harvesting of wildflowers) and socio-economic issues. The programme may fund clearing of invasive alien plants on private, communal or municipal land if it has been identified as a priority, but the landowner has to commit to meeting the costs of keeping the land clear of invasive alien plants afterwards, a process which can take five to ten years.

Working for Water is a public entity under the national Department of Water Affairs. A multi-departmental partnership facilitates co-operative governance and helps drive the strategic direction of the programme. Regional programme leaders are responsible for managing project implementation, which may take place through direct employment of contractors recruited from local communities, or through the appointment of implementing agents such as municipalities, which, in turn, employ contractors to carry out clearing activities. Regional advisory committees involving key stakeholders assist with the selection of contractors to ensure that targets are met for employment of women, youth, black people and people with disabilities.

Working for Water team member

Expanded public works team involved in clearing invasive alien plants, Baviaanskloof

The Working for Water Programme has been hailed as highly successful in terms of its objective of restoring water supply in alien-infested catchments and as one of the most successful integrated land management programmes in the world, due to its combined impacts on water, biodiversity and socio-economic development (Turpie *et al.*, 2008). Some key achievements of the programme include:

- Between 1995 and 2009, Working for Water spent R4 billion (about US$519 million) clearing nearly 2 million hectares of invasive species countrywide.
- Clearing of alien plants has increased water runoff by 48 - 56 million m^3 each year.
- More than 20,000 previously unemployed beneficiaries who have no other access to formal employment have been provided with short-term work opportunities and training through the programme annually, equating to 27.5 million person days of employment.
- Social development projects are undertaken as an integral part of the programme, including: partnership with the Planned Parenthood Association of South Africa; provision of childcare facilities; HIV/AIDS education; education about reproductive health and providing access to clinics; reintegration of rehabilitated drug offenders, and saving schemes for programme beneficiaries.

In addition, there are numerous secondary benefits accruing from removal of invasive alien species, including the provision of cheap fuel, the production of value-added products such as furniture and the development of associated secondary industries, and the possibility of using the wood of invasive alien plants as biomass for the generation of electricity.

An ongoing challenge for the programme is the maintenance of cleared hectares through either controlled follow-up, or systematic handover to landowners. Clearing invasive alien plants is a complex process that needs to be continued over many years before an area is completely cleared, if ever. As long as there are invasive alien plants in the surrounding landscape the area can never be assumed to be free of alien plants, as seeds are continually being reintroduced. The period of initial control is the most labour-intensive and costly. The follow-up phase from the second year targets secondary seedling invasions and can vary from one to many years. This means that the programme can potentially provide work opportunities for many more people over an extended period.

CASE STUDY Working for Water in the Tsitsikamma Region: delivering water

"Tsitsikamma" is a Khoisan word meaning "place of much water." The Tsitsikamma area of the Garden Route National Park incorporates 80 km of rocky coastline with coastal fynbos, spectacular seascapes and landscapes, remote mountainous regions, secluded valleys covered with afromontane forest, and deep river gorges leading down to the sea. The areas surrounding the Park are covered in plantations of various species of exotic pines.

This area, with its spectacular and important biodiversity, is under serious threat from invasive alien species such as silky hakea, black wattle, blackwood and species of pine and eucalyptus. The invasive alien plants in the mountains have dramatically reduced groundwater levels and the flow of water into the main rivers in the area.

Through Working for Water, over R29 million (about US$3.8 million) of state funding has been spent on clearing 18,000 hectares of alien invasive trees and shrubs and about 8,000 hectares of regrowth, with most work being done in the upper river catchments. This has led to noticeable improvements in the rivers and their functioning within a few years, in the form of restored wetlands and seeps around rivers. Further clearing could release an estimated 47 million m^3 of water per year.

If invasive alien plants are allowed to spread unchecked in this area, they could potentially consume up to 204 million m^3 of water each year. By clearing these invading plants, the Working for Water Programme is restoring ecological functioning to the Garden Route National Park and preventing loss of plant and animal species. Erosion of river banks is prevented as a stable cover of indigenous species is re-established. Dense stands of single exotic species are being removed, allowing the natural biodiversity to return. Removal of the excess biomass of alien plants is also allowing natural fire cycles and water regimes to resume.

View over forests and the mouth of the Groot River at Nature's Valley, Garden Route National Park

4 Restoration of wetlands – Working for Wetlands

South Africa has over 110,000 wetlands covering 4 million hectares and representing 3.5% of South Africa's surface area. These wetlands collectively play an important role in sustaining the ecology and economy of South Africa. They provide essential ecosystem services including water purification, flood control, streamflow regulation, provision of water, food and natural products, and they represent natural infrastructure for gathering, managing and delivering water for human use. Many of our wetlands play a vital role in agro-pastoral production systems and local livelihoods, through the provision of highly productive agricultural land, grazing, fish, fibre and medicines, and they underpin the health and well-being of many rural communities.

Despite the direct and indirect value of wetland ecosystem services to all sectors of the economy, South African wetlands have been severely affected by human activities and in some catchments up to 60% of the wetlands have been lost (Dini, 2010). Broader consequences of this large-scale wetland loss include diminished water security, desertification, reduced food security, reduction in biodiversity, lost livelihoods and increased vulnerability to natural disasters, especially floods and droughts.

Nuwejaars Wetlands, Agulhas Plain

INFO BOX Restoration and rehabilitation

In line with global trends, the term "restoration" has been used to refer to all interventions designed to aid the recovery of degraded ecosystems, regardless of whether they are intended to restore the ecosystem to its earlier pristine state or not. It is acknowledged, though, that in some earlier literature a distinction is drawn between rehabilitation (which focuses on restoring functioning of the ecosystem, even if it is not returned to its original state) and restoration, and the Working for Wetlands Programme has tended to use the term rehabilitation rather than restoration.

The Working for Wetlands Programme

Soon after the launch of the pioneering Working for Water Programme, a conceptual link was made between increasing water flows through the removal of invasive alien plants in catchments and restoring the ability of wetlands to regulate these water flows. The potential was identified to develop a complementary programme that focussed on wetland rehabilitation, using the labour-intensive, poverty alleviation model of Working for Water.

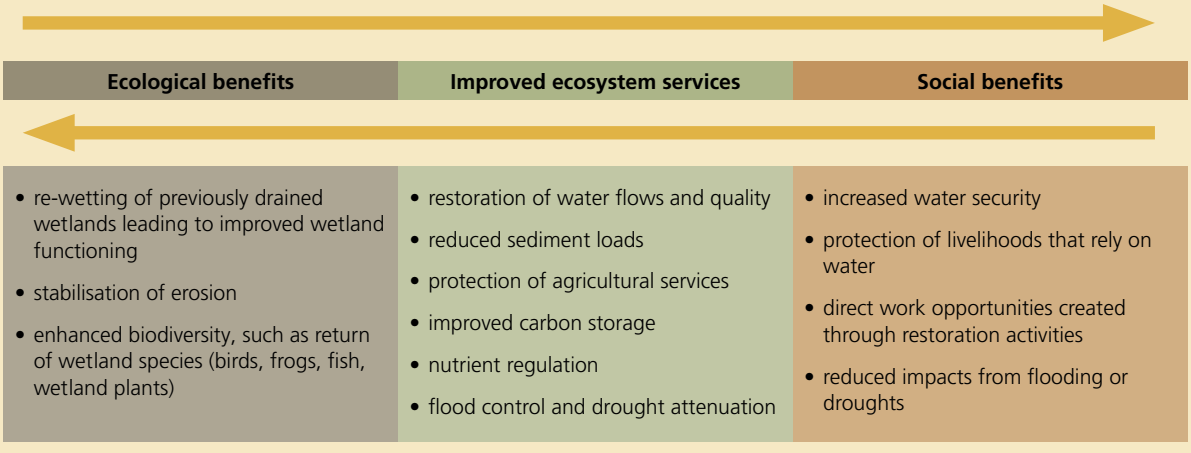
The Working for Wetlands Programme came into being within Working for Water in 2000 and moved to the Department of Environmental Affairs as a fully fledged programme in 2004. Its purpose is to focus on the rehabilitation, protection and sustainable use of South Africa's wetlands. The operations of the programme include proactive measures for maintaining healthy wetland ecosystems, rehabilitation to reverse past degradation, applied research, communication, education and awareness raising. The programme works to recover the health and ecosystem services of degraded wetlands through activities such as:

- building structures to arrest erosion, trap sediment and re-saturate drained wetland areas
- plugging artificial drainage channels
- addressing other causes of degradation, such as poor agricultural practices
- plant propagation, revegetation and bio-engineering
- building boardwalks, bird-viewing hides and interpretive signboards to enhance the recreational, tourism and educational value of rehabilitated wetlands.

These interventions contribute to improved ecosystem services that also strengthen resilience to climate change (see info box). Healthy wetlands serve as natural reservoirs that maintain perennial stream-flows and buffer against the impacts of floods and droughts, reducing the vulnerability of communities in water-limited or drought-prone parts of the country, and protecting livelihoods that rely on water.

INFO BOX Benefits from rehabilitated wetlands

Restoration of wetlands has numerous benefits that will be even more relevant with climate change.



Working for Wetlands is managed from within a public entity, the South African National Biodiversity Institute. The Working for Wetlands co-ordination unit is responsible for facilitating high-level partnerships between government departments, for securing and managing funding and for overall project planning, facilitation and co-ordination. It appoints regional or local implementers who, in turn, appoint contractors from local communities to carry out rehabilitation activities. The programme operates in prioritised wetlands identified in terms of ecological importance and accessibility to a community requiring support through the provision of work opportunities. At site level, local working partnerships involving multiple stakeholders are set up to ensure ongoing wetland maintenance.

Like the other "Working for" programmes, Working for Wetlands receives its core funding via a three-year rolling allocation from National Treasury as part of the environmental cluster of the Expanded Public Works Programme, directed though the national Department of Environmental Affairs. The programme is also exploring additional funding sources from outside of the public sector. One such option is wetland mitigation banking, which is a mechanism that compensates for unavoidable wetland loss through rehabilitation of other wetlands. This model is being piloted in a project involving the coal mining sector and efforts are underway, through the Grasslands Programme (see Chapter 7), to explore the potential to build this model into national policy.

CASE STUDY Rietvlei wetlands: restoring the "kidneys" of the landscape

The diverse Rietvlei wetland system is located immediately upstream of the Rietvlei Dam within a 4,000 ha nature reserve, just outside of the City of Tshwane (Pretoria) in Gauteng province. The dam has been used by the city since 1934 for drinking water, producing about 41 million litres per day for the growing population of the metropole. Until Working for Wetlands intervened, the Rietvlei wetlands had been heavily degraded.

Restoration of the Rietvlei wetland by Working for Wetlands

The land on which Rietvlei Nature Reserve is situated was previously used for agriculture, and the wetlands had been drained by farmers for the cultivation of crops. The entire system had become further degraded by the formation of extensive erosion channels. The Rietvlei Dam had also become severely overloaded with nutrients and other pollutants, due to the increasing volumes of treated domestic sewerage and industrial effluent emanating from the highly urbanised catchment of the dam.

Working for Wetlands and the City of Tshwane formed a partnership to rehabilitate the wetlands upstream of the dam, with the primary purpose of restoring the capacity of the wetlands to purify water. Rehabilitation interventions included the building of gabion, concrete and earth structures to control erosion and resaturation of drained areas, in order to increase water retention time and ensure even distribution of flow across the system. This work was carried out in parallel with extensive clearing of invasive alien plants by the Working for Water Programme.

In the nine years since rehabilitation of the wetlands began, monitoring has revealed notable changes including:

- significant reductions in the levels of pollutants such as ammonia, nitrates, fluoride and sulphates in the water exiting the wetland
- reduction in the growth of unwanted micro-organisms in the dam, with corresponding reductions in the cost of water treatment
- improved water flows through the wetland
- visual signs of recovery including the return of reeds, birds and frogs.

Restoring the function of the Rietvlei wetlands has had direct economic value to the City of Tshwane and its residents, and has validated the investment of at least R8 million (over US$1 million) to date by Working for Wetlands.

Working for Wetlands has demonstrated the success of wetland rehabilitation on a large scale. Some key achievements of the programme between 2004 and 2009 include:

- rehabilitation of 427 wetlands at a cost of just under R300 million (about US$39 million)
- the creation of close to 10,000 short term work opportunities (averaging 100 days in length) for people from vulnerable and marginalised communities
- the creation of 214 small, medium and micro-enterprises established by the rehabilitation contractors
- entrenching wetland rehabilitation as a vehicle for delivering on a range of policy objectives and tackling broader issues of wetland conservation and wise use
- ensuring that wetlands continue to yield economically productive and socially beneficial flows of ecosystem services.

CASE STUDY Wetlands and flood mitigation: lessons from the Kromme River

The Kromme River in the Eastern Cape cuts across a narrow coastal plain that includes important and threatened coastal lowland fynbos and thicket vegetation types. This region, which includes valuable agricultural landscapes, previously contained some of the largest wetlands of their type in South Africa. But up to 50% of these wetlands have been lost through infestation by invasive alien plants and destructive activities such as large-scale cultivation on floodplains.

The Kromme supplies water to growing coastal settlements, as well as nearly 40% of the water for Port Elizabeth, the Eastern Cape's largest city with a population of about 1.5 million. For this reason, the Kromme River wetlands have received focussed attention from the Working for Wetlands Programme. Since 2001, the Gamtoos Irrigation Board (the local implementer for Working for Wetlands) has used local contractors to build ten large structures at a total cost of R10 million (US$1.3 million), to combat erosion that threatened the remaining large, intact wetlands.

Dramatic floods hit the southern and eastern Cape in 2006, resulting in loss of life and extensive damage to property. The Kromme River experienced the most severe floods on record since 1938. The river was gouged down to bedrock in some places, large sediment loads were deposited on fields and in dams, and extensive damage was caused to infrastructure. An investigation conducted immediately after the floods revealed that the Working for Wetlands erosion-control structures had accomplished their purpose: the rehabilitated wetlands slowed the velocity and destructive potential of the floodwaters and trapped sediment, reducing further potential damage downstream. This was in stark contrast to other parts of the Kromme Valley which suffered massive flood damage, where wetlands had been destroyed to make way for cultivated fields. The ongoing effort required to maintain and rehabilitate other wetlands in the Kromme Valley provides much needed work opportunities to local communities for whom there are few other employment options.

Kromme River wetland restored by Working for Water, near Cape St Francis, Eastern Cape

5 Managing fire – Working on Fire

Fire is a key factor determining structure and function of vegetation in many African ecosystems and is also important in determining biodiversity patterns. Three of South Africa's nine biomes – Fynbos, Grasslands and Savanna – are not only fire-prone but are also fire-dependent, and require fire to maintain the biodiversity patterns and ecological processes that give them their character.

Natural fire cycles in South African landscapes have become severely disrupted because of several factors, and unwanted veld and forest fires regularly devastate South Africa's landscapes, affecting natural habitats, damaging ecosystem functioning, endangering life and destroying property. Scientists predict that climate change will cause further increases in the intensity and frequency of fires, as well as changes in their seasonality. High fire-risk conditions are projected to almost triple in the western parts of the Western Cape, and to increase by up to 40% in the east (Freeth, Bomhard and Midgley, 2008). To manage this risk effectively at the landscape level, it is important to adopt a landscape approach and to make a shift from reactive fire-fighting to integrated fire management.

It is neither practical nor desirable to completely eliminate fires from natural vegetation, and in many parts of South Africa, proactive fire management through controlled burning is an important part of wise landscape management. However, a reduction in the order of 25% in the total area of unwanted fires is thought to be achievable. Rapid and efficient response to unwanted fires also significantly reduces the risks posed to human settlements and the economic losses associated with fires that burn out of control.

The Working on Fire Programme

Working on Fire was established in 2005 to train previously unemployed people as fire-fighters and to employ them to patrol fire-prone areas. Working on Fire aims to enhance the sustainability and protection of life, livelihoods, ecosystem services and natural processes through integrated fire management in order to contribute to:

- economic empowerment
- skills development
- social equity
- accelerated service delivery.

Working on Fire deploys well equipped and trained personnel to work alongside existing fire-fighting services to help prevent wildfire catastrophes. The programme also contributes resources and services to land management agencies and Fire Protection Associations (see info box on page 131).

Fire in natural vegetation

INFO BOX Fire Protection Associations

Working on Fire supports the establishment of Fire Protection Associations (FPAs), which are required in terms of national fire management legislation. An FPA is a forum in which landowners and communities come together to address the wildfire risks to their land. FPAs encourage co-operation between rural landowners, managers and users, leading to more effective management of wildfires through clearing of invasive alien vegetation and burning firebreaks. Any group of willing landowners may form an FPA, but they are usually formed where fire hazards are particularly high.

In some parts of South Africa, climate change is likely to increase the frequency and intensity of wildfires. In response to this, a major insurance company has lowered insurance premiums for farmers who manage their fire risk by belonging to an FPA.

CASE STUDY Fighting fires, building spirit

In the Eastern Cape village of Keiskammahoek near the city of East London, Phumza Matitiba, a 32-year old mother of four children, was battling to find secure employment and build a future for herself and her young children. Although she had completed her schooling with good grades, and had briefly held employment with the South African Defence Force, she had no post-school training and few special skills. Living as she does in an extremely poor part of the country, with very high unemployment rates, Matitiba could not find stable employment.

Working on Fire team building firebreaks

Matitiba heard about the Working on Fire Programme from her local councillor and travelled to the nearest Working on Fire base to complete the fitness test required for entry into the programme. She passed and was accepted, and immediately began the rigorous fire-fighting and physical fitness training.

For Matitiba, becoming a fire-fighter gave her not only an income, but an opportunity to develop her potential and broaden her life experience: "All of a sudden we were being airlifted to fight fires in the Western Cape and other parts of the Eastern Cape". She has received additional training at Working on Fire centres in other provinces. Matitiba says: "Working on Fire has given me a spirit. It is enabling me to become the person I want to be. So many rural women never reach their full potential, but with this programme you can be a leader."

Working on Fire is funded by government and the commercial forestry sector. The programme operates through nine provincial centres that co-ordinate fire-fighting crews drawn from local communities. Each crew has an immediate area of responsibility spanning a 100 km radius centred on its home base, but teams can be deployed nationally, should the need arise. Unlike Working for Water, Working on Fire employs people on a year-long contract, which is renewable depending on a performance assessment, and pays people a daily wage. Since its inception, the programme has established 64 fire-fighting bases and employs 1,753 fire-fighters, of whom 95% are young people (between 18 and 36 years old), 26% are women and 88% were previously disadvantaged by apartheid.

Whilst the focus of Working on Fire is on fire management, its underlying motivation is poverty relief and skills development designed to help beneficiaries build self-esteem and fulfil their true potential. About 25% of each fire-fighter's time is spent receiving training that includes: skills required for fighting wildfires, life skills and physical fitness in order to maintain the physical condition needed to fight fires, and building team spirit.

6 Land restoration – Working for Land

Working for Land is a newly emerging "Working for" programme that seeks to create livelihood opportunities through restoration of degraded landscapes, either by addressing bush encroachment or by restoring degraded wood- and grasslands. Although it is still in the early stages of development, the new programme features some interesting variations on the model developed by Working for Water and its related programmes. The features of the emerging programme are outlined briefly here.

Woodlands, a collective term applied to a range of savanna, thicket and forest ecosystems, cover extensive areas of South Africa, but only a small proportion of these landscapes are formally protected. A significant proportion of woodland landscapes either are degraded, but could recover over time, or are irreversibly modified.

To restore woodlands to a natural or near-natural state and optimise benefits from them, a country-wide restoration programme is needed. This need is all the more urgent because most degraded woodlands are situated in communal areas, where dependence on natural resources, high population densities and unplanned extraction of wood and other natural resources further erode the natural resource base and reduce future livelihood options.

Many rural communities are caught up in an apparent spiral of poverty and environmental degradation. This spiral has to be broken if South Africa's marginalised rural poor are to be economically empowered. The proposed Working for Land programme offers real opportunities for restoring not only natural capital in wood- and grasslands, but also the social and financial capital of rural communities.

Working for Land aims to address rural unemployment, poverty and ecological degradation simultaneously through integration of land restoration, the development of markets for goods and services and economic development. The logic behind this approach is that restoration will generate ecosystem services that have economic value and that can serve to generate revenue, for example, landscapes suitable for ecotourism.

The objectives of the programme are:

- to restore the composition, structure and function of natural landscapes so that ecosystem services such as carbon sequestration and landscapes for tourism are maintained
- to contain the spread of invasive alien plants by minimising the potential for invasions and working closely with Working for Water
- to improve natural species diversity and restore landscape stability and resilience

Elephant in savanna, iMfolozi Game Reserve, KwaZulu-Natal

- to promote the development of a market for ecosystem services
- to enhance the sustainability of livelihoods and the productive potential of land (reducing environmental risks), and promote economic empowerment in rural areas.

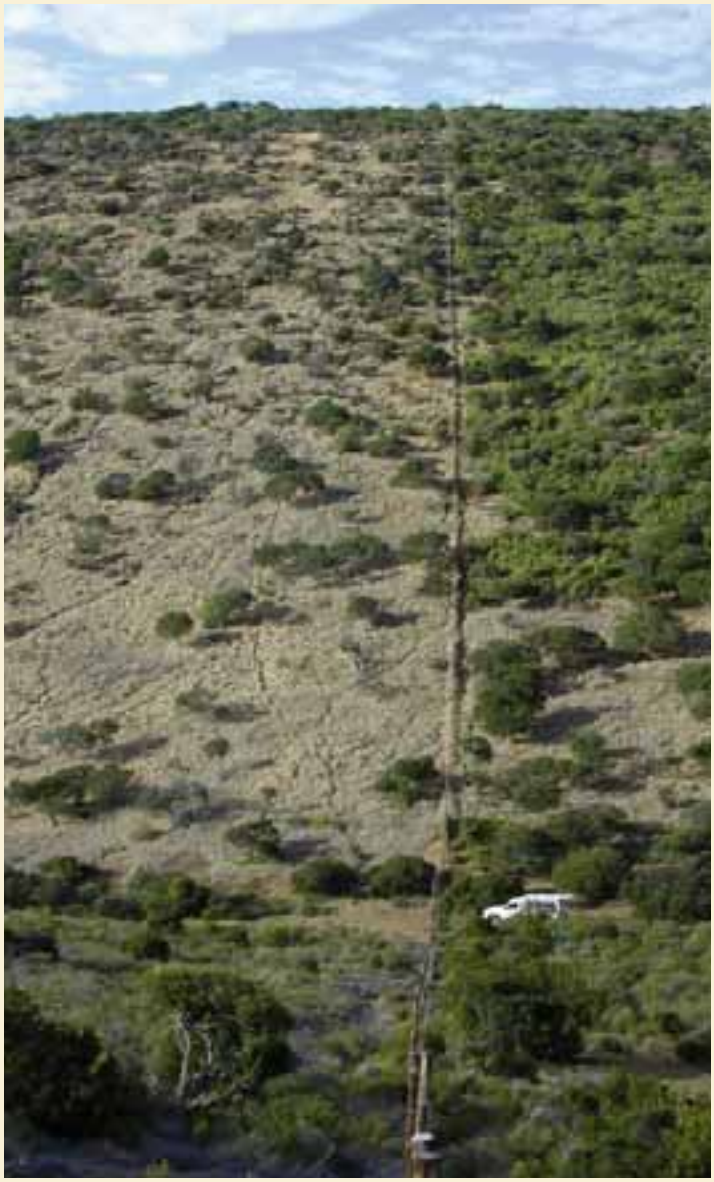
The Department of Environmental Affairs funded two pilot projects to test this model, one in the Letaba River catchment near Giyani in Limpopo province, and the other in coastal dune forests near Port St Johns on the Wild Coast of the Eastern Cape. Collectively, these projects employed 576 previously unemployed people and have led to the creation of a number of small businesses, at the same time as restoring several thousand hectares of degraded land. In addition, the restoration of degraded subtropical thicket in the Eastern Cape has been piloted in the Baviaanskloof World Heritage Site, funded through the Department of Water Affairs, and is now being rolled out at additional sites in the province (see case study below).

CASE STUDY Investing in sustainability: thicket restoration

More than 1 million hectares of thicket vegetation called "spekboomveld" (dominated by the spekboom plant, *Portulacaria afra)* have been converted from dense forest-like vegetation to an open desert-like state. This degradation is the result of unwise livestock farming practices, largely over-stocking with angora goats. Fortunately, this degraded land can be restored by planting cuttings of the Eastern Cape's unique and remarkable spekboom plant (also called *ingwanishe* in isiXhosa). The cuttings grow rapidly into tall dense vegetation, without any irrigation, and other indigenous species begin to return once they have become established.

Based on trials conducted in the Baviaanskloof World Heritage Site, it has been calculated that large-scale restoration of tens of thousands of hectares using spekboom cuttings will generate major benefits for South Africa, both environmental and socio-economic. The restoration process is extremely labour-intensive and is highly cost-effective relative to restoration activities in other biomes.

The environmental benefits of thicket restoration include: improved carrying capacity of the landscape for wisely managed livestock farming and wildlife; improved soil conservation; decreased sediment runoff into rivers; the increase of carbon capture; improved replenishment of groundwater and the return of other plants and animals associated with functioning thicket ecosystems.



Fenceline contrast showing intact spekboomveld on the right, and spekboomveld degraded by over-grazing on the left

Socio-economic benefits of the restoration process include: the creation of thousands of work opportunities for rural communities; improved landscapes for ecotourism; enhanced ecosystem-based adaptation to climate change, and improved income streams arising from carbon sequestration.

Thicket restoration in the Baviaanskloof

The emergence of the international carbon market has created a great opportunity for funding large-scale restoration, and the South African government has been quick to capitalise on this. In 2003, the then Department of Water Affairs and Forestry (now Department of Water Affairs) invested in the development of restoration projects that focus on carbon sequestration and generation of carbon credits. The rationale behind this investment was that carbon credits would be generated and ultimately provide a financial return on the project. It is as a result of this investment that Working for Land is today undertaking extensive planting operations in key protected areas in the Eastern Cape, where large tracts of degraded spekboomveld exist. Baseline carbon stocks are being determined and a project design document has been written to generate carbon credits on the voluntary carbon market in preference to the compliance market (Pierce and Skowno, 2009).

Samora Gusha is the project manager for two thicket restoration projects being implemented in communal land near the village of Peddie, on the boundary of the Great Fish River Nature Reserve. "There are lots of benefits to the communities when projects like this are started and grown," says Gusha. This sentiment is confirmed by Mzikhulu Nkone, a contractor in charge of one of the restoration teams: "We didn't have jobs and we were suffering. Now we can put food on the table. A lot has changed since we started to work – we are happy and earn money."

Based on the success of these pilot projects, the Working on Land Programme will be rolled out more broadly, working in close association with the LandCare Programme, which is a community-based, government-supported approach to sustainable management and use of agricultural resources (see info box). Details of the implementation arrangements still need to be finalised, but it is likely that a public-private partnership will be established to manage the programme on behalf of the Department of Agriculture, Forestry and Fisheries. Implementing agents will be appointed to employ teams of workers to carry out restoration work, much as in the Working for Wetlands model, but the financial model used will involve creating a wage incentive that encourages involvement by civil society and the private sector.

INFO BOX The LandCare Programme: working to combat desertification

The National LandCare Programme, managed by the Department of Agriculture and falling under the banner of the Expanded Public Works Programme, is the largest government programme aimed at combating desertification. The vision of LandCare is to have communities and individuals adopt an ecologically sustainable approach to natural resource use and management, and it focusses on enhancing *in situ* services that support livelihoods. Areas of well managed vegetation on farms are essential for strengthening food security and agricultural productivity, and can be used as the basis for new, supplementary economic activities.

7 Why these tools work in South Africa

South Africa's environmental public works programmes have mostly been in operation for less than ten years and still face many challenges. Environmentally, a key challenge is maintaining rehabilitated or restored ecosystems in a healthy state on an ongoing basis. From a socio-economic perspective, the key challenges are the need to create work opportunities that are of longer duration, for more people, and at a higher wage so that more people can be lifted above the poverty line. The South African government is exploring other models for creating stable employment, such as the Community Public Works programme that creates a minimum level of regular work for people who need it. These models could provide complementary income streams to the "Working fors" in future.

The "Working for" programmes set out to create short-term work opportunities for people who have few other opportunities for earning a living, by involving them in paid work associated with maintaining the ecological infrastructure of the country. Despite the ongoing challenges they may face, these programmes have made significant progress towards achieving their stated goals, in a relatively short period of time.

Some of the reasons for the success of these tools in South Africa include that:

- The programmes represent demonstrable win-win-win models with explicit social, economic and environmental gains.
- The programmes speak directly to the national government priorities of job creation, rural development and environmental sustainability, and are funded via the National Treasury.
- Rigorous scientific research has underpinned the development of the "Working for" programmes and ongoing research allows for refinement of strategies and operational plans.
- The programmes represent multi-departmental partnerships, so they are able to deliver effectively on a number of policy objectives simultaneously.
- Restoration, rehabilitation and clearing of invasive alien plants have proved effective as vehicles for creating work opportunities for marginalised communities because they are extremely labour-intensive activities that require few skills at entry level.
- The short-term nature and flexibility of the work opportunities is often well suited to the rural communities who are the beneficiaries of the programmes.
- Flexibility in the institutional models used for implementation of the programmes has meant that they can be applied in a range of contexts and cross-institutionally.
- The programmes have made a compelling argument about the direct connection between healthy ecosystems, a healthy economy and healthy people.

Three of the biggest environmental challenges over the next decade will be food security, biodiversity loss and water stress. Climate change is expected to worsen these problems through loss of habitat, the spread of invasive alien plants and associated land degradation, water scarcity and increased fire hazards. South Africa's "Working for" programmes, which address these issues whilst creating much-needed work opportunities, will be increasingly important for reducing South Africa's environmental and social vulnerability to climate change risks.

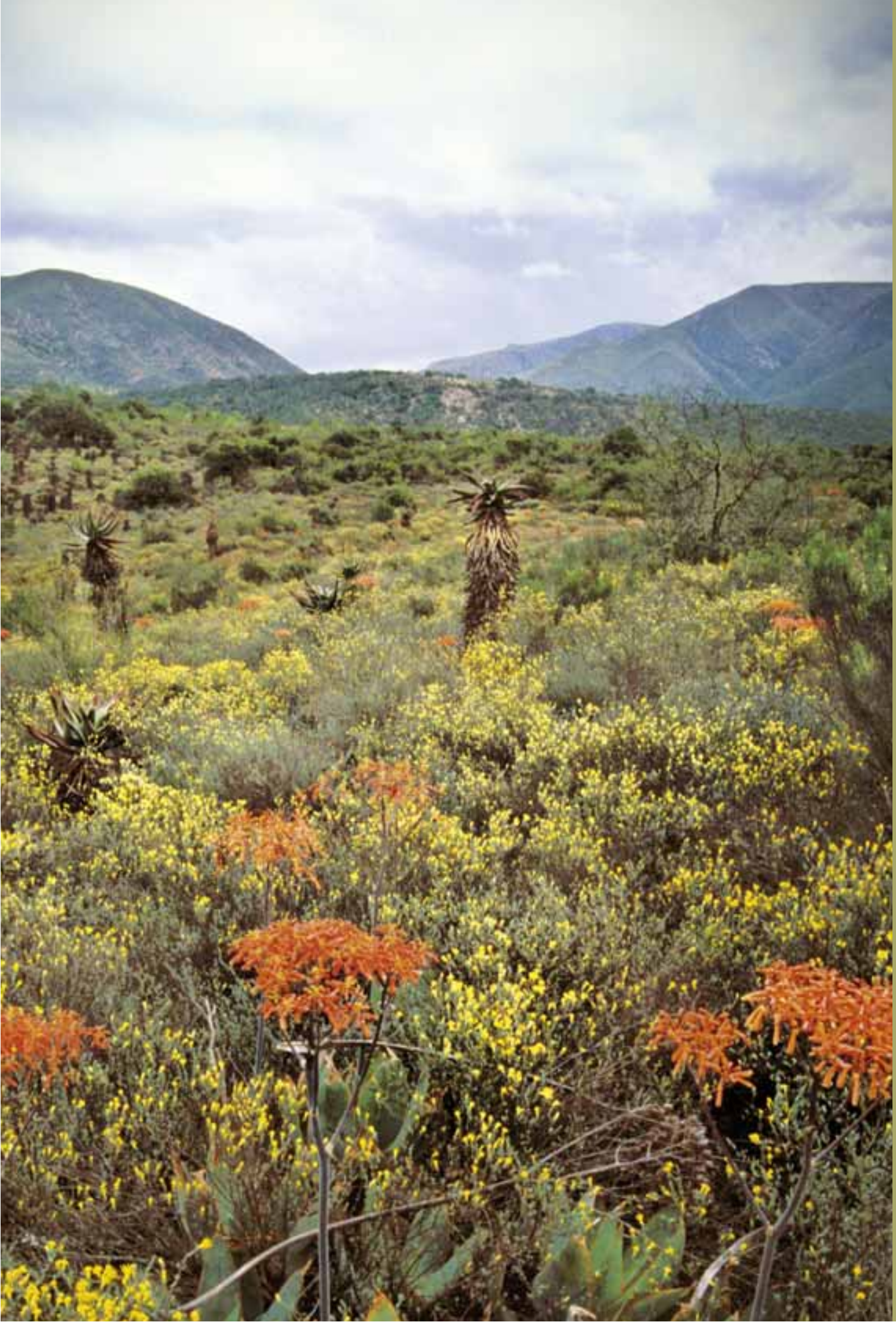
The last chapter explores the institutional partnerships behind the development of the tools described in this and the other chapters of this book.

7

Partnerships for implementation

Included in this chapter:

- Putting tools to work: the institutional context for implementation in South Africa
- Building co-operation and collaboration: types of partnerships; the importance of working at different scales
- Working in biomes
- Working in corridors
- Working at local level
- Funding partnerships
- Why these tools work in South Africa



1 Putting tools to work

Adopting a landscape approach requires interventions at national, regional and local scales, considering existing policies, institutions, livelihood issues and stakeholder interests. Adaptive management over time is needed and the most successful broad-scale conservation programmes have been those that have built effective partnerships between government, the private sector and local communities (Dudley *et al*., 2010). This has been clearly demonstrated in South Africa where strategic cross-institutional partnerships, supported by innovative funding strategies, have been amongst the most critical mechanisms for achieving dual conservation and development outcomes. These partnerships are the subject of this chapter.

The landscape approach in South Africa

South Africa has a long history of concern and action regarding biodiversity, although the philosophy and approach of the biodiversity conservation sector has changed significantly over time. Early approaches were characterised by a focus on species, establishing protected areas and law enforcement. Over the last decade, the biodiversity conservation sector has adopted a landscape approach in which a mosaic of different land uses contributes to broader conservation aims.

Globally, much biodiversity conservation work is still focussed primarily on formal protected areas. Whilst some countries have begun exploring the issue of creating connectivity across the landscape by working beyond the boundaries of protected areas, there has been a general lack of practical tools and guidelines for doing this type of work. In South Africa, new thinking shaped by pressing socio-economic needs, enabled by new legislation and supported by rigorous science, has created a positive enabling environment for the development of new tools for implementing a landscape approach to conserving biodiversity pattern and ecological processes.

Prerequisites, stimuli and mechanisms for successful implementation

The availability of biodiversity management tools does not mean that they will be taken up, or that their use will lead to conservation and development goals being met. Successful integration of biodiversity into development across multiple sectors depends on the presence of three interdependent components (see Figure 7.1): prerequisites, such as scientific understanding of biodiversity and ecosystem values; stimuli, such as the demand for ecosystem services; and mechanisms, like synergistic partnerships and catalytic funding (Cowling, Pierce and Sandwith, 2002). The South African experience has shown that some of the most critical prerequisites for effective mainstreaming are: good scientific information that is effectively interpreted and made available to end-users, institutional capacity and commitment, supportive policies and legislation, and a willingness by the scientific and conservation communities to create opportunities to demonstrate that biodiversity-compatible policies can provide development opportunities for poor communities.

Applying tools across the biodiversity management continuum

The earlier chapters of this book demonstrate how these prerequisites are being effectively met in South Africa, leading to successful implementation of tools relating to: national biodiversity policy and planning, land-use planning and decision-making, expansion of protected areas through biodiversity stewardship, working in production landscapes, and supporting sustainable livelihoods through rehabilitation and restoration of landscapes and ecosystems. These tools are implemented in the context of a biodiversity management continuum that includes a system of well managed protected areas, as well as other land-management approaches that promote ecological connectivity, increase resilience, and involve the people who live and work in the region in managing the landscape sustainably (see Figure 7.2 on pages 140 and 141).

The institutional context for implementation in South Africa

The biodiversity conservation sector is well established in South Africa. Nationally, the Department of Environmental Affairs is the primary custodian of the environment. It is mandated to develop and regulate biodiversity policy and legislation, although responsibility for biodiversity management is shared with a number of different departments and their public entities, at both national and provincial levels.

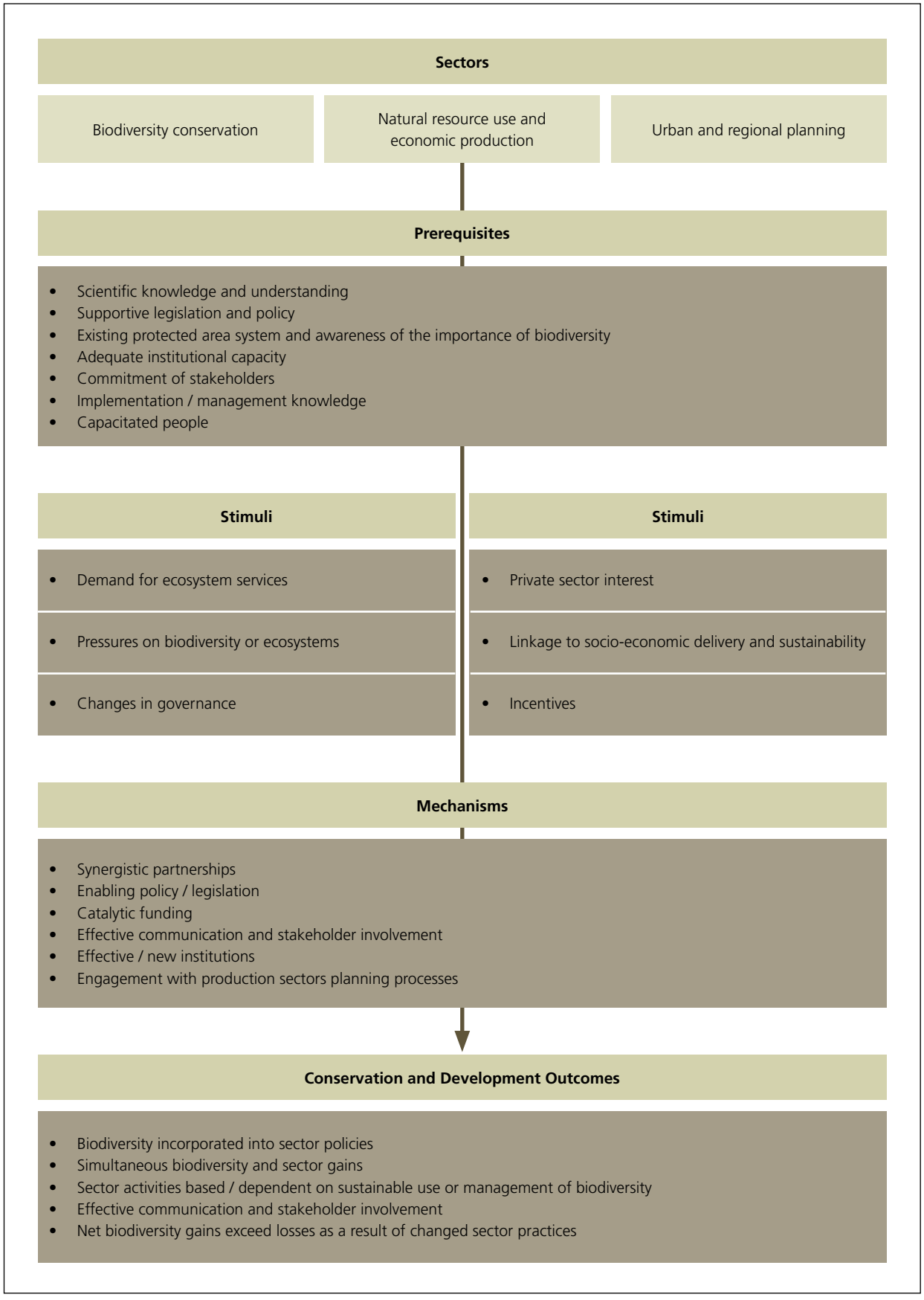


Figure 7.1 Conceptual model for integrating biodiversity objectives into land management (based on Pierce *et al.*, 2002)

INFO BOX National government institutions for biodiversity management, policy and co-operative governance

The national Department of Environmental Affairs has two public entities: a national parks authority (SANParks), mandated with the management of the country's national protected areas; and the South African National Biodiversity Institute, which is responsible for a range of functions related to biodiversity research, planning, mainstreaming, policy advice and programme co-ordination (see Chapter 2). There are also several other government institutions whose core business is not biodiversity conservation, such as the Department of Agriculture, Forestry and Fisheries, but whose activities impact on biodiversity, and these are important role-players in the broader biodiversity management continuum.

A number of inter-governmental structures facilitate co-operation between the three spheres of government with respect to biodiversity management. Notable amongst these are the:

- Ministerial Forum (MINMEC): This forum is politically responsible for co-operative governance between the national Minister of Environmental Affairs and his / her counterparts at the provincial level. The Ministerial Forum is supported by technical committees.
- Ministerial Technical Committee (MINTEC): This committee, which is supported by technical working groups, facilitates co-ordination between the national and provincial departments responsible for environmental management and biodiversity conservation.

TYPE OF LANDSCAPE	PROTECTED LANDSCAPES	
Type of land	State-owned and managed Protected areas (mostly natural/wild land) – for example, a National Park	Mostly natural land of high biodiversity importance privately or communally owned and managed through partnerships – for example, a nature reserve on private or communal land
Strategy for conserving biodiversity	Formal protected areas	
		
Our main biodiversity management tools	Proclaimed protected areas National Protected Areas Expansion Strategy	Biodiversity stewardship agreements (statutory)

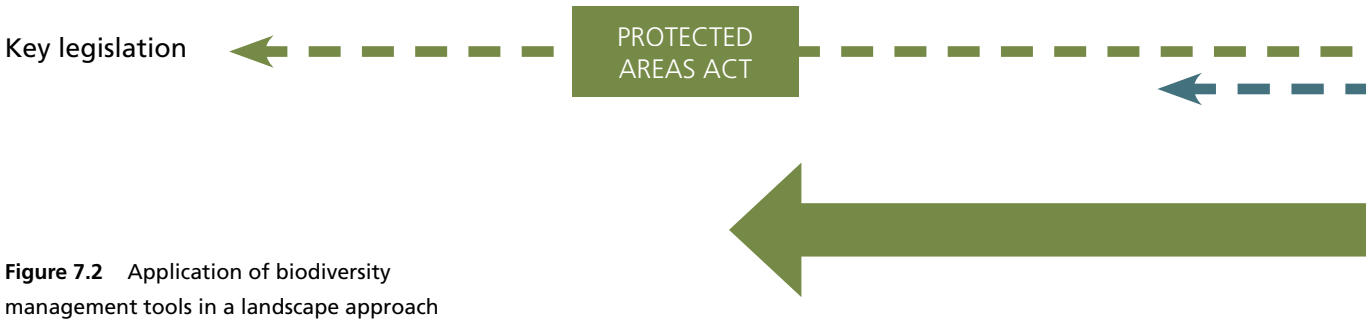


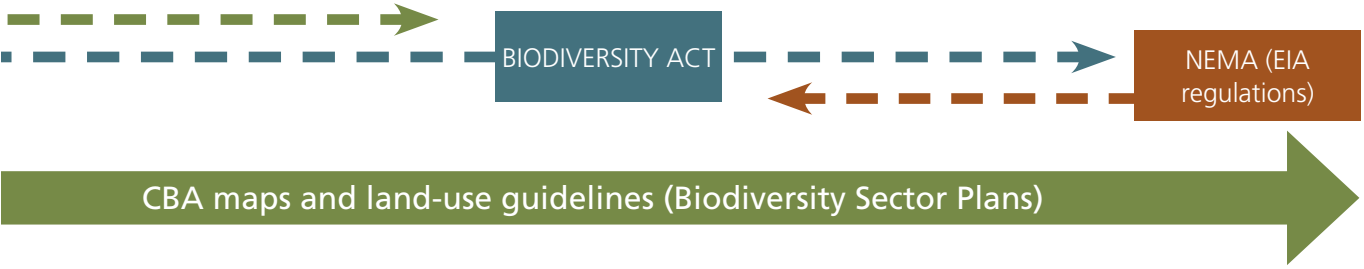
Figure 7.2 Application of biodiversity management tools in a landscape approach

Each province has a specific conservation authority mandated with management of biodiversity and implementation of conservation action, but these institutions vary widely in structure and character across the nine provinces. In some cases their mandate is restricted to within the boundaries of protected areas, although in others it also extends beyond protected areas. Levels of capacity within these agencies vary widely between the provinces.

Increasingly, municipalities are emerging as important managers and users of biodiversity resources and they are also responsible for local economic development, service delivery and social upliftment. Rarely, though, do municipalities have specific portfolios dedicated to biodiversity management or staff adequately capacitated to fulfil this role. Civil society organisations play a critically important role in biodiversity conservation in South Africa, and, increasingly, innovative partnerships between NGOs and government agencies are being forged to drive the implementation of projects on the ground.

Namakwa District Municipality workshop

PRODUCTION LANDSCAPES		URBAN LANDSCAPES
Largely natural land with elements of biodiversity importance and low-impact production areas – for example, grazing	Land largely modified for intensive production – for example, commercial crops	Lightly to heavily modified landscapes with fragments of important biodiversity
Biodiversity stewardship Best practice production		Land-use planning and decision-making
		
Biodiversity stewardship agreements (contract law and informal) List of threatened ecosystems Industry best practice production guidelines	Best practice production guidelines and resource for well managed farms Ecosystem guidelines for environmental assessment	Biodiversity Sector Plans CBAs incorporated into spatial development frameworks Ecosystem guidelines for environmental assessment



INFO BOX The role of civil society organisations in biodiversity conservation

Non-governmental organisations with a biodiversity focus are well established and have played a very significant role in the establishment of protected areas, awareness raising, environmental education, research, monitoring and mobilising the support of the private sector for conservation and development work. Traditionally, the focus of these NGOs was on advocacy and the protection of biodiversity, but more recently they have broadened their perspective to include biodiversity mainstreaming, poverty alleviation, sustainable use and benefit sharing.

Many of the tools that have been showcased in the earlier chapters of this book had their origins in smaller, pilot projects initiated by NGOs, and their ongoing development and implementation is often facilitated through partnerships with NGOs as key members. NGOs have proved invaluable as fertile testing grounds for new ideas and for leveraging implementation capacity that would not otherwise have been possible. They have played particularly important roles in identifying and initiating projects on integrating biodiversity into land-use planning, and biodiversity stewardship and engagement with production sectors. NGOs have initiated ideas, secured funding to support pilot studies and then successfully embedded the fully fledged project in institutions that are mandated with the responsibility for biodiversity conservation. Striking examples of this are the Putting Biodiversity Plans to Work project which is described in more detail in Chapter 3, and the Baviaanskloof Mega-reserve Project, a corridor initiative described in further detail in the corridor case study presented on page 153.

Some of the larger or longer established environmental NGOs in South Africa include: the Botanical Society of South Africa, the World-Wide Fund for Nature (South Africa), the Endangered Wildlife Trust, the Wilderness Foundation, the Wildlife and Environment Society of South Africa, the Wildlands Conservation Trust, Conservation International-South Africa, BirdLife South Africa, EcoAfrica and Fauna and Flora International. Some of these are local branches of international NGOs who provide valuable links to international networks, programmes, technical expertise and funding. Increasingly, the larger NGOs are being joined in implementation partnerships by smaller community-based organisations operating at local site level.

Environmental education through Cape Flats Nature

2 Building collaboration and co-operation

Co-operation and collaboration across institutional boundaries is essential for managing ecosystems at the landscape scale. Fragmented or overlapping institutional mandates, wide variability in capacity and commitment, conflicting priorities and a lack of communication can make it difficult to create a sense of common purpose, align activities and build cohesion at a larger scale. The key to overcoming these difficulties lies in the establishment of strategic, cross-institutional partnerships that bring role-players together to commit to a common vision, develop a plan of action, share information and resources efficiently, and tackle agreed priorities. Collaborative governance will be critical in enabling society to cope with the impacts of climate change, whether through measures to enhance resilience, reduce emissions, or safeguard ecosystem services that reduce the vulnerability of society to climate change.

Types of partnership

Just as in a landscape approach there is a range of possible land-use mosaics for making the landscape resilient to ecological change, so there are different ways of building partnerships for implementation. Partnerships can be determined spatially, institutionally or thematically, or by some combination of these criteria. They may also be formal or informal in nature.

In some cases, where spatial criteria are used to define partnerships, it makes sense to use political or administrative boundaries for organising conservation activities in a particular region. In other cases, an ecological or climatic boundary or biophysical feature makes most sense as the focal point for developing partnerships. Thematic partnerships can be established within

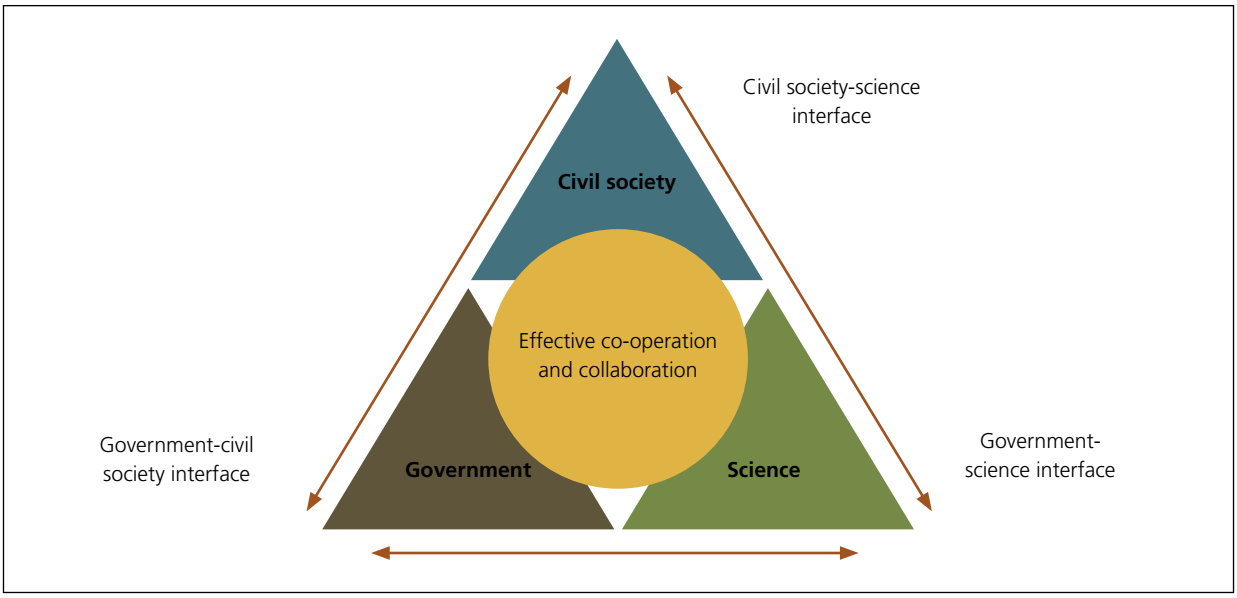


Figure 7.3 Building effective partnerships

a particular spatial context, such as the CAPE Estuaries Task Team, which brings together scientists and estuary managers from across the Fynbos Biome to deal with issues of common concern. Alternatively, they may cut across spatial boundaries, as is the case with the Climate Action Partnership, an alliance of eight large NGOs that aims to reduce the impacts of climate change and increase the resilience of South Africa's biodiversity and communities by promoting the management of intact ecosystems at the landscape scale.

Formal partnerships include alliances, implementation committees, steering committees and task teams that operate at different scales to co-ordinate the work of partner institutions, either within a defined spatial area, or in common areas of work. Examples of these types of partnerships are discussed in Sections 3 to 5 of this chapter.

Informal partnerships include a range of open learning networks and forums that serve to encourage communication and participation, make information accessible and stimulate innovation. Examples of two informal partnerships, the Namaqualand Biodiversity Advisory Forum and the CAPE Learning Network, are provided in the case studies which follow.

CASE STUDY The Namaqualand Biodiversity Advisory Forum

The Namaqualand Biodiversity Advisory Forum grew out of a local government training programme that Conservation International (SA) held in the Namakwa District Municipality in early 2009.

The need for the forum was expressed by local government officials, who felt there should be opportunities for horizontal learning between practitioners, and to provide training in the use of biodiversity information that has been developed over the last five years of the Succulent Karoo Ecosystem Programme (SKEP) investment in the region. The Namaqualand Biodiversity Advisory Forum assists with implementation of the Namakwa Biodiversity Sector Plan (see Chapter 3) and guides environmental policy and legislation.

Membership of the forum is open to local government officials, and the provincial department of tourism, environment and conservation.

In South Africa, partnerships like this one have been used to bring together scientists, implementing agents and civil society stakeholders to collaborate and co-operate, enable collective problem solving, maintain dialogue and facilitate learning through participation. Formal partnerships secure commitment and facilitate strategic co-ordination, and provide the touchpoints needed for developing the collaborative working relationships that cement communities of practice.

CASE STUDY The CAPE Learning Network

An example of a formalised learning network can be seen in the Cape Action for People and the Environment (CAPE) partnership in the Fynbos Biome (see Section 3). The CAPE Learning Network was established in 2008, and aims to build the 23 CAPE signatory partners as learning organisations, to showcase achievements, to record lessons learnt and to improve practice.

The network builds on the many existing and overlapping knowledge networks and communities of practice across the partnership – for example, task teams on a range of topics from systematic biodiversity planning to resource economics; or the Fynbos Forum, an annual conference of scientists and managers which has met since the early 1980s.

A Global Environment Facility (GEF) investment through the UNDP enabled the appointment of a learning network coordinator who oversees the development of case studies and publications, and organises learning and skills training events. Through funding from the CEPF, community groups participate in learning exchanges to visit other organisations doing similar work in biodiversity conservation and socio-economic development. The network also includes an electronic newsletter sent to 3,500 stakeholders, a website used as a learning vehicle, and an online searchable bibliography.

The importance of working at different scales

The South African experience has demonstrated the importance of operating at a number of different scales simultaneously. Working at the national scale, it is possible to address broad issues relating to policy and to secure high-level political commitment to common goals in prioritised areas. Regional and sub-regional mechanisms that provide strategic co-ordination and build communities of practice bring multiple local-scale projects together under a common banner. Social learning networks established across this spectrum provide the opportunity to strengthen institutions, share experiences and information and develop mutual trust between multiple stakeholders across landscapes and sectors (See Figure 7.4). In the remainder of this chapter, examples are given of partnerships that have been developed at the biome, corridor and local scale in South Africa.

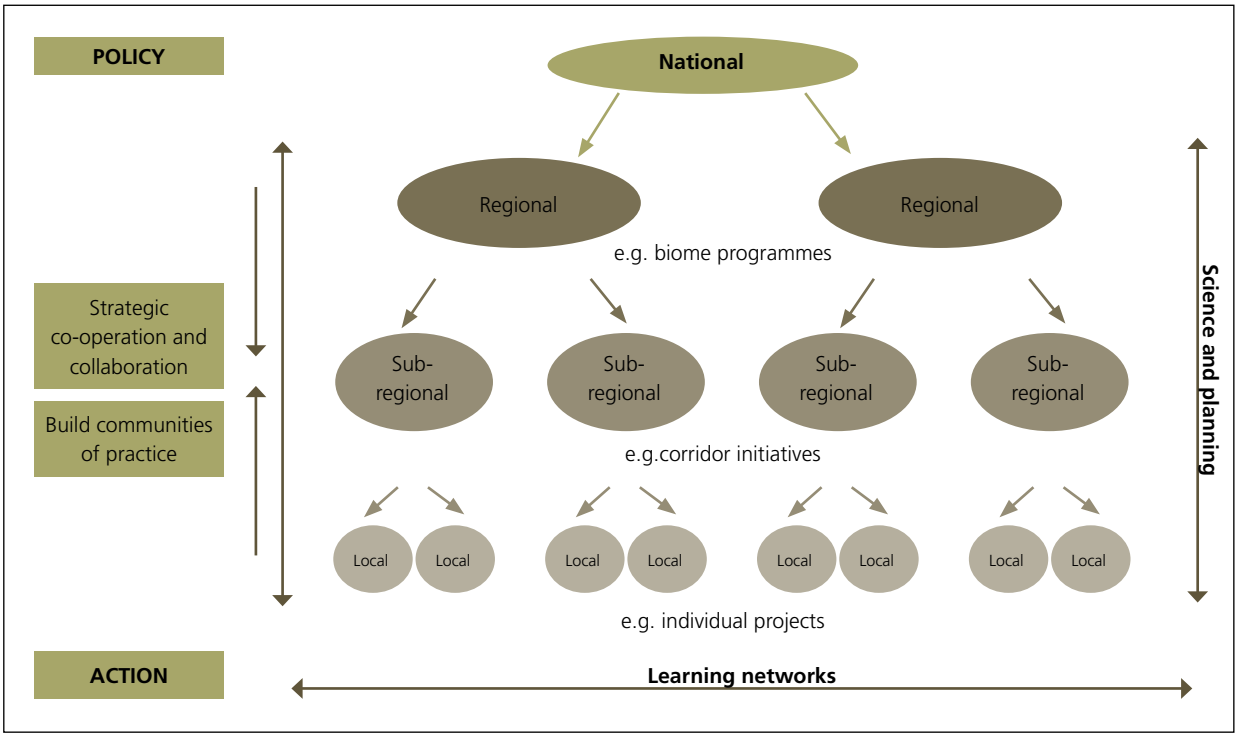


Figure 7.4 Partnerships at different scales

3 Working within biomes

Over the past decade, a number of large-scale conservation programmes have been developed, based on recognition of the integrated nature of the ecosystem services that landscapes provide, the livelihoods of people living in these areas and the need for effective natural resource management. The Isimangaliso (Greater St Lucia) Wetland Park in KwaZulu-Natal, and the Maloti-Drakensberg Transfrontier Project (a transboundary initiative involving South Africa and Lesotho) were amongst the first large-scale, cross-institutional programmes that attempted to align the goals and actions of diverse stakeholders with the common purpose of safeguarding the natural heritage of an area in a way that benefits people. The spatial domains of these programmes do not correspond with a particular biome, but rather with a broader geographic region surrounding a biophysical or ecological feature of specific conservation interest – such as the Ukhahlamba-Drakensberg mountains or the Isimangaliso lake and wetland system.

Since 2000, biome programmes, sometimes referred to as "bioregional programmes", have emerged as the principal mechanism used to develop partnerships and co-ordinate biodiversity action in South Africa's most threatened biomes and ecosystems. Although these programmes have regional boundaries that correspond with biomes, they involve interventions at multiple scales, combining top-down and bottom-up approaches.

There are currently four fully fledged biome programmes operating in South Africa. These programmes have the explicit purpose of conserving biodiversity and sustaining benefits to society through a portfolio of projects implemented at sub-regional and local levels. They operate through multi-sectoral partnerships of government and civil society and are based on a common vision and agreed programme of action that has been informed by scientific analysis of biodiversity, social, economic and institutional factors. These programmes have a unique way of working and are facilitated through co-ordination units, hosted by the South African National Biodiversity Institute, which play a similar role in all of the programmes, as described in the info box on page 146.

Kosi estuary, Greater Isimangaliso Wetland Park, showing fish traps used by the local community

INFO BOX Biome programmes – providing strategic co-ordination

Each biome programme is managed by a co-ordination team that focuses on promoting collaboration, strategic co-ordination and communication amongst the programme partners. This includes supporting programme governance, developing projects, facilitating lesson-sharing, and mobilising and managing resources. An important function of the co-ordination teams is working with partners to identify specific biome- and ecosystem-level priorities, and catalysing pilot projects that address these. The co-ordination teams operate out of the South African National Biodiversity Institute.

There are no national laws governing the implementation of biome programmes, and participation in them is entirely voluntary. Mechanisms such as Memoranda of Understanding have been introduced to formalise partner commitment and to ensure alignment of partner activities from national enabling levels through to local level, as well as cross-sectorally. Partner institutions that are signatories to these Memoranda of Understanding become members of multi-institutional implementation or co-ordination committees that meet at regular intervals to report on progress, discuss issues of common concern, set priorities and guide the work of the partners across the region.

Minister of Environmental Affairs at the signing of the declaration for the Grasslands Programme

The biome programmes have a unique way of working that involves:

- operating in priority biomes or ecosystems that have been identified as threatened through rigorous scientific analysis
- focussing on spatially explicit biodiversity priority areas that have been systematically identified throughout the landscape, and not only in protected areas
- including interventions that operate at a range of spatial scales
- using pilot projects and demonstration models to test and pioneer innovative approaches
- creating partnerships and networks involving a wide range of organisations in the public, private and civil society sectors
- capitalising on SANBI's unique ability to convene, facilitate and co-ordinate, and to catalyse collaborative programmes of action
- communicating their work to the public and feeding lessons learnt to decision-makers who formulate and implement policy.

The Fynbos Programme – CAPE

Fynbos landscape, Kogelberg Biosphere Reserve

The Fynbos Biome or Cape Floristic Region stretches from the Cederberg in the north-west, around the Western Cape coast and into the Eastern Cape as far west as the Nelson Mandela Bay Municipality (incorporating Port Elizabeth). As one of only six floral kingdoms in the world, and with 9,600 recorded plant species, 70% of them found nowhere else on the planet, it is a region of great diversity and is one of the world's 25 most threatened biodiversity hotspots.

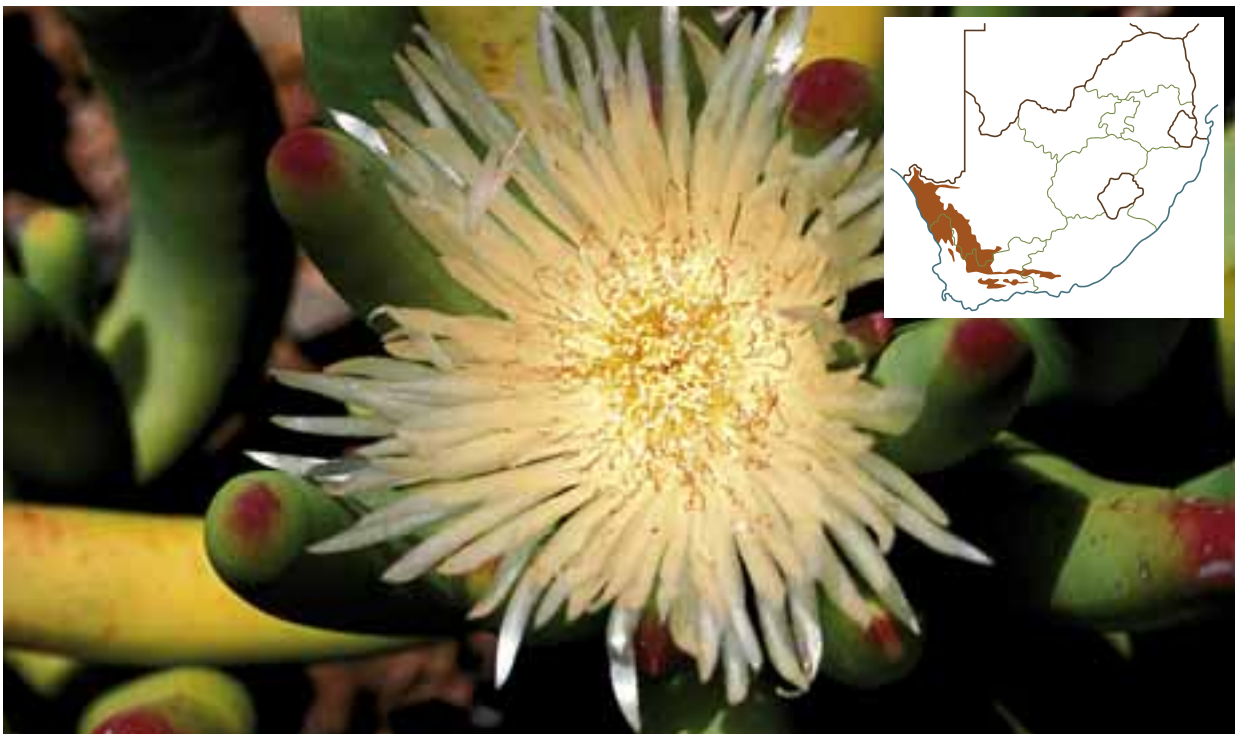
Whilst 20% of the region has been set aside for conservation, much of this is in mountainous areas. The natural vegetation of the region's lowlands is coming under increasing pressure from human activities, such as agriculture, resort development and urban expansion, and ecosystems have also been damaged by over-extraction of water, over-frequent fires and the spread of invasive alien plants.

The Cape Action for People and the Environment (CAPE) partnership of role-players involved in fynbos conservation was formed in 2001 as a response to these threats. Initially co-ordinated by an NGO, WWF South Africa, the partnership is now hosted by SANBI's Fynbos Programme. The CAPE partnership programme unites government and civil society in a strategy to conserve biodiversity, while creating benefits for the people of the Cape Floristic Region. There are 23 signatory partners to the CAPE Memorandum of Understanding, including NGOs, municipalities, national and provincial government departments and conservation agencies. The partnership's co-ordination unit is supported by an implementation committee that provides for partner alignment and overall programme governance, steering committees that drive landscape-level initiatives, and task teams that oversee activities in common areas of work.

The programme partners work together strategically and collaboratively in the following areas: landscape or corridor initiatives, protected area management, conservation stewardship, business and biodiversity, resource economics, fine-scale planning, land-use planning, biodiversity information, freshwater resources, estuary management, urban biodiversity, fire management, alien invasive species, institutional strengthening, learning networks, conservation education and capacity development. In addition to a number of large landscape or corridor initiatives, some 300 smaller projects have been catalysed through the CAPE programme.

The implementation of the CAPE programme has been made possible through the support of international donors, including the Global Environmental Facility (through the World Bank and the United Nations Development Programme) and the Critical Ecosystem Partnership Fund, as well as through funds committed by government and other programme partners.

The Succulent Karoo Programme – SKEP



Succulent plant, Northern Cape

The Succulent Karoo Biome stretches from the Klein Karoo up the West Coast through Namaqualand and into Namibia, and is the only arid or semi-arid region in South Africa to be globally recognised as a biodiversity hotspot. Only 27% of the Succulent Karoo Biome is still in a pristine state, and by 2008, only 5% of the region was conserved in formal protected areas. Accelerating land modification and loss of natural habitat caused by mining, overgrazing and ostrich farming threaten the region's unique biodiversity and many of its species are listed as critically endangered, endangered or vulnerable. This region also faces significant climate change risks.

The Succulent Karoo Ecosystem Programme (SKEP) was formed to respond to the challenges facing the Succulent Karoo Biome. Initiated by Conservation International's South African Hotspots Programme with funding from the Critical Ecosystem Partnership Fund, SKEP developed the vision that the people of the Succulent Karoo take ownership of and enjoy their unique landscape in a way that maintains biodiversity and improves livelihoods, now and in perpetuity. From the start, SKEP took a collaborative approach and, working through local champions, set out to draw all the accumulated knowledge and existing conservation projects of the region into a co-ordinated conservation response that would serve to protect this unique biodiversity hotspot and serve the interests of the local population.

The co-ordination unit of the SKEP programme is now housed by SANBI. Nine priority areas were identified for the Succulent Karoo, where the co-ordination unit works with stakeholders to carry out the programme of work.

SKEP's current focus is on programme consolidation, integrating SKEP objectives into the programmes of national, provincial and local government and other role-players to ensure sustainability. SKEP's strategic focal areas for 2009-2014 are securing land in priority areas, expanding the SKEP partnership, linking livelihoods and biodiversity, building local government capacity, enhancing the role of science in SKEP, climate change and renewable energy, involving the mining sector and raising awareness.

Ongoing financial support for implementation is provided by the Critical Ecosystem Partnership Fund with co-funding from local donors, including the Development Bank of Southern Africa.

The Grasslands Programme

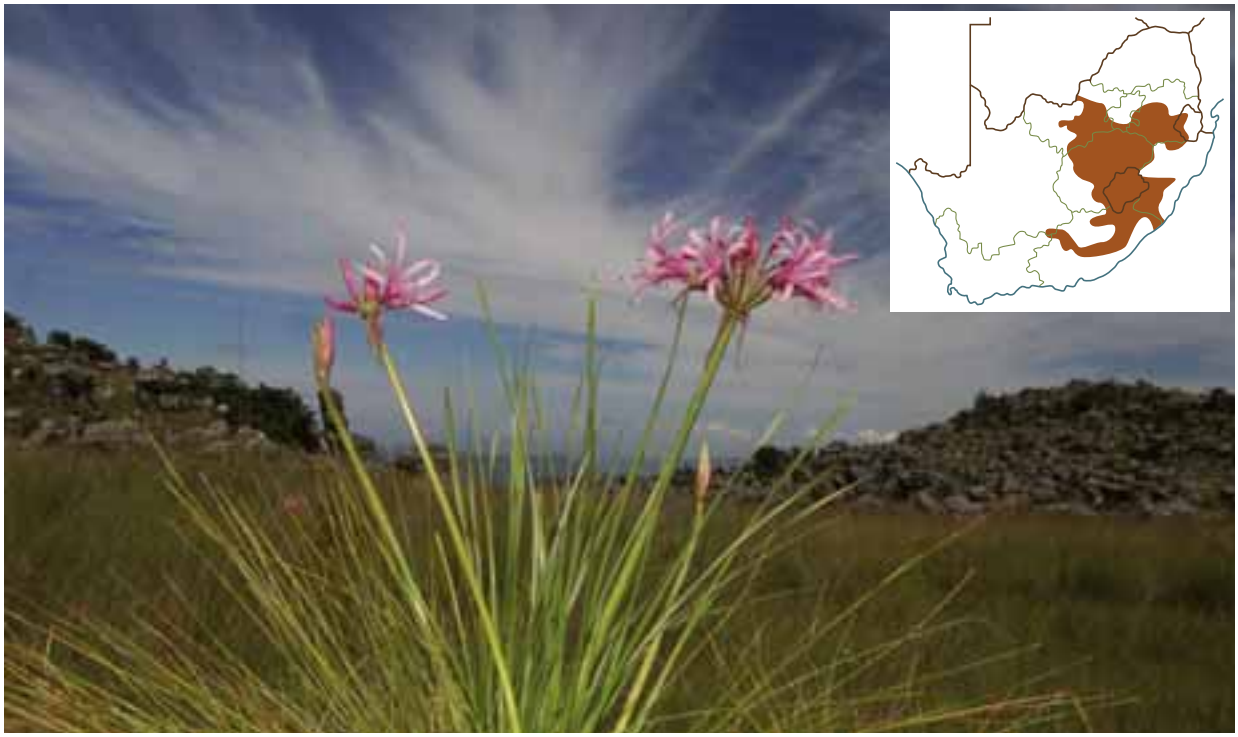
The Grasslands Biome stretches across seven of South Africa's nine provinces, covering approximately 30% of the country's land surface. Many people live in this biome, and several of the country's key economic sectors such as agriculture, forestry, urban development and mining are centred in grassland areas. Less than 3% of the biome is currently conserved in protected areas, and nearly 40% of its original extent has been significantly modified by other land uses.

The importance of protecting grasslands was recognised many years ago as a result of various projects undertaken by NGOs and the government. In 2004, the National Spatial Biodiversity Assessment identified the Grasslands Biome as a biodiversity priority area in need of urgent conservation action. Grasslands support a rich assemblage of plant and animal species, many of which are critically endangered, endangered or vulnerable, and also include rivers, wetlands and other ecosystems that provide important ecosystem services. Four of South Africa's major river systems originate in the grasslands and their conservation and wise management are essential for maintaining water supplies.

The work of the Grasslands Programme and its partners is to protect and conserve grasslands and the ecosystem services they provide for current and future generations. The programme is pursuing a 20-year conservation strategy for the biome, aiming to fulfil the targets by working through a range of formal and informal partnerships involving government departments, conservation agencies, industry associations, private sector groups, civil society organisations, tertiary and research institutions.

The programme's strategy to meet conservation targets involves working with the major economic sectors to incorporate biodiversity goals into their plans, policies and decision-making. These sectors include agriculture, forestry, urban development and coal mining. Market-level initiatives are being developed with partners to direct the development footprint away from high priority biodiversity areas and to incentivise "greener" production practices. Work is also being carried out with landowners to protect important biodiversity on privately owned land through biodiversity stewardship.

The implementation phase of the Grasslands Programme, which was launched in 2007, has been made possible by a major investment by the Global Environmental Facility, directed through the United Nations Development Programme. Co-financing from partner institutions will be secured for ongoing implementation beyond 2012.



Nerine angustifolia in grasslands, Mpumalanga highlands

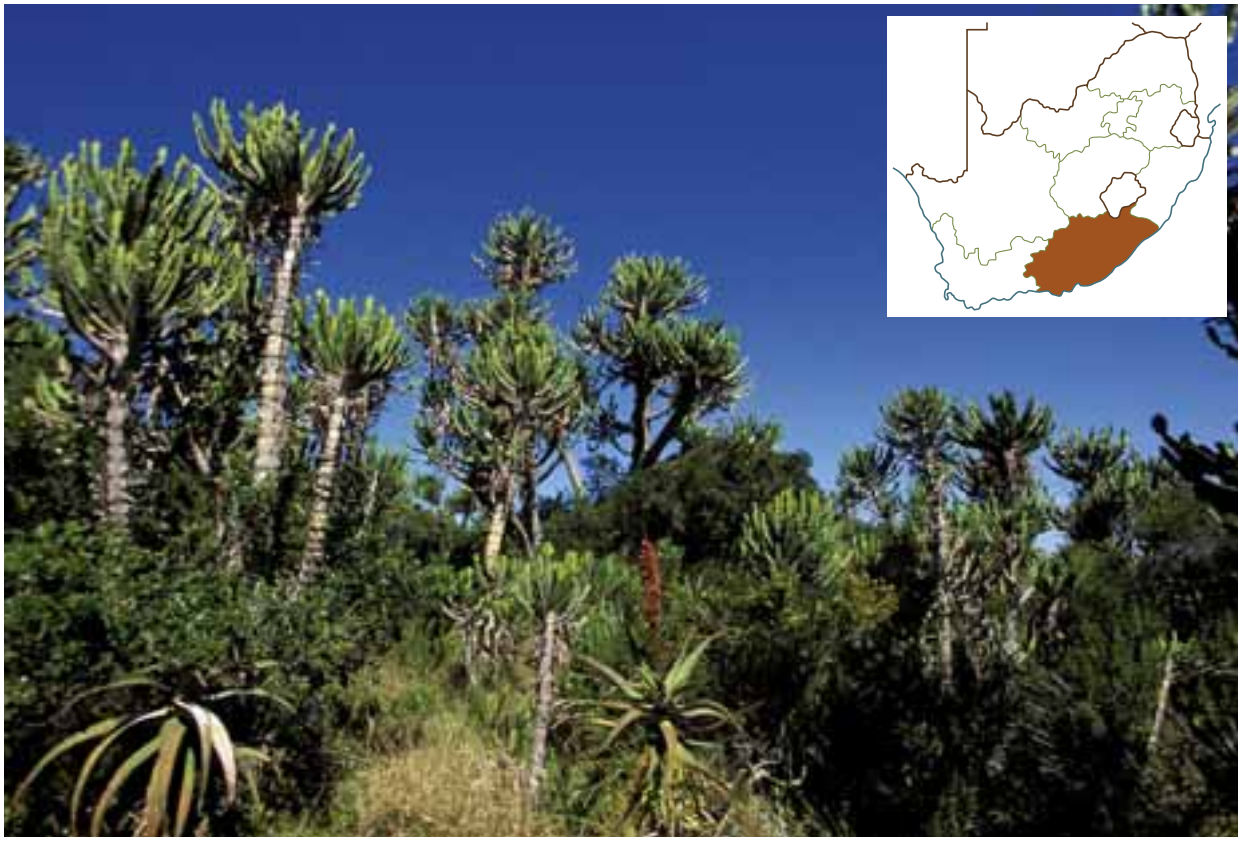
The Eastern Cape biome programmes

Seven biomes converge within the boundaries of the Eastern Cape and the province includes portions of both the Fynbos and the newly recognised Maputaland-Pondoland-Albany biodiversity hotspots. There have been numerous sub-regional biodiversity planning projects undertaken in the province, including: CAPE (Cape Action for People and the Environment), STEP (Subtropical Thicket Ecosystem Planning) project, SKEP (Succulent Karoo Ecosystem Programme), the Maloti-Drakensberg Transfrontier Project, the Wild Coast Conservation and Sustainable Development Project and the Grasslands Programme.

In order to co-ordinate the implementation strategies and action plans of these biodiversity initiatives, SANBI has established an Eastern Cape co-ordination unit based in the centrally located town of East London. The unit works in close association with partner institutions and has a broad range of functions relating to the development, implementation, co-ordination and mainstreaming of the biome programmes and other biodiversity conservation initiatives operating within the province.

The co-ordination unit has facilitated the establishment of, and helps to maintain, the Eastern Cape Implementation Committee – a multi-stakeholder co-operative governance partnership established in 2004, through which participating agencies can co-ordinate their biodiversity management activities and align their environmental, social and economic development goals with biome programmes. There are 24 signatories to the Eastern Cape Implementation Committee's Memorandum of Understanding, involving key national and provincial role-players in government, municipalities, the private sector and civil society.

In 2007, the province launched the Eastern Cape Biodiversity Conservation Plan (see Chapter 3), which provides spatial information about biodiversity to municipalities, to feed into their Spatial Development Frameworks (SDFs) and Integrated Development Plans (IDPs). The Eastern Cape co-ordination unit provides training to municipalities in the use of this plan, based on an approach first developed by the Subtropical Thicket Ecosystem Planning project. This training helps local government to facilitate sustainable development by ensuring that the province's ecosystems continue to deliver vital services for human well-being.



Tree euphorbias growing in dense Albany thicket, Eastern Cape

Differences between programmes

Each of these programmes has arisen in a different way, and the characteristics of their receiving environments vary widely.

The CAPE programme could move quite quickly to operate at a broad strategic scale combining both top-down and bottom-up approaches, because it operates in a region that has been extensively studied for centuries by scientists, has generally well capacitated institutions, includes a major city, and has a strong economic base related to well established commercial agriculture and other economic sectors. Its work has been driven by a combination of thematic task teams, and steering committees for sub-regional landscape initiatives (see Section 4).

In contrast, SKEP operates in a vast but thinly populated region with no real economic centre, a largely rural and mostly poor population who have few opportunities for creating sustainable livelihoods. For this reason, SKEP worked from the bottom up, focussing immediately on people-centred projects and working through local champions. Only later did SKEP establish strategic mechanisms for influencing policy and securing high-level institutional alignment.

The Grasslands Programme, working as it does in a biome that includes many important economic activities across multiple provinces, adopted a sectoral approach, focussing on engagements with industry role-players. Sectoral task teams co-ordinate and channel effort for on-the-ground impact.

SKEP stakeholder, Namaqualand

In the Eastern Cape, where the complexity of biomes and biodiversity initiatives falling within the boundaries of the province made it difficult to align action plans, the most effective approach was to work within an administrative boundary, providing a strategic co-ordination facility that could cut across both institutional and biological boundaries.

Donkey cart trail, a local-scale project at Heuningvlei in the Cederberg

4 Working in corridors

Within the CAPE programme, sub-regional co-ordination is provided by multi-stakeholder steering committees and project management teams that address the development of large conservation corridors in priority landscapes. These "landscape initiatives" are located either in priority lowland landscapes (such as the Agulhas Biodiversity Initiative) or in priority areas that extend from the coast, through lowland areas into the mountains, like the Baviaanskloof Mega-reserve in the Eastern Cape, and the Greater Cederberg Biodiversity Corridor and the Gouritz Initiative in the Western Cape (see Figure 7.5 on page 155).

These corridors comprise areas of mainly natural vegetation that are large enough (250,000 – 1,000,000 ha) to sustain biodiversity patterns and processes in the long term, even in the face of climate change. They include a variety of ecological linkages and incorporate areas of transition between biomes. They represent models of ecologically sustainable landscape management that also provide opportunities for sustainable, biodiversity-based economic development. Although these corridors typically include at least one protected area, they operate across production landscapes and represent a mosaic of land tenure types and land-uses.

Landscape in the Cederberg mountains which form part of the Greater Cederberg Biodiversity Corridor

CASE STUDY Connecting landscapes in the Baviaanskloof

View across the Baviaanskloof Mountains, Baviaanskloof Mega-reserve, Eastern Cape

The Baviaanskloof, which lies between parallel mountain ranges in the western part of the Eastern Cape province, is an area of spectacular natural beauty characterised by dramatic and rugged landforms and diverse vegetation types belonging to seven of South Africa's nine biomes. The region incorporates a cluster of protected areas, the most well known of which is the Baviaanskloof Nature Reserve, interspersed with land that is used for stock farming, principally with angora goats and ostriches. In the lowland areas that connect the mountains to the coast, irrigated crops such as citrus, potatoes and other vegetables are produced alongside some of the major rivers.

In addition to its importance from a biodiversity perspective, the Baviaanskloof contains a remarkable diversity of pre-historic and historical sites and artefacts. It also fulfils a critically important role as a catchment area providing water to meet the needs of agriculture and urban settlements to the east and south-east, including the city of Port Elizabeth, which is the economic hub of the province.

The Baviaanskloof, which is one of eight areas making up the Cape Floristic Region World Heritage Site, was identified through the CAPE programme as a priority site for the establishment of a mega-conservation corridor. This led to the development of the Baviaanskloof Mega-reserve Project in 2000. The Eastern Cape government, though fully committed to establishment of the corridor, did not have adequate capacity at that time to undertake the work that establishing the Mega-reserve would involve. They entered into an innovative partnership with a well capacitated NGO, the Wilderness Foundation, to catalyse the project over a six-year period. An integral part of the project involved the NGO working closely with the newly emerging Eastern Cape Parks authority to appoint and train staff to continue with ongoing management of the corridor initiative. Responsibility for ongoing project management has now been successfully transferred to Eastern Cape Parks.

Because the Baviaanskloof includes production landscapes and many poor rural communities, it was essential that the Mega-reserve Project should focus not only on biodiversity conservation, but also on unleashing economic opportunities in the area. A wide range of implementation projects has been completed since 2004, including: comprehensive conservation planning resulting in expansion of the area under formal protection; enhanced management effectiveness facilitated by the development of a strategic management plan for the Reserve and the implementation of a Management Effectiveness Tracking Tool; the development of a Biodiversity and Citrus Initiative aimed at strengthening the sustainability of citrus farming activities through more biodiversity-compatible production methods;

unleashing economic opportunities and stimulating enterprise development through the establishment of seven tourism routes; and small business training in community bee-keeping, craft production and other enterprises.

An interesting aspect of the Baviaanskloof initiative has been the formal and informal partnerships that have been set up to create a sense of purpose and pride amongst diverse stakeholders who were previously deeply divided. The multi-stakeholder Project Steering Committee that was set up to guide the project through the early stages of implementation has been succeeded by the Baviaanskloof Liaison Forum. This provides local stakeholders who live and work in the Baviaanskloof with the opportunity to maintain communication, deal with issues of collective concern and sustain a common vision into the future. A Mega-reserve Co-ordinator and Community Liaison Officer has been appointed by Eastern Cape Parks to maintain the stakeholder partnerships in the Baviaanskloof.

A key component of making these corridor initiatives work is taking enough time to establish positive relationships between all who live and work in the area, building up trust and involving them actively in developing a common vision for the area. The partnerships established through the corridor initiatives bring together local communities, farmers' associations, industry role-players, local and district municipalities and government departments to think collectively and work collaboratively to secure the future of the place they all call home. It is important that people can live and work on the land in ways that safeguard biodiversity, respect local cultures and ensure sustainable livelihoods, and achieving this will require ongoing effort and investment of resources by the relevant conservation authority.

CASE STUDY The Agulhas Biodiversity Initiative

The Agulhas Biodiversity Initiative (ABI) on the Agulhas Plain is one of several landscape initiatives in the Cape Floristic Region. It integrates and coordinates efforts to minimise the further loss of threatened natural habitat on the Agulhas Plain, and forms part of the broader CAPE partnership.

The Agulhas Plain, an area of approximately 270,000 hectares near the southernmost point of Africa, is a mosaic of agricultural land separated by stretches of rare and endemic coastal lowland fynbos and wetlands.

Wildflower harvesting at Flower Valley farm on the Agulhas Plain

The diversity of indigenous fynbos vegetation in this area is enormous: of the 2,500 species that occur here, about 100 are endemic to the area and 112 are listed in the Red Data list. Originally the Agulhas Plain was home to large herds of game, including many species of mammals. Some of these are now extinct and others only remain in protected areas such as the Agulhas National Park.

ABI is implemented by a number of partners who have agreed to work together and pool their resources to conserve the biodiversity and ecosystems on the Agulhas Plain. Through their efforts they want to make sure that benefits flow to the local economy through activities such as responsible nature-based tourism and the sustainable harvesting of natural vegetation (see Chapter 5).

Some landowners have conserved their land and natural habitats for many years, but, at the start of ABI only 14% of the Agulhas Plain was conserved under legally binding arrangements. Through biodiversity stewardship agreements with landowners and the expansion of the Agulhas National Park, this figure now stands at 37% (102,000 hectares). This includes the innovative Nuwejaars Wetland Special Management Area formed by 23 landowners including the Elim community, who have collectively applied for their land to be declared as a Protected Environment. At least 40% of the ABI area is privately owned, which reinforces the important role that landowners and the agricultural sector play in conservation.

Because the fynbos of the Agulhas Plain is of global significance, ABI was able to source funds through the UNDP from the Global Environment Facility (GEF) and the German government's International Climate Initiative, and substantial funding has also come from the ABI partners. Following the end of the first phase of ABI in mid-2010, another phase is being discussed. The Flower Valley Conservation Trust is currently playing a coordinating role, drawing together regular meetings to build the partnership of conservation agencies, landowners, community leaders, municipalities, national and provincial government departments, non-governmental organisations and other interested parties.

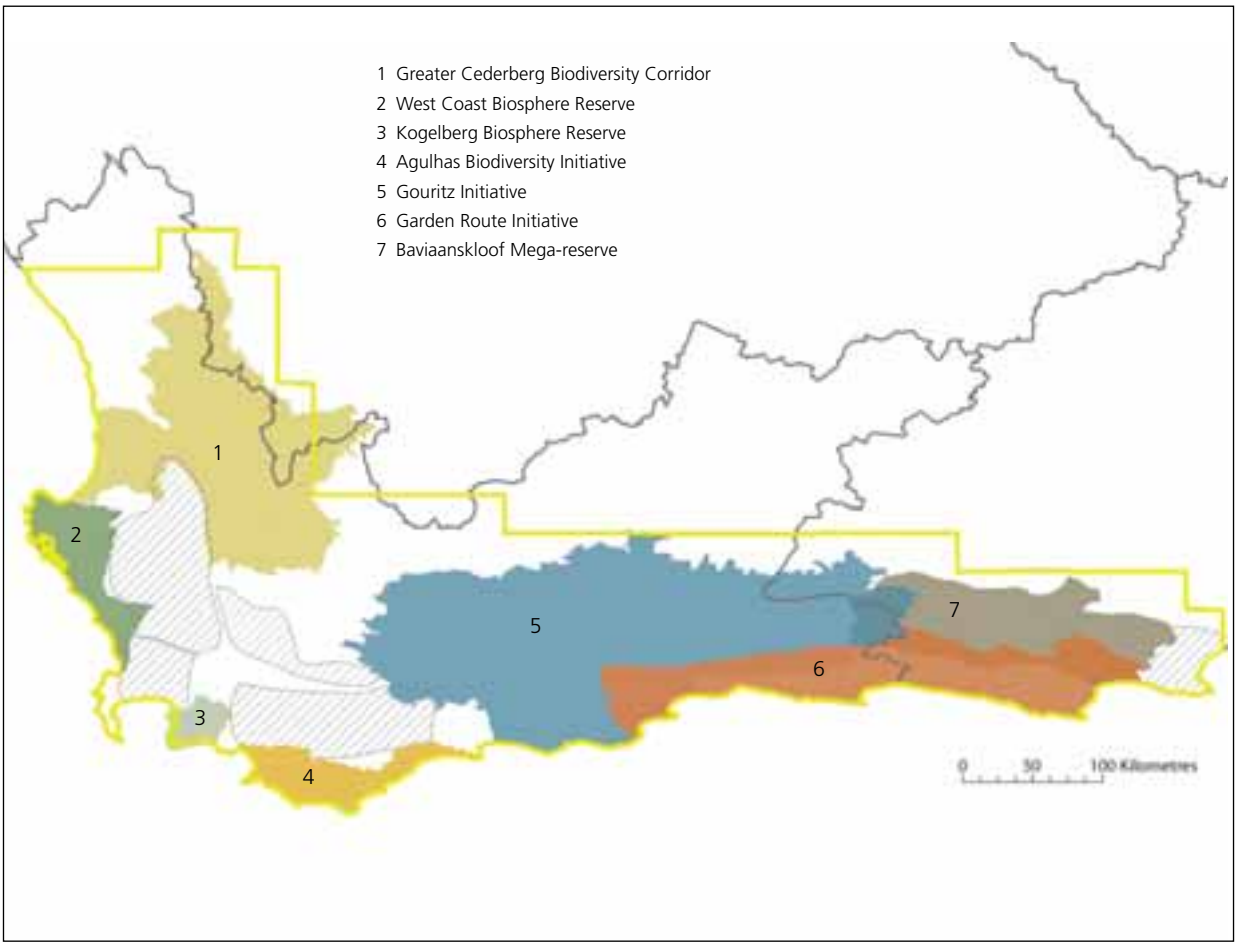


Figure 7.5 The location of large conservation corridors and priority landscapes in the Fynbos Biome

5 Working locally

There are many innovative biodiversity conservation and development projects being implemented at the local scale throughout South Africa, as in other parts of the world. In the absence of an overarching vision or partnership there is a danger that a multiplicity of individual projects could result in short-term interventions, often managed by short-lived project teams without any integration between projects or longer-term sustainability. Although there are many organisations doing good work at the local scale, the overall impact is far greater when individual projects are aligned with a broader goal.

Coherence at a broad scale is achieved when there is strategic thinking and a critical mass is generated by collective action and a convergence of biological, social, economic, institutional and political realities. This has been the overriding impact of building partnerships for implementation, united around a common vision and set of goals. By developing and adopting biome- or landscape-wide strategies, or through thematic partnerships, it has been possible to provide a unifying context for individual projects and to avoid the pitfalls of *ad hoc* project development and implementation.

Lessons that have been learnt through project-level implementation in South Africa include that:

- Each project must adopt a clear strategy and goals to provide direction and enable monitoring and evaluation, whilst remaining open to emergent outcomes.
- Large projects can take a long time to negotiate and get started; it is important to identify smaller, short-term activities to maintain interest amongst stakeholders and to couple planning with implementation. Specific plans for taking the project to scale should also be identified at the outset.
- It is better to set realistic, achievable goals that can be met than to make impressive-sounding promises that cannot be met and raise expectations unrealistically.
- Projects from other areas may be inspiring and may be able to teach a great deal, but it may not be possible to transfer them directly to a different context; considerable adaptation may be required for projects to work in different ecological or social settings.
- Local-level partnerships are important for establishing and maintaining dialogue between the project stakeholders. These partnerships make project stakeholders more aware of each other's perspectives and help develop mutual trust, without which even the best project ideas can fail.
- Steps should be taken at the outset to secure institutional commitment for sustaining the work once the initial project is completed.
- In the context of rapid change and limited resources, agility and flexibility in implementation are essential.
- Wherever possible, projects should build in features that involve civil society and benefit poor communities, such as small business development opportunities, work opportunities, small grants facilities, capacity building and training.

There is no shortage of innovative projects in South Africa, and many of these benefit from being linked to broader programmes of action. The challenge is for short-term, catalytic projects to develop exit strategies that institutionalise the innovations so that they can be sustained.

Community environmental education project

6 Combining funding sources

The initiatives described in this chapter have been characterised by innovative funding models involving combinations of investments at different levels. Resources have been committed by government and other partners, and synergies have been built between local and international resources. Whilst this in itself is not unique, a key factor for success has been that the donors have been included in projects as partners and not only as disbursers of funds. Funding has been mobilised from many different sources, aligned around the common vision and complementary actions of partnership programmes.

All of the large-scale conservation programmes discussed in this chapter have received critically important catalytic funding from international donor agencies such as the Global Environmental Facility (through the World Bank and United Nations Development Programme) and the Critical Ecosystem Partnership Fund. This has been effective in leveraging additional co-funding and "in-kind" support for activities from the South African public and private sectors, which is important for financial sustainability.

The partnership approach has made it possible for funding agencies to disburse funds more strategically. Co-ordination units of the biome programmes have helped to build confidence amongst potential donors regarding the risks of investment, and assisted implementing agencies with complex project development procedures, using their networks and experience. Working within spatially explicit priority areas such as biodiversity corridors, within which there are numerous local-level projects taking place, makes funding more efficient and minimises the investment risk. The way that CAPE, SKEP and other partnership programmes have built on earlier initiatives and strong stakeholder processes to develop long-term programmes has also been appealing to donors.

Small-grants funding has played a critically important role in both the CAPE and SKEP programmes. Small-grants facilities make it possible to fund smaller, pilot projects that enable new partners to become involved in the programme and allow for experimentation with different project approaches that might be considered too risky to fund using government or large programme resources. Small-grants facilities, such as the SKEPPIES Small Grants Facility for Conservation and Development and the Table Mountain Fund have been especially important in involving civil society partners in programme activities.

CASE STUDY The Table Mountain Fund

The Table Mountain Fund is a capital trust fund designed to provide sustained funding for the support of biodiversity conservation within the Fynbos Biome. The TMF was founded when WWF-SA had the foresight to raise start-up capital in 1993, with the specific purpose of conserving fynbos ecosystems of the Cape Peninsula and on Table Mountain. The capital was increased by donations from local custodians and the Table Mountain Trust Fund was registered in 1998. A major investment in the Fund by the Global Environment Facility, through the World Bank, increased the capital fund by a further R30 million (approximately US$3.9 million), and allowed the Table Mountain Fund to expand its operations to support conservation and restoration of fynbos habitats and ecosystems throughout the Cape Floristic Region.

Table Mountain, Cape Town

The TMF has a unique funding strategy in which half of the capital is invested offshore, with the fund managers mandated to achieve a return of domestic inflation plus 7.5%. This allows the real value of the Fund to be maintained, with the growth used for funding projects, management and administration.

The TMF programme development strategy is based on initiating, developing and funding projects in focal areas that have been determined in line with the overarching CAPE strategy. Project proposals are subject to peer review against a set of criteria that check for sustainability, effective working partnerships and ability to deliver social and biodiversity goals. To date, the Fund has invested in over 120 projects that have successfully built local capacity for conservation action, raised awareness, contributed to scientific understanding of local conservation issues and protected or restored critically important fynbos habitats.

Erica plant, Fynbos Biome

CASE STUDY The SKEPPIES Fund – supporting livelihoods in the Succulent Karoo

Anatolian Sheepdog guarding goats from predators, Northern Cape province

The SKEPPIES small project fund for conservation and development supports projects with a focus on both conservation and development in the Succulent Karoo Biome. SKEPPIES is a joint project of the Development Bank of Southern Africa, the Critical Ecosystem Partnership Fund, Conservation International's Southern Africa Hotspots Programme and the SKEP co-ordination unit in SANBI.

SKEPPIES provides start-up funding to projects that support entrepreneurship and business development and link to other projects taking place in SKEP priority areas. A wide range of organisations in the public, business and civil society sectors can apply for the funding, and individuals are also eligible for support.

An example of the type of project supported by SKEPPIES is the Anatolian Sheep-Dog Project in the Kamiesberg District of Namaqualand. There is a long history of conflict in this area between livestock farmers and predators such as leopards, jackals and caracals. Many other species such as honey badgers, tortoises and aardvarks have also been killed in the traps set by farmers for the predators to which they believe they have lost stock. In an effort to reduce this conflict, the Namaqua National Park initiated a project in which Anatolian Shepherd dogs have been bought and given to farmers with funds supplied through SKEPPIES. After three years in which eight dogs have been living and working on farms in the Kamiesberg District, there has been a reduction in both stock losses and trapping of predators. Farmers with Anatolian dogs report a drop in livestock losses from 100 to about 10 per year, and an increase in sightings of wild animals on and around their farms, and many more farmers are asking to be supplied with Anatolian dogs. The Namaqua National Park has now initiated its own breeding programme, in the hopes of reducing the costs of the project and increasing the number of dogs in the area, making the project more sustainable in the long term.

Leopard, Cederberg, Western Cape province

7 Why these tools work in South Africa

Partnerships that bring together diverse stakeholders around a common purpose and plan of action are enabling the implementation of the tools described throughout this book. The enhanced co-ordination of conservation activities at the regional scale has resulted in greater site-level impact. Meeting regularly, through both formal and informal networks, has improved communication and co-operation amongst implementing agencies, and has bridged gaps between government and civil society organisations in the conservation and development sectors. These partnership programmes have been successful in involving a wide variety of stakeholders in active learning networks, and in attracting an ever-expanding group of professionals from diverse fields into direct implementation.

There remains a need to evaluate the extent to which the partnership programmes have achieved biodiversity gains on the one hand, and social and economic development on the other. However, these programmes mostly have a 20-year vision and at the time of writing, are less than halfway through this period. Even in that time, it is possible to identify areas of success, as follows:

- drawing up a common vision and strategy for a landscape, in line with national biodiversity and development priorities
- co-ordination structures that offer a flexible and replicable method of facilitating collective effort at the site level, supported by the agreed high-level vision and strategy
- the preparation of a clear programme of action, with dedicated roles and responsibilities among implementing agencies
- the creation of opportunities for peer review, analysis and discussion, as well as the celebration of successful projects and an honest appraisal of less successful ones
- the provision of strategic co-ordination across institutions and sectors
- the identification of key institutional and community champions, who are prepared to take on leadership roles and work across institutional boundaries in a spirit of co-operation
- the opportunity to reflect on and analyse lessons learned and to capture and disseminate insights within, between and beyond programmes
- the development of strong, everyday working relationships between organisations, that go beyond formal partnerships
- the use of catalytic funding, which leverages additional co-financing and in-kind support and commitment
- a focus on building the capacity and improving the effectiveness of existing institutions, rather than creating new institutions
- the integration of conservation and development goals
- the maintenance of strong links between science and implementation, and the use of spatially explicit priorities that are based on systematic biodiversity planning
- the existence of a well capacitated statutory agency that is mandated to nurture and expand programmes and partnerships, making them a core element of environmental governance in South Africa, even though many of them had their origins in NGO-led planning projects.

Useful websites

Note: This directory of website addresses is not intended as a comprehensive guide to all website addresses relevant to the topic. It includes those websites that contain key information specific to the material or case studies covered in this Primer.

Chapters 1 and 2, and General	
DEA:	www.environment.gov.za
GEF:	www.thegef.org
SCBD:	www.cbd.int
SANBI:	www.sanbi.org.za
SANParks:	www.sanparks.org.za
SA Yearbook:	www.gcis.gov.za
Statistics South Africa:	www.statssa.gov.za
World Bank, Environment Department:	www.worldbank.org/biodiversity
UNDP:	http://www.undp.org/biodiversity
UNEP:	www.unep.org
Chapter 3:	
BGIS website:	www.bgis.org.za
SANBI's Biodiversity Advisor:	www.biodiversityadvisor.sanbi.org.za
Chapter 4:	
CapeNature:	www.capenature.org.za
Endangered Wildlife Trust:	www.ewt.org.za
Ezemvelo-KZN Wildlife:	www.kznwildlife.com
IUCN World Commission on Protected Areas:	www.iucn.org/wcpa
Wildlands Conservation Trust:	www.wildlands. co.za
Chapter 5:	
Biodiversity and Wine Initiative:	www.bwi.org.za
Flower Valley Conservation Trust:	www.flowervalley.org.za
Forestry SA:	www.forestry.co.za
Red Meat:	www.grasslands.org.za
Sustainable Seafood Initiative:	www.wwf.org.za/sassi
SusFarMS:	www.wetland.org.za; www.bettersugarcane.org
Chapter 6:	
DEA:	www.environment.gov.za
Working on Fire:	www.workingonfire.org
Working for Water:	www.dwaf.gov.za/wfw
Working for Wetlands:	www.wetlands.sanbi.org.za
Chapter 7:	
CAPE:	www.capeaction.org.za
SKEP:	www.skep.org.za; SKEPPIES: www.skep.org.za/skeppies.php
Grasslands Programme:	www.grasslands.org.za
Baviaanskloof Mega-reserve project:	www.wildernessfoundation.co.za
Table Mountain Fund:	www.tmf.org.za
Agulhas Biodiversity Initiative: Climate Action Partnership:	www.cap.org.za

Acronyms and abbreviations

Acronym	Meaning
ABI	Agulhas Biodiversity Initiative
AsgiSA	Accelerated and Shared Growth Initiative of South Africa
BGIS	Biodiversity-GIS website of SANBI (http://bgis.sanbi.org)
BotSoc	The Botanical Society of South Africa
BWI	Biodiversity and Wine Initiative
CAPE or C.A.P.E.	Cape Action for People and the Environment
CBA	Critical Biodiversity Area
CBD	Convention on Biological Diversity
CEPF	Critical Ecosystem Partnership Fund
CR	Critically endangered
DEAT	Department of Environmental Affairs and Tourism
DEA	Department of Environmental Affairs
EAF	Ecosystem Approach to Fisheries
EN	Endangered
EPWP	Expanded Public Works Programme
ESA	Ecological Support Area
FFI	Flora and Fauna International
FPA	Fire Protection Association
FSC	Forest Stewardship Council
GDP	Gross Domestic Product
GEF	Global Environment Facility

GIS	Geographical Information System
IDP	Integrated Development Plan
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for the Conservation of Nature
KZN	KwaZulu-Natal (province of South Africa)
LUDS	Land-Use Decision Support Tool
MDG	Millennium Development Goal
MA	Millennium Ecosystem Assessment
MINMEC	Ministerial Executive Committee
MINTEC	Ministerial Technical Committee
NAMBAF	Namaqualand Biodiversity Advisory Forum
NBF	National Biodiversity Framework
NBSAP	National Biodiversity Strategy and Action Plan
NEMA	National Environmental Management Act (Act 107 of 1998)
NGO	Non-Governmental Organisation
NSBA	National Spatial Biodiversity Assessment
NPAES	National Protected Areas Expansion Strategy
PES	Payments for Ecosystem Services
PPSA	Protea Producers of South Africa
R	South African Rands (currency)
REDD	Reducing Emissions from Deforestation and Degradation
SANBI	South African National Biodiversity Institute

SASSI	South African Sustainable Seafood Initiative
SCBD	Secretariat for the Convention on Biological Diversity
SDF	Spatial Development Framework
SKEP	Succulent Karoo Ecosystem Programme
SKEPPIES	Succulent Karoo Ecosystem Programme small grants fund
STEP	Subtropical Thicket Ecosystem Plan
SusFarMS	Sustainable Sugar Cane Farm Management System
TMF	Table Mountain Fund
TNC	The Nature Conservancy
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
VU	Vulnerable
WCPA	World Commission on Protected Areas (of the IUCN)
WCS	Wildlife Conservation Society
WESSA	Wildlife and Environment Society of South Africa
WfW	Working for Water
WoF	Working on Fire
WWF-SA	World Wide Fund for Nature – South Africa

Glossary of terms

Climate change adaptation: initiatives and measures to reduce the vulnerability of natural and human systems to the actual or expected impacts of climate change.

Biodiversity: the diversity of genes, species, ecosystems and landscapes on Earth, and the ecological and evolutionary processes that maintain this diversity.

Biodiversity hotspot: an area characterised by high levels of biodiversity and endemism, which faces significant threats to biodiversity.

Biodiversity planning: see *systematic biodiversity planning*.

Biodiversity sector plan: a map of biodiversity priority areas (critical biodiversity areas and ecological support areas) accompanied by contextual information, land-use guidelines and supporting GIS information. The map must be produced using the principles and methods of systematic biodiversity planning, in accordance with nationally agreed guidelines. A biodiversity sector plan represents the biodiversity sector's input to planning and decision-making in a range of other sectors.

Biodiversity stewardship: a model for expanding protected areas in which the state conservation authority enters into legal agreements (contracts) with landowners to place land that is of high biodiversity value under formal protection. Different categories of agreement confer varying degrees of protection on the land and hold different benefits for landowners. In this model, the costs and responsibilities for conservation of important biodiversity are shared between the state and private and communal landowners.

Biodiversity targets: quantitative targets, based on best available science, that indicate how much of each biodiversity feature should remain in a natural state in order to conserve biodiversity pattern and ecological processes.

Biome: an ecological unit of wide extent, characterised by complexes of plant communities and associated animal communities and ecosystems, and determined mainly by climatic factors and soil types. A biome may extend over large, more or less continuous expanses or land surface, or may exist in smaller, discontinuous patches. Examples in South Africa include the Fynbos Biome, the Grasslands Biome, and the Succulent Karoo biome.

Bioregional plan: a biodiversity sector plan that has been published in the Government Gazette, and that has been produced in accordance with the nationally agreed Guideline for Bioregional Plans.

Carbon sequestration: a biochemical process through which atmospheric carbon is absorbed and stored by living organisms including plants and soil micro-organisms, involving the storage of carbon in soils, with potential to reduce atmospheric carbon dioxide levels.

Conservation planning: see *systematic biodiversity planning*

Critical biodiversity areas: all the areas that are required to meet targets for biodiversity pattern and ecological processes, as determined in a systematic biodiversity plan.

Development: the process of social and economic improvement in a society.

Endemic: restricted or exclusive to a particular geographic area, occurring nowhere else.

Ecological support areas: areas that play an important role in supporting ecological functioning of critical biodiversity areas and/or delivering ecosystem services, as determined in a systematic biodiversity plan.

Ecological infrastructure: natural biodiversity, ecosystems and resources that provide essential ecosystem services to human communities and that support livelihoods and economic activities.

Ecosystem: an assemblage of living organisms, the interactions between them and with their physical environment. Each ecosystem is characterised by its composition (the living and non-living components of which it is made), its structure (how the components are organised in time and space) and the ecological processes (functions such as nutrient cycling) that maintain the structure and composition of the ecosystem and keep it as a functioning unit. Ecosystems can be delineated at various scales. In systematic biodiversity planning in

South Africa, vegetation types have been considered to represent ecosystems, and are used as surrogates for biodiversity in systematic biodiversity plans.

Ecosystem-based adaptation: the use of biodiversity and ecosystem services as part of an overall strategy to help people adapt to the adverse effects of climate change. Ecosystem-based adaptation involves maintaining ecosystems in a natural, near-natural or functioning state, or restoring ecosystems where necessary, to support human adaptation to climate change.

Ecological processes: all the processes that result from the relationships and interactions within and between ecosystems are called ecological processes. These processes operate at various scales and include, for example, nutrient cycles, energy flow, soil formation, nitrogen fixation, carbon storage, predator-prey interactions, fire cycles, seasonal migrations and pollination. Ecological processes are referred to, interchangeably, as "ecosystem processes" or "ecosystem functions".

Ecosystem resilience: the ability of an ecosystem to maintain its functions (biological, chemical, and physical) in the face of disturbance or to recover from external pressures. A "climate-resilient" ecosystem would retain its functions in the face of climate change. Ecosystem-based adaptation will require measures to maintain the resilience of ecosystems under new climatic conditions, so that they can continue to supply essential services.

Ecosystem services: the benefits that people obtain from ecosystems, including provisioning services (such as food and water), regulating services (such as flood control), cultural services (such as recreational benefits), and supporting services (such as nutrient cycling, carbon storage) that maintain the conditions for life on Earth.

Ecosystem threat status: a measure of how threatened an ecosystem is, based on how much of the ecosystem's original area remains intact relative to three different thresholds or "tipping points". These thresholds indicate the points at which it is estimated that the ecosystem would undergo fundamental change, either in terms of biodiversity pattern or ecological processes. Ecosystems are categorised as critically endangered, endangered, vulnerable or least threatened.
Forest: a biome dominated by tall trees that form a closed canopy; in South Africa forest is usually found in areas of higher rainfall, on cooler southern slopes or in deep or steep river valleys, particularly in mountainous regions of the east and south-east, but it is also found found in coastal areas. The only large expanses of forest that remain in South Africa today are found in the south-eastern Cape, but smaller patches are also found in other parts of the country. Forest occupies only 2% of the land-surface of South Africa and is the smallest of the nine biomes.

Fynbos: a biome dominated by shrubby vegetation, mostly with very small, narrow ("fyn" meaning "fine" or "narrow") leaves, like heather, along with wiry, reed-like plants called restios, and taller shrubs and bushes with broader, leathery leaves, like proteas. Fynbos occurs predominantly in the south-western Cape, a winter-rainfall area, but small patches of fynbos can be found in mountainous areas in the eastern parts of South Africa and tropical East Africa. The fynbos of the Cape Floristic Region has a unique floristic composition (combining particular taxonomic groupings of plants) and high levels of endemism.

Grassland: a biome dominated, at least visually, by species of grasses, and characterised by a lack of tall shrubs and woody plants. Grasslands are also home to a rich variety of herbaceous forbs (small, non-woody plants) and bulbous plants. In South Africa, grassland covers much of the central and eastern parts of the country, in regions dominated by summer rainfall.

Integrated Development Plan: a strategic development plan required by law and developed through participatory processes, to guide and inform all planning, budgeting, management and decision-making in a municipal area in South Africa.

Landscape approach: the landscape approach to biodiversity conservation involves working both within and beyond the boundaries of protected areas, to manage a mosaic of land uses including protection, restoration, production and subsistence use, in order to deliver ecological, economic and social benefits. Partnerships between diverse role-players, and effective mainstreaming of biodiversity considerations in land-use planning and operations of multiple sectors, are critical elements of the landscape approach.

Mitigation: measures to reduce greenhouse gas emissions into the atmosphere, and enhance greenhouse gas sinks.

Nama Karoo: a biome characterised by vegetation including grasses and small bushes adapted to dry conditions, with open ground in between. Nama Karoo occurs in parts of the central and southern interior of South Africa, in areas with very low summer rainfall. Although the soils are rich and fertile, plant growth is limited by the dry climate.

Natural capital: natural resources and ecosystems.

Persistence: a principle of systematic biodiversity planning, referring to the need to maintain the ecological and evolutionary processes that enable ecosystems and species to persist over time.

Production landscape: a landscape in which land-use is directed primarily towards economic activities that modify natural ecosystems to produce goods for human consumption or use. Production landscapes include those that support subsistence or commercial wild-harvesting of natural products to provide livelihoods for local communities.

Protected area: an area of land or sea that is formally protected by law and managed primarily for biodiversity conservation. There are numerous categories of protected area, defined by the National Environmental Management: Protected Areas Act (Act 57 of 2003) and distinguished according to management objectives, permissible land-use types and management authority.

Representation (or representivity): a principle of systematic biodiversity planning, referring to the need to maintain a representative sample of species and ecosystems.

Resilience: a term referring generally to a system's capacity to absorb expected and unforeseen change, whilst retaining its character and functionality. See also *ecosystem resilience*.

Resistance: the capacity of an ecosystem to resist change in the face of disturbance.

Restoration: all interventions designed to aid the repair or recovery of degraded ecosystems, in some cases with a focus on restoring basic ecological functioning, and in others with restoring structure and composition as well.

Savanna: a biome occurring in summer-rainfall regions of South Africa, and made up of grasses and scattered trees and bush-clumps of varying density. Sometimes called "bushveld" in South Africa.

Spatial Development Framework: a spatial plan developed as part of an Integrated Development Plan to indicate current and future patterns of land use by all sectors such as agriculture, housing, industry and conservation. The Spatial Development Framework guides and informs all decisions of the municipality relating to planning, development and use of land.

Albany Thicket: a biome comprising dense bushes, small trees, climbers and sprawling shrubs. Many of the plants have succulent or leathery leaves and spines, and are adapted to low summer rainfall. Thicket can become extremely thick and impenetrable and it is very slow to recover from degradation. Albany thicket occurs mostly in the south-western parts of the Eastern Cape province of South Africa, although it is found in valleys throughout the eastern parts of the country, particularly along the coast. Albany thicket is sometimes referred to as "subtropical thicket".

Succulent Karoo: a biome dominated by small bushes, succulents and geophytes, with open ground in between. It occurs in the south-western interior and along the west coast of South Africa, and extends into Namibia. It is characterised by very low winter rainfall and sandy, quartzitic soils. The Succulent Karoo Biome is one of only two semi-arid biodiversity hotspots in the world.

Systematic biodiversity planning: a scientific methodology for determining areas of biodiversity importance involving: mapping biodiversity features (such as ecosystems, species, spatial components of ecological processes); mapping a range of information related to these biodiversity features and their condition (such as patterns of land and resource use, existing protected areas); setting quantitative targets for biodiversity features, analysing the information using software linked to GIS; and developing maps that show spatial biodiversity priorities. Systematic biodiversity planning is sometimes called "systematic conservation planning".

Veld: a South African term referring to open land containing natural vegetation.

Vulnerability: The degree to which a system is susceptible to, and unable to cope with, the adverse effects of climate change.

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