

# Turning strategy into action: implementing a conservation action plan in the Cape Floristic Region

Caroline M. Gelderblom<sup>a,\*</sup>, Brian W. van Wilgen<sup>a</sup>, Jeanne L. Nel<sup>a</sup>, Trevor Sandwith<sup>b</sup>,  
Mark Botha<sup>c</sup>, Maria Hauck<sup>d</sup>

<sup>a</sup>*CSIR Division of Water, Environment and Forestry Technology, PO Box 320, Stellenbosch, 7599, South Africa*

<sup>b</sup>*Cape Action Plan for the Environment (CAPE), Private Bag X7, Claremont, 7735, South Africa*

<sup>c</sup>*Cape Conservation Unit, Botanical Society of South Africa, Private Bag X10, Claremont, 7700, South Africa*

<sup>d</sup>*Institute of Criminology, Faculty of Law, University of Cape Town, Private Bag, Rondebosch, 7700, South Africa*

Received 1 November 2001; received in revised form 1 September 2002; accepted 13 September 2002

## Abstract

This paper describes the history of conservation in the Cape Floristic Region, and the development of a conservation action plan for the region, arising from the Cape Action Plan for the Environment (CAPE). The plan turns the long-term strategy, which identified priorities for conservation action, into a practical 5-year action plan. The tension between protection and the use of natural resources is addressed within the context of institutional frameworks. CAPE has succeeded in bringing together previously fragmented institutions, and has ensured that they work together more effectively. It has also strategically realigned existing resources earmarked for conservation. The factors that contributed to this success include a long history of research-based management; the existence of a body of understanding and knowledge that made it possible to rapidly assess conservation priorities; a small but viable number of scientists to carry out the planning phase of the project and institutions willing to take it forward.

© 2003 Published by Elsevier Science Ltd.

*Keywords:* Community involvement; Fynbos; Sustainable use; South Africa

## 1. Introduction

The Cape Floristic Region and adjoining marine areas have exceptionally high levels of biodiversity and endemism, concentrated in a relatively small area of 90,000 km<sup>2</sup> (Cowling and Hilton-Taylor, 1994). Major threats to this biodiversity include the loss of habitat to agriculture, rapid and insensitive development, over-exploitation of marine resources and wild flowers, and the spread of invasive alien species. Some important habitats have been reduced by over 90% (Rouget et al., 2003a) and less than 5% of land in the lowlands has been set aside for conservation (Rouget et al., 2003b). These pressures are predicted to intensify, as the region acts as a magnet for settlement and development (a trend typical of Mediterranean climate regions globally, Myers et al., 2000).

In recognition of the unique biodiversity of the Cape Floristic Region and the high level of threats, the Global Environmental Facility (GEF) funded the establishment of a national park in the richest and most threatened part of this area, the Cape Peninsula. In addition, the GEF also allocated funds to support a planning process for the remainder of the Cape Floristic Region. This was the foundation of the Cape Action Plan for the Environment (CAPE), which aimed to develop a pragmatic plan, with local support, for the conservation of the Cape Floristic Region and surrounding marine environment. The plan needed to both realign internal resources effectively, and to secure additional external resources.

In this paper, we outline, briefly, the history of conservation in the Cape Floristic Region that preceded CAPE. We describe how the conservation plan was developed, and discuss important lessons that were learnt during the development of the plan. A full account of all elements of the plan cannot be presented

\* Corresponding author.

E-mail address: [cgelder@csir.co.za](mailto:cgelder@csir.co.za) (C.M. Gelderblom).

in a paper of this nature, and our account provides examples of key projects that characterise the plan.

## 2. The pre-CAPE era: conservation history of the Cape flora

The unique nature of the Cape Floristic Region has long been recognised. Early botanists (starting with Carl Peter Thunberg, Anders Sparrman and Francis Masson in 1773) began an almost unbroken tradition of botanical exploration, discovery and description that continues today. However, the road to effective conservation developed more slowly. Conservation in South Africa in the early parts of the twentieth century focussed on game protection, and the concept of “floral” reserves proved hard to sell. For example, early attempts (in 1929) to secure parts of the Cape Peninsula for conservation were met with incredulity by politicians of the day, who considered reserves in “windswept barren areas” to be of no possible value (Pringle, 1982).

Serious attempts at conserving the Cape’s ecosystems came about in the mid-twentieth century largely through the activities of South Africa’s Forestry Department. These stemmed from a concern for protecting water resources in mountainous areas earmarked for afforestation with alien pine trees. A research programme was initiated with a view to determining the effects of forestry on water resources in 1936 (Wicht, 1943), and this was later expanded to include research into the ecology and management of natural vegetation in watershed areas (van der Zel, 1974). The appointment of broad-minded foresters in these programmes led to the first strategic assessments of conservation needs in the region (Wicht, 1945; Kruger, 1977). In addition, an ethos of providing for recreational opportunities in undeveloped wilderness areas further drove the Forestry Department to set aside areas for conservation in the mountains (Ackerman, 1977). The 1970s and 1980s were consequently characterised by active, and relatively well-funded, conservation activities in the mountain areas of the Cape Floristic Region. Under the auspices of the Forestry Department, nature reserves and wilderness areas were proclaimed, a prescribed burning programme was developed and implemented, and a concerted effort was made to bring invasive alien plants under control. In parallel with this, a well-funded co-operative research project produced a generation of scientists and a body of scientific knowledge and human capacity to underpin management (Huntley, 1992).

The momentum of the conservation programmes was lost in the late 1980s. Increasing demands on government spending in a beleaguered South Africa under apartheid and sanctions led to funding cutbacks and a loss of momentum. Research programmes also suffered

cutbacks, and the net result was that programmes for fire management, and invasive alien plant control, fell behind at best, and had to be abandoned in many cases. By the early 1990s, the situation was bleak, with what remained of the staff in conservation organisations being unable to adequately manage the areas under their control.

A significant improvement in the conservation prospects in the region was precipitated by the election, for the first time, of a democratic government in South Africa. The unique opportunity offered by the new government, and the climate of optimism and acceptance of change, was critically important in providing an environment conducive to re-invigorating conservation programmes (Cowling et al., 2002). For the first time, South Africans were able to access international funding aid, which led to the GEF-funded projects supporting the CAPE initiative, among others. In addition, the government launched the Working for Water programme, aimed at bringing invasive alien plants under control (Van Wilgen et al., 1998). This programme currently spends US\$ 9.5 million annually in the two provinces in which the Cape Floristic Region occurs, providing employment to over 6000 people in the process. The degree to which society was able to respond to the challenges of resurrecting the conservation initiatives in the region was in part due to the existence of a cohort of experienced managers and academics who played a vital role in guiding the implementation of these initiatives. CAPE came into being as a result of efforts by these people, and led to the development of a strategy (Lochner et al., 2003). Our task was to turn the strategy into action, by developing a detailed action plan, with a range of projects, and estimates of the budgets required. It was critical that this be supported by the development of a strong sense of ownership within the institutions responsible for implementation, including those (such as planning) that were not traditionally associated with biodiversity conservation.

## 3. From strategy to action—implementation themes in CAPE

The CAPE action plan was developed between September 1999 and September 2000. The interventions necessary for achievement of the overall strategic goal (Lochner et al., 2003) were identified and grouped into three broad themes:

1. The protection of biodiversity in priority areas, through the establishment of an effective reserve system, and the strengthening of off-reserve conservation.
2. The promotion of sustainable use of biodiversity to protect ecosystem services (especially the

delivery of water from mountainous areas), improving harvesting techniques for both terrestrial and marine resources, and promoting sustainable nature-based tourism.

3. The strengthening of institutions, and the promotion of co-operative governance and community involvement in conservation.

Project ideas were then developed into detailed proposals in close collaboration with the institutions that would implement them (Younge and Fowkes, 2003).

#### 4. Key themes and projects within the CAPE action plan

The action plan to achieve the goals of the three themes listed above contained proposals for 37 projects (Table 1). For each of these projects, we estimated the total funds that would be required over a 5-year period to ensure implementation. We assessed the capacity of local institutions to support these projects from existing budgets, and estimated the amount of additional funds that would need to be sought from external donor agencies to make up the difference. It is not possible or relevant to review these projects in detail in this paper. Many deal with aspects of conservation (such as the establishment of new reserves, re-enforcing existing projects, or developing tourism opportunities) that, while extremely important and obviously needed, are not novel. Rather, we attempt here to highlight some projects that provide examples of new approaches to conservation, and that, in our opinion, represent significant advances in the approach to the conservation of the Cape Floristic Region.

##### 4.1. The protection of biodiversity

The CAPE action plan called for an effectively managed system of conservation areas that would be representative of the Cape Floristic Region and adja-

cent marine areas. However, the plan did not simply recommend that a number of reserves be identified and established. Rather, it sought to implement a range of solutions that would ensure the conservation of patterns and processes in representative sample of ecosystems. First, three “mega-reserves” (> 500,000 ha) were identified with the aim of ensuring that landscape-scale evolutionary and ecosystem processes continue to operate (Cowling et al., 1999). The plan also earmarked large corridors (usually along rivers where development was limited) for conservation, in order to link protected areas and thus maintain migration routes. Secondly, areas in the lowlands (where enough natural habitat remains to develop viable reserves) were identified as priority areas for the establishment of a network of medium-sized reserves.

Finally, the plan sought to protect the last remnants of highly threatened vegetation types. It was recognised that most of these fragments would remain in private ownership, and a range of incentives were proposed to encourage landowners to protect the fragments (see also Pence et al., 2003). These included the creation of financial incentives for good management (Botha, 2001), supported by the drawing up of a legal framework for incentives at a national level. These incentives could take several forms: the provision of direct assistance for the management or rehabilitation of the land; the creation of tax rebates for those who conserve on private land; and simply creating and nurturing a sense of civic pride in a unique heritage, through awareness and education campaigns, where landowners would place a value on their contribution to the conservation of the world’s smallest floral kingdom.

It is further planned to enhance the protection of biodiversity through incorporating conservation priorities into planning guidelines in the Western Cape Province. Fortunately, the CAPE initiative coincided with the launch of a new strategic bioregional planning initiative by the provincial planning authorities (bioregional planning seeks to amalgamate ecosystem

Table 1  
Summary of funding required for component projects making up the 5-year CAPE action plan for the Cape Floristic Region and adjoining marine areas

Theme	Area of focus	Number of projects proposed	Local funds available (millions of US\$)	Additional funds required (millions of US\$)
Protecting biodiversity in priority areas	Strengthening on- and off-reserve conservation	15	25	30.5
	Supporting bioregional planning	2	2.5	0.7
Promoting the sustainable use of biodiversity	Conserving biodiversity in watersheds	5	1.7	2.06
	Improving sustainability of harvesting	7	3.7	12
	Promoting sustainable nature-based tourism	2	0	0.85
Strengthening institutions and governance	Strengthening institutions, enhancing collaboration and involving communities	6	2	2.6
Total		37	32.65	48.71

management with development planning). The funding provided by the GEF to support CAPE facilitated critical interactions between key individuals from the conservation and development planning communities, and led to formalised inter-agency co-operation agreements (see Section 4.3) (Gelderblom et al., 2002).

#### 4.2. *The promotion of sustainable use*

The point is often made that biodiversity should be protected for the sake of generating valuable if not essential ecosystem services. In many areas, alternatives to protection (such as conversion to crop agriculture, plantation forestry, planted pastures or urban development) would possibly generate benefits that would appear relatively more attractive than conservation, especially in the short term. In recognition of the fact that pressures for alternative forms of land use would remain, and probably grow, CAPE sought to identify ways in which the sustainable use of biodiversity could be encouraged, so as to produce tangible and recognised benefits that would ensure continued protection. Three major areas of focus were identified in this regard:

1. The conservation of biodiversity in important watershed areas.
2. The improvement of harvesting practices in both terrestrial and marine environments.
3. The promotion of sustainable tourism opportunities.

South Africa's innovative new Water Law recognises both the importance of integrated watershed management, and the need to maintain the flow of water in rivers and streams so as to protect ecosystem functioning. There has also been significant progress in the control of invasive alien plants in watershed areas, which both threaten biodiversity and reduce flow in rivers. It is generally accepted that maintaining a cover of natural vegetation in watershed areas is the best way of delivering valuable water. CAPE therefore developed projects with a focus on watershed management. These would enhance cooperative management, the development of capacity to manage fires, invasive alien plants and invasive alien fish, and the management of water demand in priority watersheds. These initiatives would pool resources from currently fragmented management authorities, build management capacity, and (by managing demand) relieve pressure for the building of more dams in important natural areas.

Projects proposed by CAPE to improve the efficiency and sustainability of harvesting included the development of models for harvesting wildflowers, and strategies for the restoration of degraded lowland areas used for cropping and grazing. In the marine environment, the largest single threat to biodiversity comes in the

form of over-exploitation. Here, a comprehensive proposal was put forward to enhance co-operative management of marine resources, the implementation of effective law enforcement, the establishment of a monitoring and compliance programme, and the establishment of an education programme.

Tourism is one of the fastest growing sectors of the economy, with the potential to create a large number of jobs across a diverse spectrum of occupations, especially in rural communities. The nature-based tourism industry in the Cape Floristic Region already contributes over US \$800 million to the regional economy (7.2% of the Gross National Product, using 1998 figures) (Turpie et al., 2003). This is already higher than any returns that can be made from harvesting, and it therefore has tremendous potential to act as an economic driver, encouraging conservation. The CAPE action plan encourages sustainable growth of the nature-based tourism industry, as well as the investment of more of the revenue generated by nature-based tourism into the conservation of the biodiversity on which it depends. This will include increasing awareness of the biodiversity of the Cape Floristic Region, while setting guidelines that ensure that the tourism development does not damage natural resources.

#### 4.3. *Institutions and co-operative governance*

The CAPE action plan recognises that capacity and commitment within the institutions responsible for conservation is critical to the success of this initiative. The conservation of biodiversity is promoted in a number of disparate policies and laws in South Africa, but a cohesive legal and policy framework, that draws the policies from different sectors together and focuses them effectively, is lacking. With this in mind, it was recognised that an overarching legal framework is needed. In addition, conservation agencies need to be strengthened so that they can enforce legislation aimed at protection, co-ordinate efforts in research, training and capacity-building, and engage communities to ensure participation in, and support of, conservation priorities. Three strategic goals are recognised in the plan:

1. Institutions need to be strengthened to a point where the collective capacity and will of implementers is sufficient to sustain innovative and adaptive management.
2. Co-operative governance needs to be enhanced: where environmental responsibilities are fragmented, role players need to be mobilised and aligned towards a common vision, policy and purpose, so that they can work together for conservation.
3. Community involvement needs to be promoted, thereby empowering and motivating resource



users to conserve and wisely use biological resources.

CAPE has already resulted in two major positive changes to the way in which various institutions are working together more effectively (Gelderblom et al., 2002). The first relates to the co-ordinated use of a database on biodiversity to inform development planning in the Western Cape Province. Prior to CAPE, development planning proceeded in the absence of any comprehensive information base on biodiversity priorities. After the interventions put in place by CAPE, three arms of government collaborate closely to improve the planning process. The department responsible for environmental policy has relocated to the offices of the department responsible for regional planning, to facilitate collaboration through the use of a common database on biodiversity features (see Section 4.1). In addition, the department charged with conservation management has established a conservation planning unit, charged with maintaining and updating the biodiversity database through the continual addition of new information. Thus, for the first time, up-to-date scientific information is being used, and being given legal status, in the process of development planning.

The second change relates to the way in which conservation goals are promoted outside of formal reserves. Prior to CAPE, the department responsible for agriculture focussed on soil conservation. The department charged with conservation management focussed (outside of formal reserves) on policing the use of biodiversity (e.g. through issuing permits for hunting, fishing, flower harvesting or the keeping of wild animals in captivity). In line with the strategy developed by CAPE, the conservation department has now instituted a training course in biodiversity conservation, aimed at agricultural extension officers. Thus, for the first time, these extension officers will have been exposed to biodiversity-related issues, and will apply this when exercising their duties (e.g. when considering applications for permits to plough virgin soil). In addition, a new unit, tasked with addressing issues relating to “off-reserve” conservation, has been created within the department charged with conservation management. This unit will seek to secure longer-term conservation in privately owned areas important for the protection of biodiversity. These would include both small remnant fragments of pristine land (where the establishment of reserves would not be feasible), or large, un-transformed areas where the options for purchase and inclusion in formal reserves is beyond the means of conservation agencies. The focus on the management of privately owned land has thus shifted from policing and soil conservation to the conservation of biodiversity through a combination of education and incentives.

## 5. Lessons learnt

The Cape Action Plan for the Environment was arguably the largest co-ordinated conservation planning exercise yet undertaken on the African continent. It has amassed a large body of information to underpin effective conservation planning and implementation. It has brought together people from a range of institutions and interest groups, and gone a long way to the elimination of fragmented, uncoordinated and ineffective management. It has inspired the conservation community with vision and energy to turn plans into action. Many of the outcomes outlined above have improved the prognosis for conservation of the Cape Floristic Region significantly. Yet, with hindsight, CAPE made some critical mistakes, and had some serious weaknesses.

The first weakness was perhaps that CAPE started in the wrong place. It was initiated by enthusiastic and visionary ecologists whose primary motivation was the development of a scientifically robust plan for the conservation of biodiversity patterns and the processes that maintain ecosystems. The scientific agenda was far advanced before the development of a strategy, and the subsequent fleshing out of the strategy into a pragmatic and collaborative plan, was initiated. The logical place would have been to start with the strategy development, and to allow the rest of the programme to be guided by priorities identified in the strategy. A second major weakness was the failure to plan for implementation. The GEF grant that funded CAPE came to an end with the final production of reports by consultants, and a hiatus ensued. It was only through the timely intervention by WWF (South Africa) that funds were found to appoint a temporary co-ordinator to ensure that the momentum and enthusiasm generated by CAPE was not lost. Finally, the terrestrial, freshwater, and marine components of CAPE failed to capitalise on the opportunity for integration. Rather, these components developed plans largely in isolation.

Despite the earlier weaknesses, the CAPE project has, on balance, been a success. It has brought together previously fragmented institutions, and has ensured that they work together more effectively. It has also ensured that the existing resources earmarked for conservation are re-aligned to address issues of strategic importance for conservation. A number of factors have contributed to this success. First, unlike many other parts of the developing world, the Cape Floristic Region has a long history of botanical exploration, and a good understanding of the ecology of the region. The work that laid this foundation began with Carl Peter Thunberg, Anders Sparrman and Francis Masson in 1773. It included the efforts of notable botanists and ecologists such as Francis Guthrie (1831–1899), Rudolf Marloth (1855–1931), Harry Bolus (1834–1911), Christian Wicht (1908–1978), Fred Kruger (1944– ) and many others. It

continues today through the work of ecologists such as William Bond and Richard Cowling. The existence of this understanding and knowledge made it possible to rapidly assess the conservation priorities in a way that would not have been possible in many other parts of the globe. The research activities of the 1970s and 1980s (under the auspices of the South African Co-operative Scientific Programmes of the CSIR, [Huntley, 1987](#)) saw the formation of a generation of ecologists and conservation managers. Survivors of this group had become increasingly frustrated with declining funding and an inability to deal with conservation during the 1990s. South Africa's re-entry to the global community provided this group with opportunities to turn frustration into action ([Pierce et al., 2002](#)). Despite the decline in funding for conservation over the past two decades, the region was fortunate enough to have a remaining critical mass to carry the CAPE project through to success. This capacity had remained in universities, conservation departments, and science councils, where enough people had managed to remain in active employment despite declining funding. Two points stand out in this regard. First, the level of this remaining capacity was such that enough experienced scientists and managers remained to ensure the success of CAPE. In many other parts of the world (particularly the developing world), this level of experience and local knowledge is simply not there. Secondly, the relatively small size of the conservation community meant that there was no room for the formation of (e.g.) opposing schools of thought, or rival groups of consultants. Thus the corps of experienced people were able to work together very effectively and without serious rivalry.

## 6. The way forward

The initial year of implementation has provided some valuable insights. Putting the institutional frameworks for implementation in place was not a trivial task and a significant investment in negotiation between the national, provincial and local government structures was necessary before agreement was reached. The interim coordinating mechanisms are already increasing collaboration between institutions that manage natural resources in the Cape Floristic Region. If this process continues, resources will be used more effectively, as gaps are filled, overlaps removed, and synergies established. Facilitating collaboration between sectors is important because the most effective solutions for biodiversity conservation are generally found by bringing different sectors together.

Above all, the CAPE action plan recognises the need to mobilise civil society as a partner in conservation through enhanced institutional frameworks as well as capacity-building. For long-term success, it will be cri-

tical for conservation agencies to realign their internal resources around agreed priorities, to collaborate to ensure that the most important projects are implemented and that resources are used efficiently. From this perspective, it is very encouraging that the lead agency for the implementation programme (Western Cape Nature Conservation), has adopted the CAPE strategy to guide its operations.

However, even with the realignment of internal resources to focus on conservation priorities, implementation of this conservation plan will be too gradual to prevent substantial loss of biodiversity. For this reason, additional funding from the international community or national budgets will be sought. The action plan for the initial 5 years calls for an investment of around US\$81 million, of which around US\$48 million will have to be secured from sources outside of South Africa (e.g. from the GEF and other forms of foreign aid, [Table 1](#)). [Frazee et al. \(2003\)](#) estimate an expenditure of US\$45.6 million per year, assuming a 20-year implementation horizon, to acquire and implement a representative reserve system that achieves all conservation targets for the Cape Floristic Region; annual costs of maintaining this system are estimated at US\$29.6 million.

Successful implementation will depend on continual monitoring of progress, and insights from this review process will need to be continually fed back into both strategy and implementation in a process of ongoing adaptive management. This is viewed as an important function of the coordinating structure for the implementation of this programme. The foundation of this coordinating structure was laid during the development of CAPE. High level representatives of key institutions that would be responsible for implementation were brought together regularly over the team to ensure that their insights were incorporated into the end product. As part of the development of the conservation plan, each lead agency also committed internal resources to the projects in which they were involved. This was strengthened by the drafting of a memorandum of understanding which provided a formal framework for collaboration. The coordinating structures appear to be operating well thus far and several key integrative projects are already underway.

Engagement with potential funding agencies is a complex process and requires a good understanding of the sustainability of the intervention proposed. For an integrated programme such as CAPE, it is critical that a strategic approach to funding is followed instead of piecemeal support of the most attractive projects. The expectations of rapid progress generated by CAPE will also need to be carefully managed in the coming years to ensure that enthusiasm does not wane, as the ongoing implementation will take time.

## Acknowledgements

We thank the members of the CAPE Coordinating Committee for their inputs into the development of this conservation programme and wish them well in its implementation. We would like to recognise the very valuable inputs of Richard Cowling and Bob Pressey. Funding from the CSIR's Division of Water, Environment and Forestry Technology enabled some of us to prepare of this paper.

## References

- Ackerman, D.P., 1977. The conservation role of forestry in South Africa. In: *Proceedings of a Symposium on the State of Nature Conservation in Southern Africa*; Koedoe (Suppl.), pp. 203–209.
- Botha, M.A., 2001. Incentives for Conservation on Private Land. Options and opportunities (CCU Report No. 02/2001). Botanical Society of South Africa, Kirstenbosch, Cape Town.
- Cowling, R.M., Hilton-Taylor, C., 1994. Patterns of plant diversity and endemism in southern Africa: an overview. In: Huntley, B.J. (Ed.), *Botanical Diversity in Southern Africa*. National Botanical Institute, Pretoria, pp. 31–52.
- Cowling, R.M., Pierce, S.M., Sandwith, T., 2002. Conclusions. The fundamentals of mainstreaming biodiversity. In: Pierce, S.M., Cowling, R.M., Sandwith, T., MacKinnon, K. (Eds.), *Mainstreaming Biodiversity in Development. Case Studies from South Africa*. World Bank, Washington, pp. 143–153.
- Cowling, R.M., Pressey, R.L., Lombard, A.T., Heijnis, C.E., Richardson, D.M., Cole, N., 1999. Framework for a Conservation Plan for the Cape Floristic Region (Institute for Plant Conservation Report 9902). University of Cape Town, Cape Town.
- Gelderblom, C., 2002. M, Kruger, D., Cedras, L., Sandwith, T., Audouin, M., Incorporating conservation priorities into planning guidelines for the Western Cape. In: Pierce, S.M., Cowling, R.M., Sandwith, T., MacKinnon, K. (Eds.), *Mainstreaming Biodiversity in Development. Case Studies from South Africa*. World Bank, Washington, pp. 117–128.
- Frazer, S.R., Cowling, R.M., Pressey, R.L., Turpie, J.K., Lindenberg, N., 2003. Estimating the costs of conserving a biodiversity hotspot: a case-study of the Cape Floristic Region, South Africa. *Biological Conservation* 112, 275–290.
- Huntley, B.J., 1987. Ten years of cooperative ecological research in South Africa. *South African Journal of Science* 83, 72–79.
- Huntley, B.J., 1992. The fynbos biome project. In: Cowling, R.M. (Ed.), *Fynbos: Nutrients, Fire and Diversity*. Oxford University Press, Cape Town, pp. 1–5.
- Kruger, F.J., 1977. Ecological reserves in the Cape fynbos: towards a strategy for conservation. *South African Journal of Science* 73, 81–85.
- Lochner, P., Weaver, A., Gelderblom, C., Peart, R., Sandwith, T., Fowkes, S., 2003. Aligning the diverse: the development of a biodiversity conservation strategy for the Cape Floristic Region. *Biological Conservation* 112, 29–43.
- Myers, N., Mittermeier, R.A., Mittermeier, C.G., da Fonseca, G.A.B., Kent, J., 2000. Biodiversity hotspots for conservation priorities. *Nature* 403, 853–858.
- Pence, G., Botha, M., Turpie, J.K., 2003. Evaluating combinations of on-and off-reserve conservation strategies for the Agulhas Plain, South Africa: a financial perspective. *Biological Conservation* 112, 253–273.
- Pierce, S.M., Cowling, R.M., Sandwith, T., MacKinnon, K. (Eds.), 2002. *Mainstreaming Biodiversity in Development. Case Studies from South Africa*. World Bank, Washington.
- Pringle, J.A., 1982. *The Conservationists and the Killers: The Story of Game Protection and the Wildlife Society of Southern Africa*. Books of Africa, Cape Town.
- Rouget, M., Cowling, R.M., Richardson, D.M., Lloyd, J.W., Lombard, A.T., 2003a. Current patterns of habitat transformation and future threats to biodiversity in terrestrial ecosystems of the Cape Floristic Region. *Biological Conservation* 112, 63–85.
- Rouget, M., Richardson, D.M., Cowling, R.M., 2003b. The current configuration of protected areas in the Cape Floristic Region,— reservation bias and representation of biodiversity patterns and processes. *Biological Conservation* 112, 129–145.
- Turpie, J.K., Heydenrych, B.J., Lamberth, S.J., 2003. Economic value of terrestrial and marine biodiversity in the Cape Floristic Region: implications for defining effective and socially optimal conservation strategies. *Biological Conservation* 112, 233–251.
- Van der Zel, D.W., 1974. Catchment research at Zachariashoek. *Forestry in South Africa* 15, 23–30.
- Van Wilgen, B.W., Le Maitre, D.C., Cowling, R.M., 1998. Ecosystem services, efficiency, sustainability and equity: South Africa's Working for Water Programme. *Trends in Ecology and Evolution* 13, 378.
- Wicht, C.L., 1943. Determination of the effects of watershed management on mountain streams. *Transactions of the American Geophysical Union* 594–608.
- Wicht, C.L., 1945. *Preservation of the vegetation of the south western Cape*. Special publication of the Royal Society of South Africa.
- Younge, A., Fowkes, S., 2003. The Cape Action Plan for the Environment: overview of an ecoregional planning process. *Biological Conservation* 112, 15–28.