Chapter 7
Building Biodiversity Knowledge: Mobilising Citizen Science

We are drowning in information, while starving for wisdom. The world henceforth will be run by synthesisers, people who are able to put together the right information at the right time, think critically about it, and make important choices wisely.

Edward O. Wilson (1998) *Consilience: The Unity of Knowledge p 294*

7.1 The Development of a Conservation Science Ethos

When the great Carolus Linnaeus was working on his revolutionary system of botanical classification (*Genera Plantarum* Linnaeus 1737; *Species Plantarum* Linnaeus 1753), he was able to examine the increasing number of botanical collections arriving in Europe from the far corners of the globe. One collection in particular excited his interest – that of the German physician Paul Hermann. Hermann was on a Dutch East Indiaman en route to Sri Lanka when the ship called into Cape Town in 1672. Here he made the first known herbarium collection of Cape plants (Gunn and Codd 1981). Hermann's collection included 791 items. Linnaeus was astounded by the richness of the collection. He also recognised its historical importance. In his brief *Flora Capensis*, Linnaeus (1760) wrote:

> *In this land of the Cape of Good Hope in farthest Africa no botanist ever before had trod. Oh Lord, how many, how rare and how wonderful were the plants that presented themselves to Hermann's eyes! In a few days Hermann simply and solely discovered more new African plants than all the botanists who ever before him made their appearance in the world.*

The beauty and diversity of the South African flora has captured the attention of botanists for more than three centuries, but so too has its vulnerability to the impact of human activities. As early as 1658, the Dutch colonial government published a regulation prohibiting the cutting of yellowwood *Podocarpus latifolius*, a valuable hardwood, from the forests above Cape Town (Karsten 1951). During the late eighteenth century many botanists (Anders Sparrman, Carl PeterThunberg, Francis

B. J. Huntley, *Strategic Opportunism: What Works in Africa*, SpringerBriefs in Environmental Science, https://doi.org/10.1007/978-3-031-24880-1_7

Masson) collected extensively in the Cape and had expressed their amazement at the diversity, beauty and fragility of the flora. By the late nineteenth century serious concern regarding threats to the Cape flora was noted by the founder of Australian botany, Baron Ferdinand Mueller, after visiting the Cape. In a letter dated 1895, to Sir Hercules Robinson, the High Commissioner of the Cape Colony, Mueller wrote:

> *The vegetation of South Africa is the richest in the world … special and peculiar plants are sure to be swept out of existence altogether unless special provision is made for their preservation. … these beautiful and remarkable plants will be unknown save by dried specimens preserved in State Herbaria.*

Fortunately, Mueller's grim prediction has not been realised. In the century following his call for action, much has been done in South Africa to describe, document, protect and promote its remarkable flora and fauna. In the first assessment of the proportions of major taxonomic groups falling within protected areas Siegfried (1989) estimated that more than 70% of the vascular flora (and more than 90% of amphibian, reptilian, avian and mammalian species) were to be found in the 582 publicly owned nature reserves which then occupied 5,8% of southern Africa. Today, much more detailed biodiversity statistics are available for South Africa. The country's latest National Biodiversity Assessment (Skowno et al. 2019) reported that the protected area estate of South Africa now covers nearly 9% (108,000 km^2) of the country's land area, with three-quarters of terrestrial ecosystem types now having some form of representation. The marine systems have also received attention. In 2018, twenty new Marine Protected Areas (MPAs) were accepted for declaration, covering 5% of the country's marine territory. At species level, South Africa's birds and reptiles are the best protected of the seven taxonomic groups assessed in the NBA, with more than 85% of these species considered 'Well Protected', marginally lower than Siegfried's 1989 estimates, but still very high by any international standard.

7.2 How Did this Happy State of Biodiversity Conservation Arise?

There is no simple answer to this question, but the early fascination with the fabled *Flora Capensis* by explorer-naturalists – Carl Peter Thunberg, Anders Sparrman, Francis Masson – of the eighteenth century (Gunn and Codd 1981), and a succession of hunter-naturalists – Gordon Cumming, Cornwallis Harris, Courtney Selous – in the nineteenth century (Pringle 1982; Beinart 2003), might have had something to do with the growth of a strong natural history tradition in the country. British settlers and colonial administrators arriving in the Cape from the early 1800s brought from Europe a fascination with the unusual – establishing private 'cabinets of curiosities' and public museums and herbaria. The first natural history museum established in Africa south of the Sahara was the South African Museum in Cape Town in 1825. By the late nineteenth century South Africa had five natural history

museums – more than all other countries of Africa combined. This interest in natural history, and in hunting, mobilised the creation of the first protected areas and national parks in South Africa from the late nineteenth and through the twentieth century, continuing to this day.

By the mid-twentieth century, South Africa had a strong conservation culture, driven both by passion and by politics. But it lacked a shared vision and a focused direction. A new conservation agenda arose immediately following the Second World War, in the late 1940s and 1950s. The establishment of the International Union for the Conservation of Nature and Natural Resources (IUCN) in 1948 provided stimulus to like-minded people around the globe. In South Africa, provincial parks boards and nature conservation departments were created during this period. In the early years, conservation on-the-ground was focused mainly on protected areas, managed by para-military 'rangers on horseback' (Steele 1968; Huntley 1978). Ecologists and conservation scientists had little influence on protected area management. In her comprehensive history of conservation in South Africa, Carruthers (2017) characterised the pioneer years (1900–1960) as the era of 'protecting, preserving and propagating'.

Science entered the conservation endeavour with the development of an identifiable programme of ecological studies through the 1960s and '70s. Research programmes in national parks focused on 'measuring, monitoring and manipulating' – activities conducted somewhat in isolation from the broader academic and research communities of the country (Carruthers 2017). Significant changes came in the 1980s, when biodiversity science began to assert its role in the conservation of South Africa's biota (Huntley 1989), with academic and government institutions offering both training and careers in the profession. Conservation research had emerged from relative obscurity to prominence in the increasingly visible and respected arena of the environmental sciences and within the context of the challenges of rapid socio-economic development (Huntley et al. 1989). Before examining specific models of successful project implementation, it is instructive to understand the origins of South Africa's conservation science tradition.

7.3 The Emergence of Cooperative Approaches to Conservation Science

The first broad-based syntheses of South African conservation science were those of Davis (1964) and Werger (1978). These works provided benchmarks on the state of the art before the term 'biodiversity' had entered common usage. This was a time of major changes in approaches to biological research, strongly influenced by the International Biological Programme (IBP). Launched by the International Council of Scientific Unions (ICSU) in 1964, the IBP lasted for ten years (Worthington 1975). South Africa was a minor player in the IBP, but the excitement created by the introduction of 'big science' thinking, funding and action in biome projects in

Australia, Britain, Canada, Germany and the USA triggered a series of national initiatives that played a significant role in laying the foundation of modern conservation science in South Africa (Huntley 1977, 1987; Carruthers 2017).

Carruthers (2017) describes the evolution of the country's involvement in international environmental science, driven by the CSIR's Cooperative Scientific Programmes (CSP) from 1975 to 1990, more specifically by the work of the CSP's Ecosystems Programmes group. At the time, the IBP was given continuity by the Scientific Committee on Problems of the Environment (SCOPE), and through the activities of IUCN commissions and of the International Union of Biological Sciences (IUBS). South African researchers played an increasingly important role in these programmes, laying the foundations for much of the country's current leadership positions in conservation science and action. The institutional history of this process has long been forgotten, but the principles developed through the CSP remain the cornerstones of success and merit consideration.

Established by ICSU in 1969, SCOPE focused on globally important environmental problems that 'lend themselves to solution through collaborative multidisciplinary research'. The philosophy can be traced through two closely linked streams in the development of conservation science in South Africa. The first embraced a holistic approach to developing a predictive understanding of the structure and functioning of South African ecosystems. Following the 'big science' model of the biome projects, and led by Brian Walker (then at the University of the Witwatersrand), the savanna ecosystem project at Nylsvley in the bushveld of Limpopo Province studied the flows of energy, water and nutrients through a savanna woodland (Walker et al. 1978; Scholes and Walker 1993). More importantly, the Nylsvley project provided a learning exercise in the management of large projects. This early experience guided the conceptualisation of other projects in fynbos, karoo, grassland and forest biomes. The pursuit of ambitious whole ecosystem computer-driven models soon fell away, and a much broader approach was followed to study and understand the nature, distribution, evolutionary history and dynamics of fynbos and karoo systems. These whole biome studies eventually led to a series of synthesis volumes (Cowling 1992; Cowling et al. 1997; Dean and Milton 1999).

The second stream in conservation science in South Africa was initially stimulated by the IBP but brought to focus by the various SCOPE initiatives. The programme examined specific ecological processes that cut across biomes – threats to species and ecosystems, the ecological impacts of fire, of invasive species, and of land transformation. The first project responded to the need for Red Data Books (RDBs) on the levels of threat being felt by plant and animal species. This caught the attention and support of taxonomists, conservation agencies, amateur naturalists and the national and provincial environmental authorities. The voluntary effort of academics led the way. Between 1976 and 1980, Ecosystem Programmes published the first series of RDBs for southern Africa, covering birds (Siegfried et al. 1976), mammals (Meester 1976), freshwater fishes (Skelton 1977), reptiles and amphibians (McLaghlan 1978), and flowering plants (Hall et al. 1980). All these early RDBs were published in the *South African National Scientific Programmes Reports* – a

series initiated by the CSP to ensure rapid publication and free dissemination of the results of the projects it was coordinating. In the following decades, these pioneer volumes were succeeded by multiple revisions and far more detailed accounts covering a wider range of taxa.

The funding and coordinating activities of Ecosystem Programmes coincided with the emergence of conservation biology as a 'self-conscious science' in the 1980s (Soulé 1985). The thinking of scientists such as Michael Soulé, Jared Diamond, Paul Ehrlich, Peter Raven and others provided a fertile platform for debate and progress in the South African research community, most especially in progressing from studies in ecosystem structure to ecosystem function and dynamics. To accelerate the process, a series of international workshops was convened by Ecosystem Programmes. The format comprised an open symposium addressed by international and regional leaders on a chosen research question, followed by a field trip to South African case studies, and concluded with a three-day writing retreat. The first workshop addressed the determinants of the structure and dynamics of savanna ecosystems (Huntley and Walker 1982), followed by similar workshops on the conservation of threatened habitats (Siegfried and Davies 1982; Hall 1984), on nutrients in Mediterranean-climate ecosystems (Kruger et al. 1983), management of large mammals (Owen-Smith 1983; Ferrar 1983), on the ecological effects of fire (Booysen and Tainton 1984), the biology of invasive species (Macdonald et al. 1987), and on long-term data series (Macdonald and Crawford 1988; Macdonald et al. 1988) (Fig. 7.1). During the period 1975–1990, over 500 participants from 13 universities, five provincial departments, seven statutory institutes, seven museums and three NGOs were involved in the identification, study and implementation of results arising from projects coordinated by the CSP.

By the end of the CSIR-hosted and CSP-coordinated Ecosystem Programmes in 1990, a culture of multi-institutional cooperation in complex environmental research had been laid (Huntley 1987, 1989). These field research and synthesis processes consolidated knowledge and identified questions for further study, but more importantly, built a strong national and international science network that mobilised

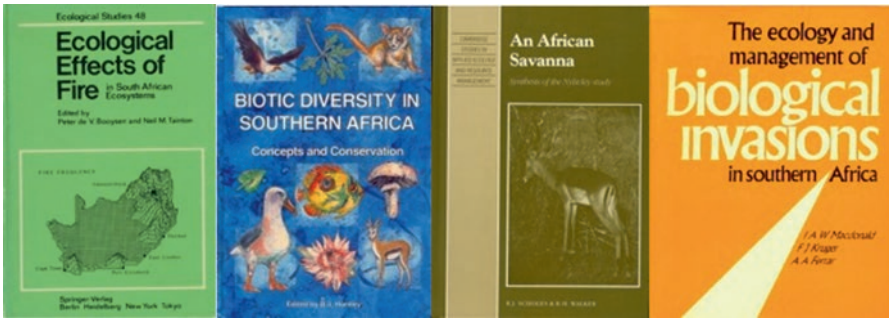

Fig. 7.1 Covers of some of the many synthesis volumes produced by the Cooperative Scientific Programmes during the 1980s

careers, introduced new thinking, and internationalised the results of South African and regional scientists (Carruthers 2017). It was the era of Wilson's 'synthesisers'.

7.4 Lessons Learned from the Cooperative Scientific Programmes

Three drivers stimulated the establishment of the CSP. First was the wave of international concern regarding the negative impacts of various environmental processes that had led to the launch of the IBP and SCOPE. The world, in the view of the scientific community, was faced by the crises of air pollution and acid rain, toxic and persistent chemicals, deforestation of tropical forests, the rise in carbon dioxide concentrations in the atmosphere and of the 'greenhouse gas effect', loss of species and habitats, and other emerging global problems. Second was the recognition, by the then President of the CSIR, Chris van der Merwe Brink (1978) of these trends and their probable deleterious impact on South Africa's growing economy. Third, the belief by the local science community that such environmental problems could not be solved simply by importing approaches and technologies from northern 'developed' countries. The IBP and SCOPE had provided a radically different philosophy to that prevailing in South Africa before the 1970s. The strongly hierarchical tradition of ivory-tower scientists working in silos, isolated from the end-users of research results, needed change.

The operational structure of the CSP evolved from a top-heavy committee system to a fairly informal network of working groups in specialist fields, gradually developing an 'invisible college' of like-minded collaborators. Workshops drew together generators of ideas and synthesisers of results, with steering committees facilitating decisions and allocating resources and ensuring open communication between participating stakeholders and the orderly progression towards agreed central goals. Projects had to meet four criteria:

- A multi- or inter-disciplinary approach;
- The cooperative endeavor of researchers from several organisations;
- New research approaches developing new skills, rather than following conventional prescriptions; and
- The commitment and active participation by decision-makers and end-users.

Towards the conclusion of the CSP, an informal evaluation of the activities of Ecosystem Programmes provided insights on the success factors, and failures, of the approach (Huntley 1987). Key factors and criteria for success included:

- The clear definition of the research objectives and the early development of conceptual models and testable hypotheses relating to their execution – developing what are now termed 'theories of change';

- Bringing together leading thinkers in ecology and environmental sciences through participation in international projects and national workshops – IUCN, SCOPE, IUBS, etc.;
- Bringing researchers together with the real-world end-users – the ultimate implementers of results – within an 'invisible college';
- Ensuring a good mix of idea-generators and idea-needers;
- Securing a critical mass of leaders and resources – but retaining an opportunistic approach to involve young 'rising stars';
- Developing trust and openness in neutral fora, and abandoning traditional academic and professional hierarchies;
- Adapting to flexible timetables and avoiding the 'tyranny of logframes' and permitting rapid responses to new challenges and opportunities;
- Avoiding data-rich, understanding-poor approaches to information gathering; and
- Facilitating the informal transfer of ideas, information, experience and learning, which often proved more effective than structured interactions.

The CSP approach was not universally accepted. A strong body of 'blue sky' academics was opposed to structured and coordinated projects, while some government institutions feared an overlap with their responsibilities by the applied nature of the CSP research focus. Without the vision and tenacity of some leaders within the network, the whole endeavour might have been disbanded during its formative years.

7.5 The Post-1990 Years – The Democracy Dividend

The major sea-change in South African conservation science and action came in 1990, coincident with, and strongly influenced by, the nation's transition to democracy. This period – continuing to the present – is what Carruthers (2017) characterised as the era of 'integration, innovation and internationalisation'. One must recall that the release of Nelson Mandela from prison in February 1990 triggered the most fundamental change in African politics since the independence events of the 1960s. While the 1960s had profound importance for those colonies granted independence at that time, the 'winds of change' (Macmillan 1960) did not reach South Africa for another 30 years. With democracy came the opportunity for South African conservationists to participate in the wave of new global policies and practices, such as those of the Convention on Biological Diversity and the Global Environment Fund.

The dramatic political changes in South Africa progressed coincident to institutional changes at national level. At the moment when the CSIR Cooperative Scientific Programmes came to an end in 1989/1990, the National Botanical Institute was established through the amalgamation of the National Botanic Gardens of South Africa and the Botanical Research Institute to form the National Botanical Institute (NBI). The NBI initiated several new programmes in response to the global priorities identified by the United Nations Conference on Environment and Development (1992) – in biodiversity, climate change and land transformation.

More specifically, NBI partnered with Botanic Gardens Conservation International (BGCI) in developing a Global Strategy for Plant Conservation, which was later accepted and approved by the Convention on Biological Diversity in 2002. In turn, many of the targets of the GSPC morphed within the broader, all-taxa targets of the CBD's Targets for Biodiversity, adopted at Aichi, Japan, in 2010. But once again, institutions had been changing, with the NBI broadening its brief by becoming the South African National Biodiversity Institute in 2004. In terms of its founding legislation – the National Environmental Management: Biodiversity Act (NEMBA 2004) – SANBI was legally required to monitor and report on the conservation status of species and ecosystems. What had been a rather informal arrangement – coordinated by CSP to produce and publish Red Data Books – became a SANBI responsibility vested in law.

Across this period of institutional change, new activities emerged to meet the demands of broader strategies. What had become clear during the heady days of the Ecosystem Programmes was the need for finer-scale data on the distribution, abundance and dynamics of the flora, fauna and vegetation of the country. The first-generation Red Data Books of the 1970s and '80s had identified large gaps in the knowledge base. The early assessments of invasive species, and the exploratory uses of systematic conservation planning indicated the need for a finer definition and mapping of vegetation, especially of those habitats that were poorly represented in or absent from the existing protected area system of South Africa. NBI, and its successor, SANBI, took their responsibilities seriously (Cherry 2005). Following the CSP tradition of collaboration among multiple institutions and across disciplines, NBI/SANBI embarked on several key information-gathering and synthesis projects. Three main thrusts brought focus to its activities.

First, as a consequence of its century-long role in plant taxonomy and herbaria, and the regional stimulus to floristic survey, inventory and electronic data-basing resulting from the SABONET project, NBI/SANBI produced updated checklists of the national, regional and continental floras (Germishuizen et al. 2006; Germishuizen and Meyer 2003; Klopper et al. 2006).

Second, it was recognised that the classic *Veld Types of South Africa* that John Acocks had single-handedly prepared based on decades of field work across the country (Acocks 1953), was at too broad a scale to serve as the base for advanced conservation planning. In 1990, NBI, with 94 contributors, initiated a 16-year project to classify, describe and map at a detailed scale, the 428 vegetation types occurring in South Africa, Lesotho and Eswatini (Mucina and Rutherford 2006).

Third, from 1990 and following IUCN guidelines, NBI/SANBI brought together the contributions of 169 botanists, both professional and amateur, to produce assessments for South Africa's 20,456 plant species indigenous to the country (Raimondo et al. 2009) – as outlined later in this chapter.

Simultaneous to these three activities, an ambitious project to gather bird distribution data from six southern African countries was launched in 1987 by what later became the Avian Demography Unit at University of Cape Town. As described below, the largely volunteer contributions of over 5000 'citizen scientists' generated a database of over seven million bird distribution records by the time of the

conclusion of the first phase of the project and the publication of *The Atlas of Southern African Birds* (Harrison et al. 1997).

These were monumental efforts, involving hundreds, indeed thousands, of collaborators. The electronically accessible, geo-referenced data sets underpin floristic, avian and vegetation maps and descriptions as well as associated RDBs for selected taxa of terrestrial, freshwater and marine ecosystems. They provide the basis for the successive National Biodiversity Assessments that guide modern environmental management in South Africa (Skowno et al. 2019). Here I describe the profiles of three citizen science projects.

7.6 The Southern African Bird Atlas Project: The Evolution of Citizen Science in Southern Africa

In early 1987, when large multi-institutional projects such as the Fynbos Biome and Savanna Ecosystem projects were at peak activity, supported by generous funding from government sources, a very different biodiversity research model was being launched within the Department of Statistical Sciences at the University of Cape Town. A small team of enthusiasts embarked on an audacious mission to document the current distribution and seasonal movements of the 932 species of birds occurring in six southern African states – Botswana, Eswatini, Lesotho, Namibia, South Africa and Zimbabwe. Ten years and seven million records of bird sightings later, the project concluded – in what was and remains one of the largest completed projects of its kind, anywhere (Harrison et al. 2008). Despite its modest beginnings and budget, the Southern African Bird Atlas Project (SABAP) rapidly captured the imagination and passion of more than 5000 ‘citizen scientists’ across the region. Each volunteer recorded sightings of birds seen around their homes or on informal travels. The efforts of citizen scientists were supplemented by professionally-led expeditions to outlying regions that would otherwise not have been adequately covered.

The success of the project can be attributed to its simple but efficient and cost-effective three-tier operational model (Harrison 1992). At the base were the volunteer observers, mostly amateurs drawn from the general public, each submitting bird lists to a network of regional committees. These honorary regional committees, comprising well informed ‘birders’, vetted submissions for obvious errors, and forwarded the processed field cards to the project coordinator, James Harrison, based at what became the Avian Demography Unit at the University of Cape Town (UCT). Behind this structure was the power of the statistical skills and computer hardware of the Department of Statistical Sciences at UCT, led by the project’s conceptualiser, Leslie Underhill. A key strength was the protocol developed by statisticians which while simple for amateurs was designed to infer useful information such as the absence of certain birds and recording rates. Technical sophistication was matched by simplicity of application.

The network, in an era preceding modern social media, was kept informed on progress and priorities through a regular hardcopy *SABAP Newsletter*. The database consolidated records with a temporal and spatial resolution of monthly reports and quarter-degree grid cells. This was and remains SABAP's simple yet elegant formula for success.

Given the dimensions of the database, it took a team of seven editors and 62 authors four years to compile the two-volume, 1500-page product of the project – *The Atlas of Southern African Birds* (Harrison et al. 1997).

Since publication and the electronic availability of datasets on which it is based, have become watershed resources for southern African ornithology. They provide fine-scale information on the general ecology, direction and timing of migration, and the seasonality of breeding of the region's avifauna. The book provides an unmatched reference and baseline for monitoring, biogeography and conservation, and a stimulus to further research. The direct academic results include more than a dozen theses based on the project data. The impact on the competence, interest and confidence of amateur bird enthusiasts has been significant, as Harrison et al. (2008) note:

> *Not only did the simple yet scientific methods of SABAP give many birders a first introduction to how science works, but the scientific output from the project showed how small contributions could be amalgamated into a meaningful and impressive whole. This new perception of their role as citizen scientists helped many birders make the transition from the relatively straightforward activity of atlasing to the more challenging requirements of bird monitoring projects.*

Although initially conceived by South African researchers and citizen scientists, SABAP has served as a model and driver for similar projects in several southern African countries, and in other taxa such as the Protea Atlas, Frog Atlas, Reptile Conservation Assessment, South African National Survey of Arachnida, and the Southern African Butterfly Assessment.

The first SABAP (now referred to as SABAP1) has been succeeded by SABAP2 which started in 2007. SABAP2 is even more ambitious than its predecessor (Fig. 7.2). It aims to move from a 'snapshot' of bird distribution to a 'movie' of ever changing distributions, without a fixed closing date. SABAP2 has proven a valuable tool for picking up range shifts that can be linked to climate change, and to tracking invasive species dynamics. As Harrison et al. (2008) conclude: "Collectively, the atlas projects represent a new era in biodiversity field research in the region." SABAP2, now in its twelfth year of operation, has expanded into the umbrella African Bird Atlas Project, using the SABAP model across Africa (Lee et al. 2022). Key to the success of both SABAP1 and SABAP2 has been the collaboration of three distinct institutions and organisations: SANBI (governmental), BirdLife South Africa (NGO) and UCT (academic). This network overcame the challenges faced by so many conservation research and monitoring projects in Africa (human capacity, financial and technical resources, and implementing conservation recommendations). It is a model of an African solution to African problems.

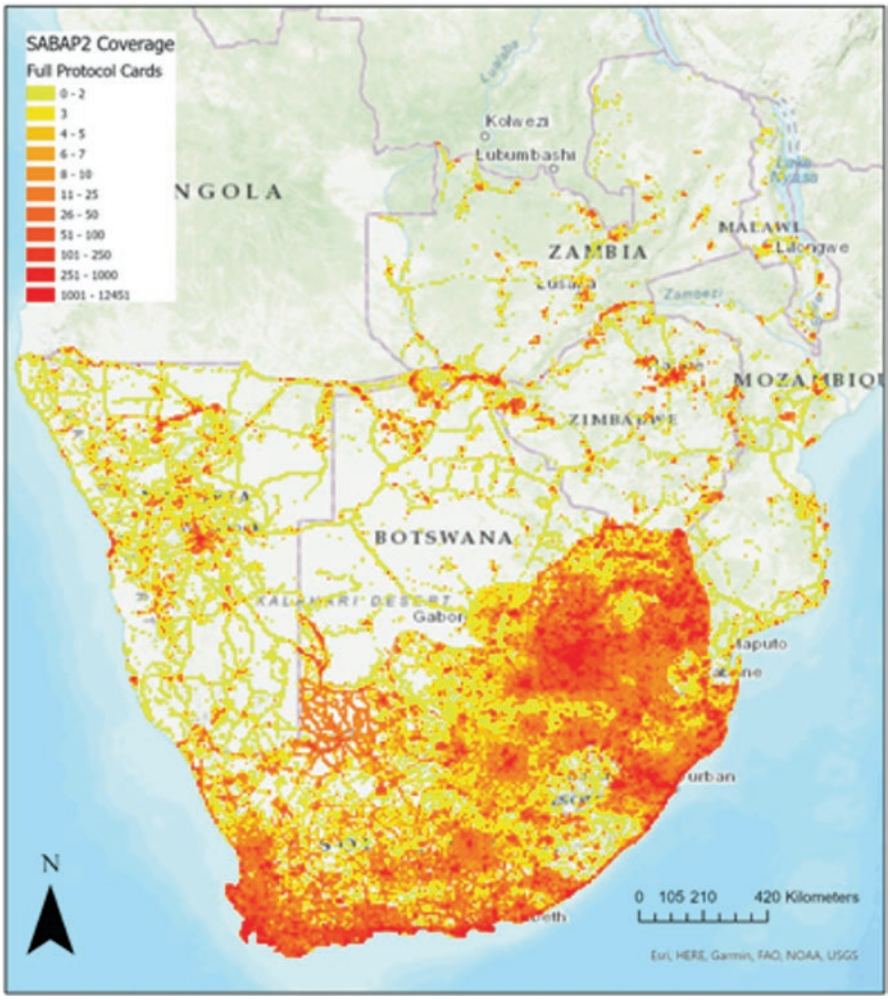

Fig. 7.2 Coverage of the Full Protocol Cards submitted by citizen scientists participating in SABAB2 during the period 2007–2022. The expanded coverage of data collection across Southern Africa during SABAB2 is impressive. (Graphic prepared by Ernst Retief)

All these atlasing projects gradually integrated into the wider network and developing role of the NBI as it transformed into SANBI, contributed to the essential and vast evidence base for national biodiversity assessments, spatial development planning and the detection of responses of species and ecosystems to environmental change (Driver et al. 2005).

7.7 Threatened Plants: A Model for the Red Listing of Endangered Species

The early history of interest in and study of the South African flora has been outlined in the introduction to this chapter and detailed in many books and papers (Hutchinson 1946; Gunn and Codd 1981; Victor et al. 2016). A long tradition of indefatigable collectors filled our herbaria with fascinating material. By the 1970s South African herbaria held over two million specimens. But this treasure trove of information was almost wholly inaccessible to potential users. At the time, Bernard de Winter, the then Director of the Botanical Research Institute (a predecessor of the NBI/SANBI), saw the need for electronic access to the vast information held in the collections. De Winter had represented South Africa on IBP committees, and was no doubt inspired by the breadth and innovation of the IBP vision. Recognition must be given to him for introducing many new approaches to plant taxonomy in South Africa (Victor et al. 2016), and for initiating what was at the time a revolutionary project to create a computerised information system for the holdings of the National Herbarium in Pretoria. This was the Pretoria (PRE) Computerised Information System (PRECIS), the first of its kind in the world. In its early years, PRECIS used punch cards for data entry and enormously large and painfully slow IBM computer housed in the Department of Agriculture's Head Office for processing. In the decades since PRECIS was established, the use of electronic data, including images of all type specimens of the flora of Africa, has become standard practice. It was the availability of computerised information on a national scale that made the second generation of Red Lists for South African taxa an achievable objective. Here I focus on just one, the Red List of South African Plants (Raimondo et al. 2009) (Fig. 7.3), which provides lessons for sharing across southern Africa.

In their succinct synthesis of the critical success factors that resulted in the assessment of South Africa's megaflora of 20,456 species being completed within just five years (2004–2008), Raimondo et al. (2013) concluded with seven key messages to help guide other large assessment processes:

- *Establish a Red List team to coordinate and conduct assessments.* The inputs of 169 professional and amateur botanists were coordinated by a dedicated full-time Red List team comprising a project manager, three ecologists and two support staff. The team ensured standardised application of the IUCN Red List categories and criteria. It provided continuity, cost-effective training, and the incorporation of the field knowledge of ecologists, of wide taxonomic expertise, and of strong computer literacy.
- *Streamline the assessment of high numbers of species via automation*. The availability of electronically accessible herbarium specimen data (backed by PRECIS and the results of SABONET) allowed rapid and automated assessment of 20,456 species in five years, assigning 9387 widespread taxa into the IUCN category of Least Concern (LC). Electronic specimen data prioritised 6000 taxa of restricted distributions that had never before been assessed. These species were targeted for

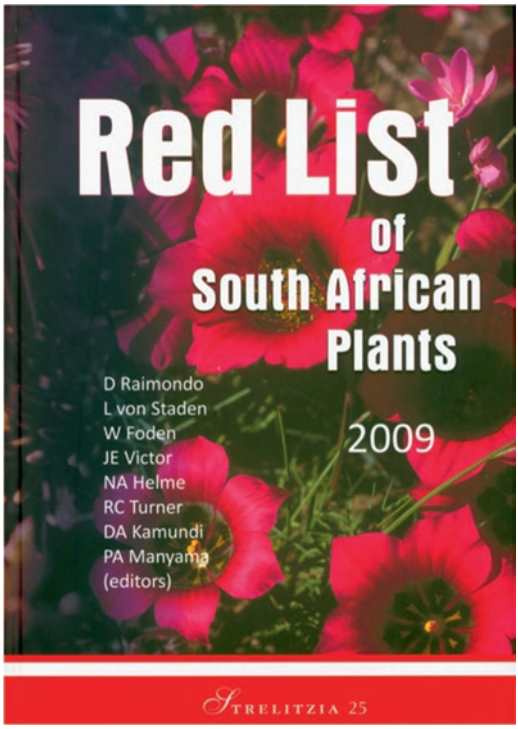

Fig. 7.3 The Red List of South African Plants synthesised expert assessments of the country's 20,456 indigenous species within five years. (Raimondo et al. 2009)

further investigation. Electronic specimen data served as a first step in threat assessment to identify those species that were clearly widespread, abundant, and unlikely to be in danger of extinction.

- *Develop a data management system that serves local conservation needs.* The project had the benefit of South Africa's PRECIS database which saved significant time. The data management system developed was more simplified than the complex and generalised IUCN Species Information System. It targeted local needs and linked directly to key information from PRECIS, in particular to spatially geo-referenced data for sub-populations of threatened species. This facility proved to be the single most useful dataset generated as part of the assessment process, and allowed intersection with other spatial information – such as vegetation maps, protected areas, topographic or climatic data, etc.
- *Invest in using the IUCN system*. In order to meet robust and testable criteria and standards for the conservation status of species and ecosystems, SANBI adopted the IUCN Red List Categories and Criteria Version 3.1 (IUCN 2001). The IUCN categories and criteria provide a quantitative, objective system that can be consistently applied across a range of taxonomic groups worldwide. According to Raimondo et al. (2013): "The value of the data obtained as part of the threat assessment process for strategic, informed conservation decision-making outweighed the effort in capturing it."

- *Focus on relevant information.* Quantitative assessments can be done with very little data. Most assessments were desktop assessments with only three basic information resources: taxonomic literature, electronic herbarium specimen data, and spatial land cover data. Threatened plant species tended to be concentrated in specific areas where high levels of endemism coincide with high levels of threat, especially the impacts of land use.
- *Save Costs*. The Red List project cost US$593291 for 20,456 taxa, or $29 per taxon. This compared well with other similar projects. Costs were contained by investing in a small team of assessors over the full period. Consultation with experts was pivotal to success, through a combination of workshops and interviews with individual specialists – the latter being more efficient than the former.
- *Achieve comprehensive assessments to ensure conservation attention for a greater proportion of the flora.* Previous RDB studies (Hall et al. 1980, Hilton-Taylor 1996; Golding 2002) had covered less than 20% of South Africa's flora. By covering all 20,456 taxa, the study added 2045 taxa to the Red List, of which 942 were threatened with extinction. The comprehensive survey also identified knowledge gaps in both conservation needs and taxonomic research (Von Staden et al. 2013).

South Africa's Plants Red List process was not a once-off project. Continuity is provided by a small dedicated team of plant ecologists which updates the status of South Africa's species on an annual basis. This same team ensures that priority threatened species are included in a variety of conservation interventions ranging from identifying and raising funds for the plants that need recovery and reintroduction to developing and implementing projects to identify key sites for the protection of high concentrations of threatened plants. Fine-scale spatial data on the distribution of plants of conservation concern, collected as part of the assessment process, are continuously fed into spatial biodiversity planning, land-use decision making and protected area expansion strategies. The Red List has been the foundation on which many elements of South Africa's plant conservation strategy have developed.

The South African Plants Red List experience is currently being shared not only across southern Africa, but also in the megafloras of Columbia and Brazil. What started as one taxonomist's passion for the rare wildflowers of the Cape fynbos (Hall et al. 1980), has now evolved into a global model.

7.8 CREW: Custodians of Rare and Endangered Wildflowers

In conservation, success breeds success. Building on the experience of the Southern African Birds Atlas project, a second large citizen science project was launched in 2003 – the Custodians of Rare and Endangered Wildflowers (CREW) project. While SABAP surveyed the distribution and seasonality of 928 species of birds, CREW has in its portfolio no less than 4809 species of plants (23.5% of the national flora)

considered in the Red List of South African Plants (Raimondo et al. 2009) to be under threat. CREW tackles the challenges of assessing the status of rare and threatened plants directly, in the field, through the support of volunteer citizen scientists. It is an initiative of the Botanical Society of South Africa, affectionately known as the BotSoc. Established in 1913, simultaneous to the founding of the National Botanic Gardens of South Africa, the BotSoc has served effectively as a public support organisation for Kirstenbosch and other National Botanical Gardens for more than a century (Huntley 2012). The BotSoc is the oldest plant conservation NGO in Africa.

The CREW model differs from other citizen science projects in that it is spatially targeted, with nodes of citizens established and focused on threatened ecosystems spread across South Africa. This approach of embedding capacity across South Africa's landscapes has been incredibly valuable allowing the development of local experts on the country's unique plants and ensuring there are eyes and ears close to the ground to respond to development pressures.

In the *CREW Newsletter* of April 2019, project founder Domitilla Raimondo (2019) reported that since 2003 CREW citizen scientists have collected accurate, reliable and recent plant species data, amounting to a total of 100,570 field records for 8973 plant species (44% of the national flora). The data set included 2120 threatened and rare plants across South Africa and from a highly diverse array of families and genera. As important as the collection of data, is the collection of herbarium specimens in order to confirm identifications. The field data collected by volunteers has been used to either confirm a plant species' Red List status or to correct erroneous classifications of previously poorly known species. CREW has added 19,437 specimens to SANBI's herbaria, material that has allowed taxonomists to describe 30 plant species new to science (Figs. 7.4, 7.5, 7.6, and 7.7). The CREW teams have also participated in SANBI's ongoing collaboration with the Millennium Seed Bank (MSB) of the Royal Botanic Gardens, Kew, contributing 25% of the species of South African plants banked by the MSB since 2005.

Fig. 7.4 CREW Volunteers search for rare, threatened and poorly documented species in the highland grasslands of Mpumalanga. (Photo: Mervyn Lotter)

Fig. 7.5 New, rare and threatened plant species re-discovered by CREW field workers: *Oxalis* sp. nov. (Photo: Brian du Preez)

In common with the SABAP projects, CREW provides data essential to formal Environmental Impact Assessments, and specifically to the new and mandatory Environmental Screening Tool being developed by SANBI and the Department of Environmental Affairs. Raimondo (2019) noted that this integration of citizen science data into government land-use planning and decision making is globally novel.

Although the use of volunteer and amateur botanists in threatened plant surveys was conceived within the floristically megadiverse Cape Floristic Region, where the vast richness of rare and often narrowly endemic species challenges the time and energy of the small core of professional workers, CREW rapidly expanded its activities across South Africa, with 'nodes' of volunteers in every biome and major vegetation type of the country. Although closely linked to the activities of central government agencies, CREW teams now work with provincial, metropolitan and non-governmental organisations, and in particular with the Biodiversity Stewardship programmes, identifying key sites to be brought under protection. CREW volunteers are true custodians: they alert relevant government officials to any threats impacting endemic rare and threatened plants such as the spread of invasive alien species within nature reserves, or the possibility of inappropriate development on fragments of threatened vegetation where threatened plants are concentrated.

Fig. 7.6 New, rare and threatened plant species re-discovered by CREW field workers: *Lobostemum belliformis.* (Photo: Dave Underwood)

The impact of CREW is best summed up by an independent review (Stewart 2019) of the project:

> *By leveraging the goodwill, expertise, time and financial resources of volunteer citizen scientists, SANBI and the Botanical Society have been able to acquire vastly more data and contribute far more widely to conservation initiatives than if the programme had been implemented only by employed staff. In light of the vast geographical extent of the country, the immense diversity of South Africa's flora, and the depth of skills and experience needed to accurately identify species, which take an extensive period of time to acquire, the programme has to date delivered a very high return on investment.*

Fig. 7.7 New, rare and threatened plant species re-discovered by CREW field workers: *Erica pilulifera.* (Photo: Cliff Dorse)

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Chapter 8
Bridging the Gap: Community Conservancies in Namibia and Zimbabwe

We need to see process as an end as well as a means, and to accept that the core objective of Community Based Natural Resource Management (CBNRM) is increased communal capacity for adaptive and dynamic governance in the arena of natural resource use. It is about local capacities to handle change and to negotiate the human impact on nature from past to future. It is as much about resourcefulness as it is about resources … The core objective of CBNRM is increased communal capacity for adaptive and dynamic governance in the arena of natural resource use.

Marshall Murphree, quoted by Rowan Martin (2009)

8.1 Introduction: The Parallel Development of Community Based Natural Resource Management in Southern Africa

This is the story of two remarkable initiatives rooted in a common concern – how to ensure sustainable benefits to rural communities while conserving the natural resources of remote arid ecosystems in southern Africa. It is a story of 'rare combinations of people and circumstances' (Child 2019).

These parallel narratives have as their actors a handful of people of great passion, fortitude and unwavering commitment to overcoming challenges. To the west of southern Africa, in the Kaokoveld of Namibia, Garth Owen-Smith was driven by a socio-ecological perspective – a romantic vision of an arid Eden occupied by Herero and Himba pastoralists living in peace with elephants, rhinos, oryx, springbok, cattle and goats, sharing dramatic desert landscapes. Owen-Smith's point of departure was empathy with rural subsistence pastoralists living without legal title to land nor access to the values of the wildlife among which they lived (Owen-Smith 1971, 2010).

To the east, in the Zambezi valley of Zimbabwe, Rowan Martin, Russell Taylor and Brian Child, using economic and ecological principles, sought the transformation of the degraded rural rangelands surrounding national parks into profit centres

B. J. Huntley, *Strategic Opportunism: What Works in Africa*, SpringerBriefs in Environmental Science, https://doi.org/10.1007/978-3-031-24880-1_8

based on a sustainable-use model financed primarily through trophy hunting (Martin 1986; Child 1988; Taylor 2001). Their initial worldview was that of managers of protected areas – threatened islands of biodiversity in a sea of rapidly degrading landscapes.

Across southern Africa, these young visionaries of the 1980s were seeking the ultimate nirvana of sustainable, well-governed community-based natural resource management (CBNRM) systems. Observing the failure of prevailing 'command and control' or 'fortress' approaches to conservation, they sought new paradigms. Their transformational agendas required over two decades of commitment, building on the firm tradition of wildlife conservation in the region.

During the 1950s and '60s, southern Africa had established a world-class body of conservation professionals. Pioneers such as Jack Vincent, Ian Player and Tol Pienaar in South Africa, Reay Smithers and Roelf Attwell in Zimbabwe, and Bernabie de la Bat in Namibia had built globally respected national park organisations. They were followed by a younger generation influenced by the writings of Aldo Leopold on wildlife management, and by visitors such as Ray Dasmann, Archie Mossman and Thane Riney on the sustainable use of wild ungulates (Leopold 1933; Dasmann and Mossman 1961; Riney 1964; Mossman and Mossman 1976). In the 1970s, Graham Child sowed the seeds of community engagement in Zimbabwe, Ken Tinley had championed 'peripheral development' to involve the communities living in and adjacent to parks in Botswana, Namibia and Mozambique, and John Hanks promoted the importance of extending conservation benefits to people surrounding the protected areas of Zambia. But it was in the Kaokoveld and the Zambezi valley that the real crucibles of new paradigms were gaining heat. It is on these regions that this narrative will focus.

8.2 Passion, Vision and Strategy – Taking the Long View in Namibia

In August 1967, 23-year-old Garth Owen-Smith (Fig. 8.1) made his first brief visit to the Kaokoveld of north-west Namibia (then the mandated territory of South West Africa). Having dropped out of university in early 1962, he had worked as a forester in KwaZulu-Natal for several years before taking a shaft-setter job in a copper mine at Tsumeb, Namibia – a far cry from the life of a game ranger envisioned in his youth. A chance visit to the basalt hills, gravel plains and sandy grasslands of the arid Kaokoveld was to change his life. Abandoning his brief mining digression, and to clear his mind, he bought a bicycle and headed off across the Kalahari – through central Namibia, across Botswana and into and across Zimbabwe – and then back through South Africa to KwaZulu-Natal.

On reaching home, Owen-Smith promptly applied for a posting in the Department of Bantu Administration and Development – the Apartheid-era organisation responsible for the Black 'Homelands' of South Africa and Namibia. Somewhat miraculously, through good luck and good timing, he was offered a position as an

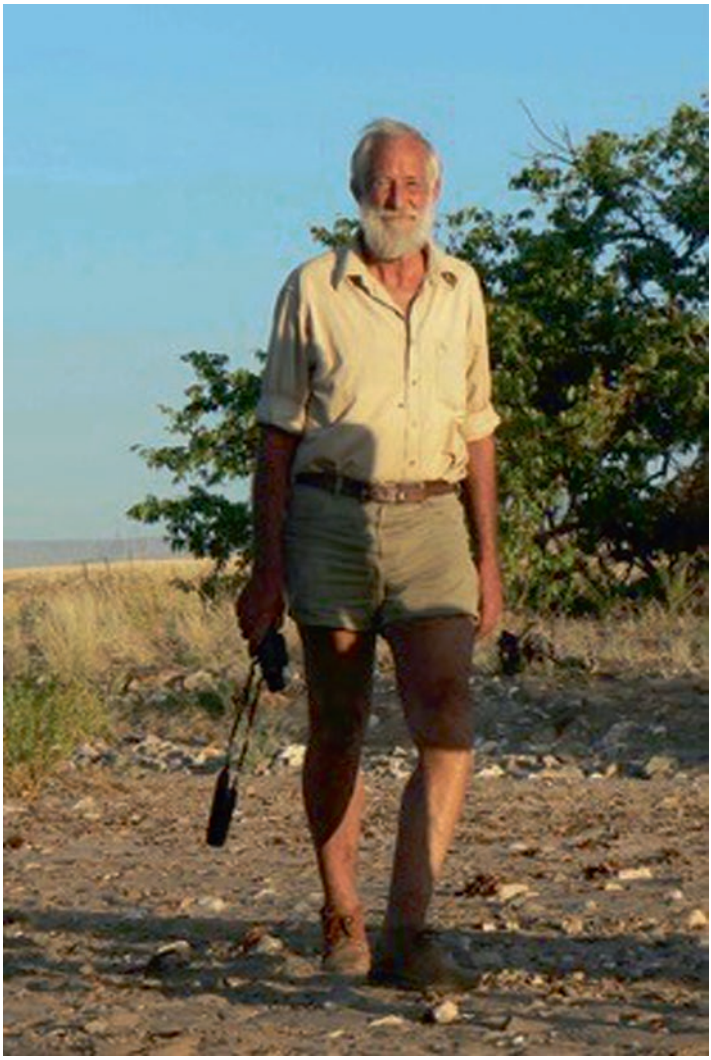

Fig. 8.1 Garth Owen-Smith – a visionary in community-based natural resource management. (Photo: John Mendelsohn)

agricultural officer in Opuwo in August 1968. This placed him back in the heart of the Kaokoveld, which stretches from Namibia northwards across the Cunene River into Angola (Figs. 8.2 and 8.3). He spent the next three years studying the region's landscapes, geology, vegetation, animals, and most importantly, getting to know the local tribal people, their culture, lifestyles, grievances and expectations. His genuine empathy with the Himba and Herero pastoralists soon placed him at loggerheads with the deeply conservative administrators of the Apartheid institution into which he had, opportunistically, placed himself.

Fig. 8.2 The intermontane plains of Iona National Park, Angola, stretches across the Cunene River as the Marienfluss of the Namibian Kaokoveld

Fig. 8.3 The Cunene River cuts deep gorges through the mountains that straddle the border between Namibia and Angola. Garth Owen-Smith and two companions walked down the final 100 km stretch of the Cunene River, through the Kaokoveld as seen in this aerial view

In the 1960s, the wildlife populations of the Kaokoveld were healthy – Garth estimated 5000 Burchell's and 1200 Hartmann's zebra, together with thousands of springbok and oryx and hundreds of kudu and elephant. The Himba and Herero cattle herds numbered over 120,000 head. He was soon the best-informed authority

on the general ecology and peoples of the region, which due to its isolation and the prohibition of entry to all but government-approved visitors, had long remained a *terra-incognita*.

In 1970 the South African government implemented a major programme of social engineering in Namibia. The Odendaal Commission de-proclaimed the western section of Etosha Game Reserve to create the Apartheid homelands of Damaraland and Kaokoland. These vast territories soon became a hunter's paradise for resident government officials and visiting VIPs. Quick to offer outspoken criticism of the government's Apartheid policies and the absence of control of poaching practices, Garth was transferred out of Kaokoveld in 1971. He landed back in KwaZulu-Natal and decided to return to university. He endured three months of what he described as 'Stone Age Biology', and was soon once more an unemployed dropout. But once again good luck and good timing came his way. He was encouraged by friends to write up his Kaokoveld work and present it at the annual congress of the South African Association for the Advancement of Science. The audience included Nolly Zaloumis, soon to become president of the Wildlife Society of South Africa, and a key player in Garth's future. Nolly introduced Garth to Neil Alcock, a revolutionary thinker testing pasture restoration by rotational grazing in one of the most degraded tribal lands of the Tugela Valley. Neil's wife, Creina Bond, dynamic editor of *African Wildlife*, arranged for the publication of Garth's report.

The Kaokoveld: An Ecological Base for Future Development and Planning (Owen-Smith 1971) challenged both the government's controversial Odendaal Report, and the proposals of the leading ecologist in Namibia at the time, Ken Tinley (Tinley 1971). Garth drew 13 conclusions, including:

- 1. Although considerable numbers of elephant, zebra, kudu, impala and springbok still survive on the Kaokoveld plateau, a realistic assessment of the position on these fertile highlands, *dictates that the requirements of the human population must take precedence in any conflict of interest* – even if it means the disappearance of much of the local fauna.
- 5. In the context of South West Africa's rapidly expanding tourist industry, a game reserve in the western Kaokoveld has vast potential as a tourist attraction. In time this potential can be turned into an economic asset to the country as a whole, *but particularly to the people of the neighbouring homelands.*
- 10. Conservation education is essential, and local participation should be encouraged at all levels. *In future a considerable portion of any revenue derived from tourism should be channeled directly to the existing tribal trust funds* and when established, to the homeland treasuries. (My italics).

The report caused some controversy, but presciently foresaw key elements of a future community-based approach to conservation.

Ever restless, Garth then took off for nearly a year wandering across Australia. He was in search of answers to arid zone rangeland management questions, but as described in his fascinating autobiography (Owen-Smith 2010), he failed to learn anything from the unsophisticated cattle ranchers of the outback of the vast country. Soon after his return to South Africa, he was back in Namibia, to assist in an

ethnobotanical study of the Kaokoveld. But his attempts to obtain employment in the then South West Africa administration was blocked by his lack of a security clearance, a consequence of his critiques of government policies. He was able, however, to obtain a post at the Cwaka Agricultural College in Zululand – a college reserved for Black students – where he would teach ecology. Despite having twice dropped out of university, he was a typical autodidact. Through reading widely and through observant field work he soon developed as good a grasp of the fundamentals of ecology as any graduate. As a teacher, he realised the he had to bring ecology "down from its scientific pedestal and make it into a commonsense subject that anyone could understand." He delayed taking up the Cwaka post until after a brief trip to Iona National Park in the Angolan Namib, during July 1974. The objective of the visit was to walk down the final 100 km of the Cunene River as it passed through the deep gorges that separate Namibia and Angola on its way to the Atlantic Ocean at Foz do Cunene (Fig. 8.3). Here he recorded the poaching, in Angola, of elephant by helicopter-borne South African soldiers. His photographic evidence reached me in Luanda within weeks. At the time I was ecologist to the national parks of Angola, and I was able to present the incriminating photos to the South African Consul General in Luanda – triggering quick but probably ineffective disciplinary actions within the military based in the Kaokoveld.

By early 1975, Garth had left Cwaka and had joined the Wildlife Society's African Conservation Education project based in Mtunzini. But this rich experience of working with Zulu school children and teachers did not last long. In late 1976 Garth had moved to Zimbabwe (then Rhodesia) – to the vast Leibig's Ranch in the war-torn eastern Lowveld. Responsible for thousands of head of cattle on the most extensive private ranch in Africa, he learnt much about animal husbandry and commercial farming operations. Key to his experience was his work with innovative range scientist Allan Savory, who was testing his 'Advanced Rotational Grazing' system (Savory 1988) of non-selective, high intensity grazing in arid savanna.

As Rhodesia descended into full-scale civil war, the call of the Kaokoveld proved too strong, and Garth headed back to Windhoek early in 1980. Bernabie de la Bat, Director of Nature Conservation, enticed Garth with the hint of a possible posting in Kaokoveld. But the only vacancy available was in the south, based at Keetmanshoop. Here he learned about commercial small-stock farming on the margins of the Namib desert – about farmers, poachers, legislation and the machinations within government departments. As he notes: "Another decade had drawn to a close … it had been a nomadic experience … in four countries and many different fields … government, NGOs and the private sector. I learned most 'on the job' from three visionary men: Nolly Zaloumis, Neil Alcock and Allan Savory."

From Keetmanshoop Garth proceeded not to the Kaokoveld but to Etosha National Park. Here he did not settle well in the competitive circle of professional egos. In late 1981 he was offered a position in a new NGO – the Namibia Wildlife Trust (NWT). He joined on a two-year contract, funded by the South African Endangered Wildlife Trust, in March 1982. His posting was at Wereldsend (World's End). "The last farm before rainfall became too low even for karakul sheep" and 120 km from Khorixas, the last petrol depot.

The objective of the NWT Damaraland/Kaokoveld project was to stop poaching, a problem that had accelerated in the decade since Garth had left the area. In 1982, Garth's colleague in the Department of Nature Conservation, Chris Eyre, reported that 76 lions, 33 cheetah and 9 leopards had been killed by farmers and trophy hunters. Unknown numbers had died of starvation, as drought devastated the wildlife and domestic stock of Damaraland and the Kaokoveld in the late 1970s and early '80s. Estimates in 1977 for Kaokoveld wild ungulates gave 1199 Hartmann's zebra, 667 Burchell's zebra, 1191 oryx and 4 859 springbok. For 1982 the counts gave 193 Hartmann's zebra, zero Burchell's zebra, 164 oryx and 217 springbok. Although not truly comparable, these estimates gave a clear indication of trends. More alarming to conservationists was the poaching of Namibia's charismatic 'desert' elephants of Damaraland and the Kaokoveld (Fig. 8.4). In 1980/82 over 100 elephant carcasses were found, and estimates reflected a decrease in the elephant population of northwest Namibia from 1200 to less than 300 over the 12 years since 1970. The majority had been poached for ivory. The incidence of poaching of black rhino was also rapidly increasing.

The anti-poaching approach taken was unconventional. Garth Owen-Smith insisted that the prevailing paradigm of conservation being a 'whites only' profession had to be changed. Rather than having khaki-uniformed (white) rangers hunt the poachers, he insisted that members of the local Himba and Herero pastoralists be drawn into the project. His approach was incremental. He first engaged with the tribal headmen that he had grown to know over more than a decade, and who respected his genuine concern for their welfare. While arguing the potential benefits of restoring the devastated wildlife populations, through the prospect of tourism and

Fig. 8.4 Elephant in an arid valley in the heart of the Kaokoveld. (Photo: John Mendelsohn)

ultimately the sharing of harvested game, Owen-Smith was well aware of the Himba's perspectives. Traditional headman Joshua Kamgombe confided: "It is easy for us who have full stomachs to talk about protecting wild animals, but it is hard for a man to put his firearm away if his children are hungry. When a man has no cattle left, his stomach is the only thing he listens to" (Owen-Smith 2010).

Owen-Smith convinced his NWT trustees that neither they, nor the government Department of Nature Conservation (DNC), should employ the 'community game guards'(CGGs). These should be selected by, and report to, their traditional leaders, not the government or an NGO. NWT would provide rations for the guards, and would mentor and train them, receive monthly reports from them, and keep them actively engaged in the dynamics of the anti-poaching project. While the CGGs revealed multiple illegal hunting events, they ensured that each investigation was conducted with respect for the dignity of the perpetrators, avoiding the antagonisms resulting from conventional law enforcement approaches. The first year of CGG project cost the donors less than US$1000.

It was not long before the activities of the NGOs started to irritate some ultra-conservative members of the DNC. Owen-Smith's open fraternisation with the Himba pastoralists, and his involvement with anti-poaching activities (seen as the exclusive responsibility of the DNC) led to the termination of the Damaraland/Kaokoveld Project in early 1984. The Endangered Wildlife Trust (EWT) threw him a lifeline until the end of 1984, and provided funding for the CGGs. Sadly, the highly competent DNC senior conservation officer, Chris Eyre, a strong supporter of the NWT, was transferred out of the north-west to the conservation Siberia of Keetmanshoop. Ever financially straightened, Owen-Smith limped through 1985 and into 1986. Slender support kept the CGGs operational, and the effective poacher control and improved rains brought rapid growth to the game populations. Between 1982 and 1986, aerial surveys showed a 90% increase in Hartmann's zebra, 180% for oryx and 300% for springbok. In Garth's view: "The populations of the desert-adapted ungulates were well on their way to recovering."

In 1986 Garth Owen-Smith met a new life-partner, journalist and ethnologist Margaret Jacobsohn. While accepting Garth's belief that local people did *care* about wildlife, Margie challenged him to show how they could tangibly *benefit* from conservation. How would his impact extend beyond the older generation of Himbas and Hereros, to the young school children who had grown up in urbanising communities, isolated from the natural environment and the traditions that regarded wildlife as part of their cultural heritage? How could black people, excluded from any benefits from wildlife for generations of colonial policy, be expected to adopt protective measures for troublesome elephants, rhinos, lions and leopards? Margie negotiated with the Endangered Wildlife Trust, whose new director, John Ledger, promised to fund Garth and the CGGs from April 1987. After a break of two years, Garth was again earning a salary. He set about writing an article for the EWT magazine *Quagga*. Reflecting on the gulf between conservation thinking, policy and action as applied within privileged white and disadvantaged African communities in the three southern African countries (Namibia, South Africa and Zimbabwe) he made several key points (Owen-Smith 1987):

- "With few exceptions, no attempt has yet been made to promote wildlife utilisation to the material benefit of African subsistence farmers.
- Far too many game rangers/nature conservation officers still carry out their duties with an arrogance that implies little sympathy or concern for rural blacks and their legitimate endeavours in overgrazed and overcrowded 'homelands'.
- In many areas wild animals still prey on black subsistence farmers' livestock and damage crops.
- With the rural black man on our side, wildlife could once more take its rightful place as one of Africa's greatest resources. With the him against us, little of what conservationists hold dear is likely to survive the twentieth century."

Owen-Smith's article concluded: "Only the government has the authority to change legislation, and in the long-term only it has the financial and staff resources to undertake effective conservation and education programmes. Non-Governmental Organisations can and must accept this challenge. It is not their role to usurp the legitimate functions of government, but to act as pathfinder and catalyst. Once a new way has been tried and proved, the NGO should withdraw, leaving it to the government agency to entrench and extend those projects that were successful."

Shortly after his article appeared in *Quagga*, Garth and Margie attended an IUCN conference in Harare on 'Sustainable economic benefits from wildlife utilisation and its contribution to rural development'. Here they learned of the emerging community-based conservation projects CAMPFIRE in Zimbabwe and ADMADE in Zambia. While differing in drivers and approach, there was much in common across these initiatives. Most importantly, they met up with the key innovators in Zimbabwe – Rowan Martin, Russell Taylor, David Cumming and Brian Child. Garth wondered how different things would have been if the relationships with tribal leaders and communities had commenced much earlier in Zambia and Zimbabwe, before the mass killings of elephant and rhinos in those countries. He also regretted that Namibian and South African conservation authorities, still locked in 'command and control' paradigms, had not attended the workshop.

Garth and Margie returned to their Kaokoveld base at Purros, where Margie was studying the life of the Himba community, and Garth continued his CGG project, wrestling eternally with the bureaucrats in Windhoek. In 1989 he applied for funding from WWF headquarters in Switzerland, where John Hanks was conservation director for Africa. John had spent his formative years as a wildlife ecologist in Zambia and Zimbabwe and had written extensively on the importance of the sharing of rights and benefits of natural resources with local communities (Hanks 1976, 1979). In 1990, this fortuitous connection between Garth and John resulted in a new era of funding from WWF, via the EWT, to continue the community game guards project in Kaokoveld and in the Caprivi. At last, implementing the Kaokoveld vision had the promise of strong and predictable funding.

8.3 Changing Tides: Independence and Innovation

On 21 March 1990, independence was celebrated in Namibia, with Sam Nujoma, leader of SWAPO (South West Africa Peoples' Organisation) as its first president. The winds of change sweeping across Africa since 1960 had finally reached Windhoek – the 'windy corner'.

The first sign of real change was the response Garth and Margie received to an article that they had published in *The Namibian* newspaper the day before the final election results were released. It concluded: "The challenge now facing wildlife conservationists is to reconcile the needs and aspirations of people – particularly those communities that are living in or around our wildlife areas." Brian Jones, a former journalist who had frequently promoted Garth's views, had joined DNC. He asked Garth and Margie to meet with him and Chris Brown, a leading young progressive voice within the still conservative department. The meeting formed the basis of a formidable partnership that changed the face of conservation policy and practice in Namibia over the following decades.

Change was further propelled by the appointment of a new Minister of Wildlife, Conservation and Tourism, Nico Bessinger, a SWAPO veteran who turned to Brown and Jones for assistance in drawing up conservation policy within the country's new constitution. The appointment of Chris Brown as head of the newly created Directorate of Environmental Affairs reinforced the transformation process. The CGG project was gaining momentum, and soon needed an institutional home to receive funding from the British High Commission. When asked by the High Commissioner what he and Margie were doing in the Kaokoveld, Garth replied that they were trying to "integrate rural development and nature conservation". The informal, nomadic, somewhat chaotic project that had been stumbling along for over a decade became a new NGO – Integrated Rural Development and Nature Conservation (IRDNC). Three decades later it continues to serve Namibia and the world as a model for Community Based Natural Resource Management (CBNRM).

In the 1990s the CBNRM concept was on steroids, as major donors leapt to support the concept of communities – formerly excluded from wildlife conservation agendas – being given centre-stage. The United States Agency for International Development (USAID) invested hugely in IRDNC's projects until 1998, when the UK's WWF took over as main sponsor, while WWF US implemented the USAID programme together with a network of Namibian NGOs, the government, and other sponsors. CBNRM was transforming from a small personalised vision of people like Garth Owen-Smith and Rowan Martin into a rapidly growing industry. A workshop in Zimbabwe formulated the 'Hwange Principles', bringing together the thinking of socio-economists Elinor Ostrom (1990) and Marshall Murphree (1991), with the idealistic visions of Garth Owen-Smith (1987) and Graham Child (1995), the pragmatic experience of conservation ecologists such as Chris Brown, Russell Taylor (2001) and Rowan Martin (Martin and Taylor 1983; Martin 1986), and economists such as Brian Child (1988) and Ivan Bond (2001) and social scientists such as Brian Jones (Jones 1999, 2016; Jones and Murphree 2001). The thinking was

elegantly summed up by Martin Holdgate's words in his preface to Graham Child's (1995) book *Wildlife and People*: "If wildlife and protected areas are to survive, they must be socio-politically acceptable, economically viable and ecologically sustainable."

The Hwange Principles can be reduced to four main legs:

- Maximisation of economic benefits from the valorisation and sustainable use of natural resources to achieve both conservation and development goals;
- Devolution by governments of authority, proprietorship and decisions over wildlife resources to the de facto land users, including rural communities;
- Collective ownership and responsibility for, and inclusive, face-to-face governance of all common property resources; and
- Adaptive policy frameworks and collaborative management strategies embracing cross-scale learning from the bottom up, building local capacities.

The development of CBNRM from an ambitious vision into a formal socio-ecological science was progressing in parallel, in Namibia and Zimbabwe through the 1990s. As Garth Owen-Smith had stated in his 1987 *Quagga* paper, only governments could create the legislation needed to formalise the CBNRM process. Such legislation would build on the conceptual thinking and testing of models initiated through the innovation of free-thinkers in NGOs, unconstrained by the rigours of bureaucracies. Having originated much of the thinking, Garth Owen-Smith and Margaret Jacobsohn, stepped back from centre stage, allowing new players to take the lead. In 2010, after a collective 60 years of dedication to the Kaokoveld, they stood down from the leadership of the IRDNC.

In 1993, Chris Brown and Brian Jones started to formulate outlines for future CBNRM policy in Namibia. They had strong models to follow. The Hwange Principles drew on a wide base of theoretical and regional experience. Further, Zimbabwean and Namibian legislation had granted freehold farmers rights over the wildlife on their farms in 1975. After initial challenges, the new policy soon resulted in a massive increase in game numbers and a surge of benefits to land owners from trophy hunting and tourism. If similar wildlife ownership rights could be extended to rural communities, could they not share in the benefits? The road forward was not smooth, but Chris Brown and Brian Jones were a powerful team, drawing on the experience of the drivers of the Zimbabwean CAMPFIRE project – Rowan Martin, Russell Taylor, David Cumming, Brian Child and Ivan Bond. These were all optimistic visionaries, and within Namibia Brown and Jones became labelled, somewhat ironically, 'the dream team'. But their seemingly unrealistic dreams came to fruition after three long years of consultation, negotiation, forceful debate and compromise. In 1996 the Nature Conservation Amendment Act was approved by the Namibian National Assembly and National Council. Key changes introduced by the Act were the devolution of rights over wildlife to rural communities (denied before independence), including sustainable use through adaptively managed extractive (hunting) and non-extractive (tourism) approaches. The barriers to effective CBNRM had been removed.

Two years later, the first three communal conservancies were gazetted. In September 1998, President Sam Nujoma received the WWF-US Gift of the Earth Award for his support of the Namibian CBNRM programme. But in reality, it was Garth Owen-Smith, Margaret Jacobsohn, Chris Brown and Brian Jones, and many traditional leaders of the Kaokoveld, who deserved the highest accolade as the real 'dream team'.

8.4 From Vision to Reality – Community Conservation in Namibia

In 2020, twenty years after the first communities were entrusted with the management of wildlife and natural resources, and were to directly derive benefits from them, the network had expanded to 86 registered communal conservancies and 43 community forests, covering 180,000 km^2, with over 233,000 rural residents participating in the programme (NACSO 2021, Fig. 8.5). The protected area system of Namibia covered 14% of the country at independence in 1990. By 2018, 44% of the country was under recognised conservation management systems. Community

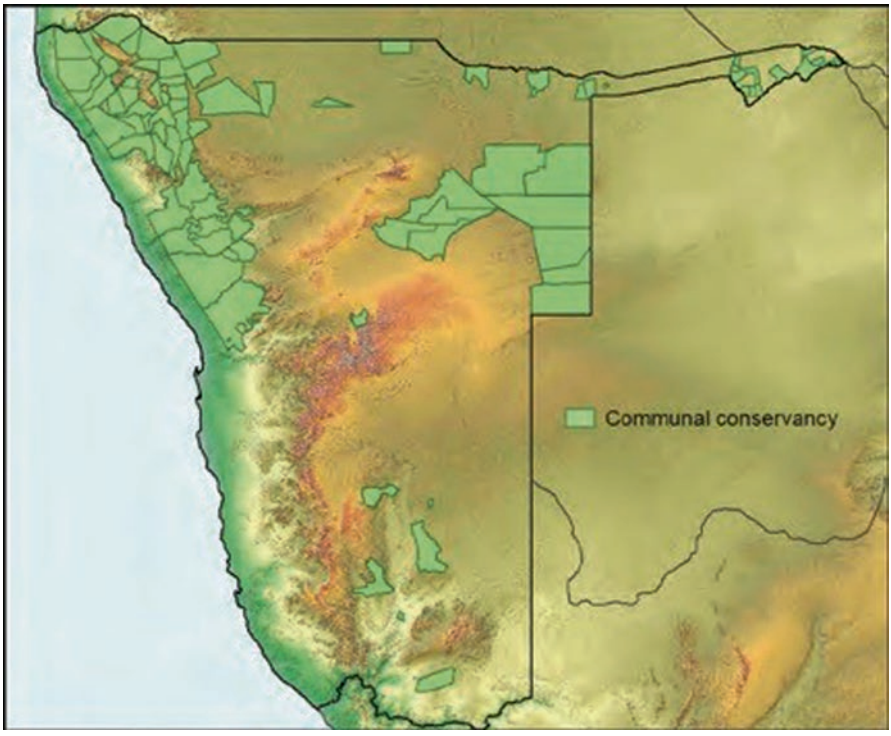

Fig. 8.5 Community Conservancies occupy over 20% of Namibia. (From NACSO 2021)

conservancies account for 20% of the nation's total land area and 53% of communal land.

The ranges of many species were re-established following the impacts of severe droughts and intense poaching in the 1970s and early 1980s. Giraffe, black-faced impala, Burchell's zebra, blue wildebeest, eland, sable and black rhino populations were re-introduced or reinforced by translocations by the Department of Nature Conservation (DNC). The magnitude of these exercises can be gauged by their results. From 1999 to 2013 a total of 10,568 animals of 15 species were translocated to 31 registered conservancies. According to official census data, the elephant population grew from 7500 in 1995 to around 22,800 in 2016. Populations of predators also fared well, with 'desert' lions increasing from 25 individuals in 1995 to 150 in 2017. However, the good rains of the 2005–2011 period were followed by extended droughts, taking a heavy toll on herbivores in the northwest of Namibia, ultimately having an impact on predator populations. But the dynamics of rainfall, grazing production, local migration or dieback of wildlife, and recovery, are typical of arid ecosystems.

Guided by the Hwange Principles and real-world experience, three pillars of Namibia's community conservation programme evolved: innovative resource management; good governance; and incentive-based conservation. As the concept and its implementation developed, so too did the institutional arrangements face complex challenges, transition, and ultimately, achieve consolidation as a national cooperative endeavour. Today the programme comprises a diverse set of partners led by the Ministry of Environment and Tourism (MET) and the Namibian Association of CBNRM Support Organisations (NACSO). Annual Community Conservation Reports, published since 2004, provide a rich resource on the performance of the programme. A few indicators of results illustrate the progress made in the implementation of the programme.

- Since the beginning of 1990 to the end of 2020, the programme has contributed an estimated N$10.8 billion to the country's net national income (NACSO 2021, Fig. 8.6). During the same period, an estimated N$2.9 billion was invested in the programme, mainly by international donors. Conservancy income is derived from two main sources: tourism and hunting. Total cash income and in-kind benefits to rural communities increased from less than N$1 million in 1998 to over N$96 million in 2020 (NACSO 2021).
- Prior to independence, while many tourism ventures within or adjoining the rural communities of the Kaokoveld had been initiated by the private sector, benefits to the communities were negligible, even though these communities carried the costs of losses of livestock to predators or damage to crops by elephants. The new legislation, and support from NGOs, donors and government agencies, created the enabling conditions for conservancies to benefit directly from joint-venture lodges and conservation hunting concessions. By 2020, 64 joint-venture tourism enterprises had been established, employing 902 full time and 62 part time staff. NACSO describes the joint ventures as the 'engines of economic growth' in conservancies (NACSO 2021).

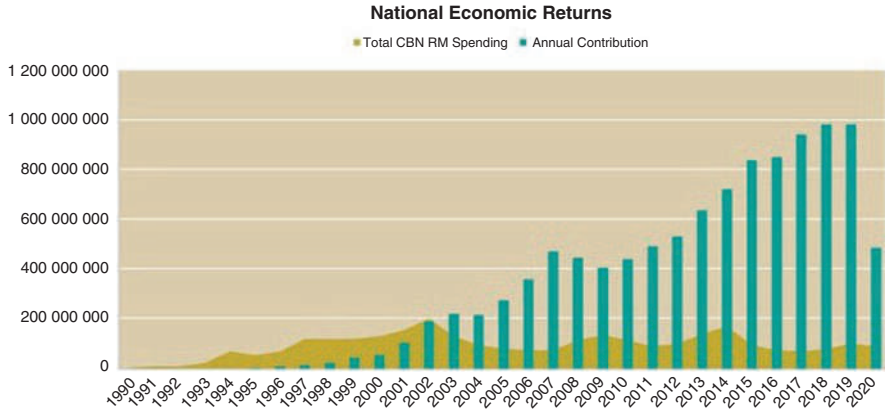

Fig. 8.6 Estimates of the yearly contribution to national economic returns from Namibia's CBNRM programme compared with economic investment costs. The sharp decline in 2020 was due to decreases in tourism receipts due to the COVID 19 pandemic. (From NACSO 2021)

Formal agreements oblige operators to share profits and train staff, while the communities are responsible for wildlife management and anti-poaching activities. Typically, 8–12% of lodge income and 30–75% of trophy price is received by the conservancy. Overall returns to conservancies from lodges and from hunting were more or less on par until recent years, with lodges responding positively to a surge in tourism before the Covid 19 pandemic dramatically placed severe challenges on the global tourism industry. Fortunately, the Namibian government responded immediately to assist conservancies and lodges, through the Conservation Relief, Recovery and Resilience Facility. As a result, conservancies are now recovering from the downturn of 2020/2021 (NACSO 2021).

Given the great diversity of landscapes, climate, ecosystems, game populations, human demography and communication infrastructure, the benefits accrued by conservancies differ widely. A detailed analysis of the 77 conservancies established by 2012 (Naidoo et al. 2016), found that 25 were reported as not generating any benefits. Of 52 conservancies deriving some benefits from wildlife, 28 derived all or almost all benefits from hunting, and six mostly from tourism. The role of highly experienced lodge, tourism and hunting operators, providing technical support, employment, capacity building and mentorship to community members, has been critical to success. Tourism operations, although taking longer to move from establishment to full financial activity, generate more cash income to households through employment than that received from hunting.

Forty-five conservation hunting concessions employed 109 full time and 25 part time staff in 2020. Conservation hunting generates higher fees to conservancies, more rapidly from the date of establishment, contributing to operational costs, development projects, and in-kind benefits of game meat. Many conservancies would not be able to cover operational costs if trophy hunting were discontinued. Trophy hunting is especially important for conservancies in areas that lack

spectacular landscapes or other attractions to photographic safaris. Conservation hunting, strictly managed by quotas set by MET, utilises an insignificant percentage of the wildlife and is unlikely to have a negative impact on any species. Of 303 animals harvested in 2013, Naidoo et al. (2016) found that buffalo and elephant accounted for 78% of hunting revenue, and elephants alone contributed 55% to the total.

Dependence on trophy hunting is potentially vulnerable to changes in global policies on animal rights such as their influence on CITES, and on national policies on the import of trophies. However, the incentives from sustainable income sources, such as those from conservation hunting, are critical for the long-term viability of conservancies. Without them, rural communities might return to the downward spiral of subsistence livelihoods – goats, cattle and minor crops, supplemented by poaching, which would lead the ultimate extinction of rare species in hyper-arid ecosystems. At the same time we should not underestimate the importance of the intrinsic value that rural Africans place on wildlife. Jones (1999, 2010) points out that in every Namibian community he has worked with, they all said they wanted to keep wildlife for future generations. Furthermore, there are often spiritual and cultural associations with different wildlife species. Essentially the Namibian approach was founded on agreement between rural people and external conservationists that wildlife should be conserved for its intrinsic value and for the potential benefits from sustainable use.

Beyond the impact of conservancies on the local and national economies, less tangible benefits are reported by NACSO (2021), including:

- *Environmental sustainability*: sustainable use, reduced poaching, a precautionary, science-based approach to management, landscape-scale connectivity, reduction of land degradation and deforestation, etc.;
- *Good governance*: empowering previously disenfranchised communities through instituting democratic systems of participation in decisions, strengthening accountability, transparency, capacity enhancement, in-service training, business development; and
- *Social transformation*: increased gender equity and empowerment of women, improved health facilities and health education, improved household food security and the promotion of cultural pride.

The above outline of benefits derived from the CBNRM programme should not suggest that it has been free of any challenges, or that significant rewards have reached all 233,000 members of the 86 community conservancies. Despite the encouraging return of N$96 million to conservancy communities in 2020, after deductions for operating costs such as game guard salaries, vehicles, office administration and management committee grants, little is actually left for individual community members. As is frequently the case in rural communities, ‘elite capture’ of benefits, decision making and information sharing can lead to financial mismanagement and conflict. The Namibia CBNRM project has experienced all of these challenges, inherent in managing the commons – it remains a ‘work in progress’. But unlike the

fate of so many similar ventures in Africa, the Namibian model deserves the many accolades that it has received from the global conservation community.

8.5 CAMPFIRE: Has the CBNRM Gold Standard Lost Its Glitter?

Any discussion on CBNRM projects must refer back to what is arguably the foundational and most widely cited initiative of its kind in Africa – the Zimbabwean CAMPFIRE (Communal Areas Management Programme for Indigenous Resources) project. CAMPFIRE has been described as a major turning point in global conservation (Borgerhoff Mulder and Coppolillo 2005). For two decades it was the Gold Standard of CBNRM and it has contributed enormously to the development of the principles and practises of community-based approaches to natural resource conservation in poorly resourced countries.

The magnitude of the challenges confronting the founders of the CBNRM approach in Namibia and Zimbabwe, and more broadly, of biodiversity conservation in tropical countries, are elegantly explored by Barrett et al. (2001). However, their comprehensive review of the problems facing CBNRM does not give due emphasis to the pivotal role of politics in Africa, and of governance at all levels of society. As described later in this chapter, governance is the Achilles' Heel of CBNRM.

The CAMPFIRE project reached its zenith at the start of the 2000s, when it encompassed 36 of Zimbabwe's 57 districts and included 13% of the country's area (Fig. 8.7). From the early 2000s, its activities were challenged by the political and socio-economic turmoil of the increasingly dysfunctional regime of the former Zimbabwean president, Robert Mugabe. The CAMPFIRE model is instructive, because it demonstrates the vulnerability of CBNRM approaches in countries where governance systems fall prey to the vicissitudes of politics, power play and personal greed. It provides a sobering lesson for those who are unfamiliar with the dynamics of African institutions and the rapidity with which robust conceptual models and effective programmes can be overturned.

Few conservation ventures in Africa have enjoyed the deep conceptual analysis and philosophical debate that the CAMPFIRE project stimulated. From the founding studies by Martin and Taylor (1983), Martin (1986, 2009), Child (1988, 2004), Murphree (1991, 1993, 1994, 2009), Metcalfe (1994), Hulme and Murphree (2001), Child and Murphree (2004), Taylor (2001, 2009), Bond (2001) and many others during the 1980s and '90s, to the recent major synthesis of Child (2019), CAMPFIRE has been the subject of intense self-analysis. What has emerged is a rich body of lessons learned, principles and guidelines. The initial simplicity of objectives – that CBNRM should be economically, ecologically and socially acceptable – has evolved into a complex of 'best, promising and emerging practices' (Tambara and Chiles 2016) with no less than 54 guiding practices for policy, governance, economic, socio-political and ecological viability.

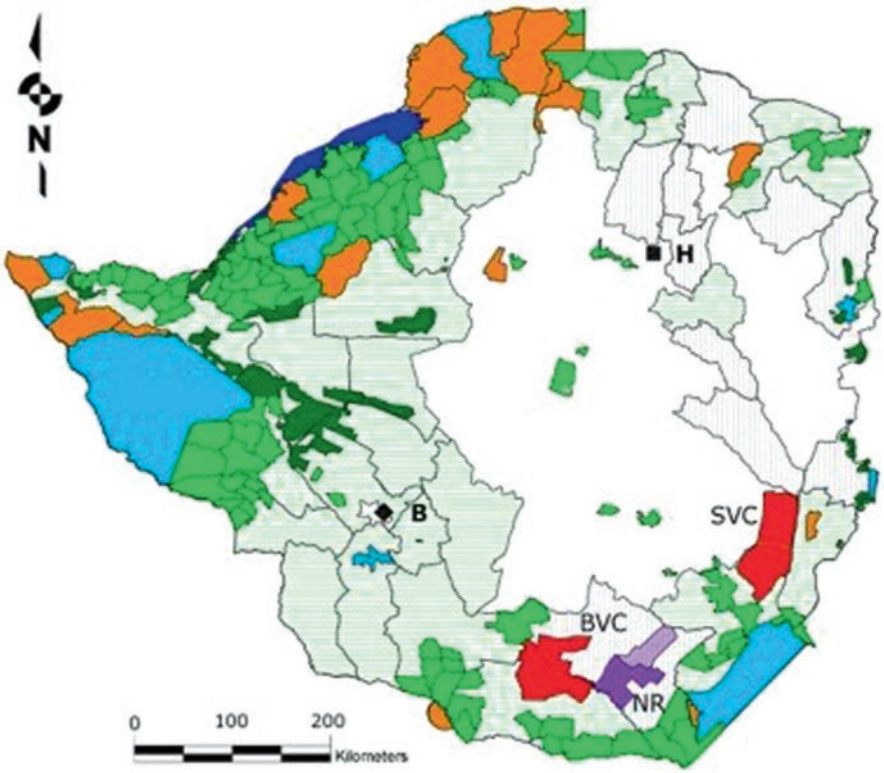

Fig. 8.7 The location of CAMPFIRE areas (in light green) relative to National Parks (blue), State protected Safari Areas (orange), Forest Areas (dark green) and Conservancies (red). (From Booth 2016)

While much has been written on the mechanisms of CAMPFIRE during its heyday, few studies comment on the fortunes of CAMPFIRE since its peak in 2002. By that year, according to a study by Khumalo (2003), it encompassed 53 Regional District Councils with 'appropriate authority' over wildlife use. Even at its peak, however, only 23 districts really functioned as intended, while only 12 received regular income from wildlife (Khumalo 2003). Between 1989 and 2001, CAMPFIRE's self-generated revenues approximated US$20.3 million, of which 97% came from the original 13 districts established with appropriate authority. Of this, 49% was dispersed to communities in these 13 districts (121,500 households – equivalent to 850,000 persons) amounting to a trickle down of less than US$2 per capita per year. During the same period, investments in CAMPFIRE by donors included US$40 million for start-up costs, consultants, capacity building, safari hunting operations, joint venture lodges, the establishment of the CAMPFIRE Association and the development of natural resource products. The concept's fragility given its dependence on donor support was obvious, with donors contributing close to twice the self-generated income resulting from CAMPFIRE activities.

Donor support collapsed to a total of US$515000 between 2003 and 2016 (Booth 2016). The promise and scale of sustainable and meaningful income streams to local communities had not been realised, even at the peak of CAMPFIRE's success.

Problems of scale relate not only to that of own-generated to donor funding imbalances. With specific reference to CAMPFIRE experience, Cumming et al. (2006) draw attention to the problems resulting from the mismatch between the scale of management intervention and the scale of the ecological processes being managed within socio-ecological systems. They also point to the critical importance of devolution of authority to local communities, a factor also emphasised by Taylor (2009). Russell Taylor, one of the pioneers of CAMPFIRE, provides a detailed assessment of the project to 2006, noting declines in hunting income and of the transfer of benefits to communities, governance failures, and lack of government commitment to strengthening the devolution of authority through policy changes supported by legislation.

What is lacking in all the recent syntheses of CBNRM experience in Africa is an example of a CAMPFIRE project that has survived and prospered since the Mugabe era. Most reviews of CAMPFIRE focus on the processes and results of the golden years of the project, while reports for more recent activities tend to focus on site-specific impacts and case studies. Four papers (Booth 2016; Pole 2016; Muyengwa and Child 2017; Tchakatumba et al. 2019) provide insights into the more recent performance of community-based conservation in Zimbabwe.

In a detailed review of the role of elephant trophy hunting (mainly by foreign – mostly American hunters, Fig. 8.8) in supporting CAMPFIRE, Booth (2016) makes some interesting statements. He notes that CAMPFIRE projects embrace about 13% of Zimbabwe's land area and benefit 25% of Zimbabwe's households (5,439,000 persons), providing incentives to conserve wildlife and prevent poaching. The report, prepared in order to answer challenges raised by the US Fish and

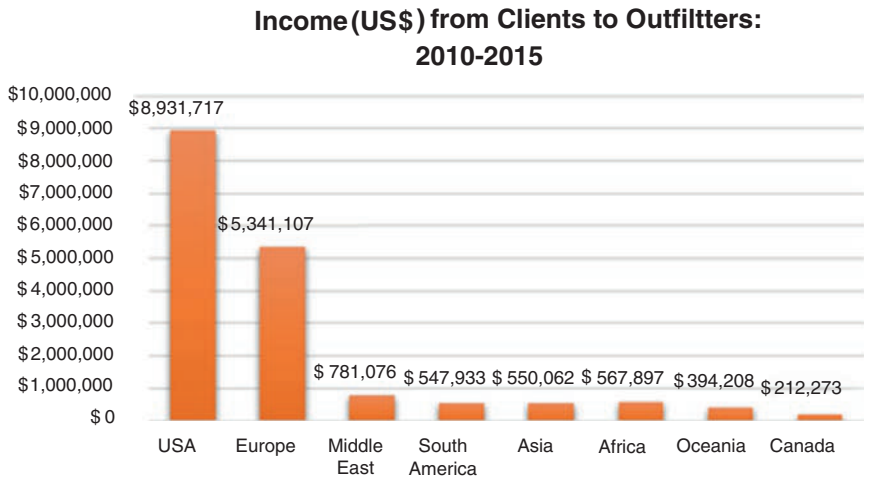

Fig. 8.8 Contribution of hunting clients to the CAMPFIRE programme. (From Booth 2016)

Wildlife Service (which had imposed a ban on the import of elephant trophies to the USA in 2014), notes that about 90% of CAMPFIRE's revenue comes from hunting, to which elephants contribute 64%. The hunting quota approximates 0.5% or 400 elephants of the national total of 80,000 elephants. Trophy fees from elephants approximated US$1.2 million per year (Fig. 8.9). Removing the income derived from elephant trophy hunting by Americans removes the incentives to local communities to conserve wildlife, and will ultimately result in their return to unsustainable pastoralism and agricultural practices and the degradation of ecosystems and the wildlife and livelihoods that they sustain (Booth 2016). As is the case elsewhere in Africa, human/wildlife conflicts will not be tolerated by local people living adjacent to protected areas, unless compensation is provided, in cash or in kind. Booth also points to an increasing human population and the lack of investment in infrastructure and human capital in the CAMPFIRE areas as challenges to sustaining the benefits of the programme.

In the Zambezi valley, one of the most successful CAMPFIRE projects – Masoka – collapsed as a result of 'elite capture' between 2009 and 2011, with a reversal of the socio-economic and environmental benefits embedded over the previous decade by the project (Muyengwa and Child 2017). The Masoka CAMPFIRE project had changed from a highly participatory model (Taylor 2009) to a personalised programme controlled by the elite.

A study of 569 households in the southern lowveld of Zimbabwe in 2014, during the post-donor period, found that income from CAMPFIRE was less than 0.5% of total household income (Tchakatumba et al. 2019). The wildlife income for the study area in 2014 totalled US$305000 and was directed mainly to community facilities, with less than 30 full-time jobs provided within an estimated population of 28,000. Tchakatumba concludes: "These aggregate amounts are considerable,

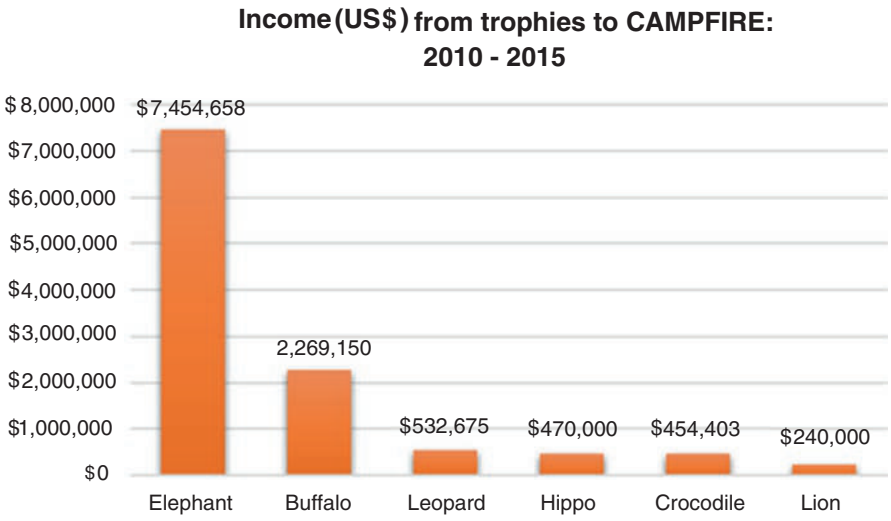

Fig. 8.9 Income (US$) generated from key trophy species (2010–2015). (From Booth 2016)

compared to what is trickling down to households." Community perceptions indicated that benefits decreased and costs in terms of human-wildlife conflict increased in the post-donor period. Communities were considered the last to benefit from CAMPFIRE, when compared to safari operators, hunters, district and ward councillors and government. The household survey found a lack of transparency resulting from a top-down approach from the district and community leadership with a lack of devolution of power. In short, the findings contradict the best intentions of CAMPFIRE.

It is not only the rural community-based conservation projects that have suffered as a result of collapsing systems of governance. The large private land conservancies (e.g. Save Valley Conservancy (SVC) in the semi-arid south east Lowveld of Zimbabwe (Lindsey et al. 2009) have experienced serious challenges due to policy changes driven by the then Mugabe regime, a process described in detail by Pole (2016). The SVC comprises a mix of private, local community, and government properties, originally totalling 3442 km^2 (but later reduced to 2500 km^2 by land invasions). Developed as a cattle ranching area in the 1970s, the industry collapsed during an extended drought in the 1980s. After private (white) landowners were granted rights over wildlife in 1975, it was found that exploiting the commercial value of indigenous wildlife exceeded that of domestic stock. From the early 1990s, a consortium of 18 ranchers formed the SVC through a complex process of negotiation between partners, motivated and financially supported by the rhino conservation project. Donor funding was raised to re-introduce black rhino, elephant and 11 other species – a total of 3128 head of game – to repopulate the savannas. By 1995 the 350 km boundary of SVC was game-fenced and provided with effective management systems, particularly focused on reducing poaching from neighbouring communities. The combination of teamwork, donor funding and highly skilled technical advice, led to rapidly increasing wildlife populations, with significant income flows from safari hunting and photographic tourism.

This positive trajectory of the Save Valley Conservancy suffered a reversal from 2000, with the start of Mugabe's Fast Track Land Reform Programme (FTLRP). By 2003, SVC had lost 33% of its land area through government-sanctioned land occupation by 4500 households. Much of the fencing was torn down, often to be used for wire snares. A continuing series of government interventions placed impossible challenges on maintaining the conservancy, with the once coherent cooperative team beginning to collapse in response to land occupation, poaching, cancellation of hunting permits and absence of donor support (Pole 2016).

Despite the reverses suffered by the CAMPFIRE programme during the 2000s, strategic opportunism seemingly came to the rescue during the 2010s. In September 2013, the mass poisoning and death of over 100 elephants in Hwange National Park attracted international media attention and public outrage. Furthermore, the Zimbabwean Minister of Environment was coming under severe pressure from traditional leaders due to dissatisfaction with the CAMPFIRE programme. The urgent and existential crisis triggered a thoughtful and perhaps opportunistic response from the Zimbabwe government and from the CAMPFIRE Association. The latter approached donor agencies for support. Generously funded by the European Union,

a national stakeholder's review of the CAMPFIRE project was commissioned. The review was led by a team of consultants with wide experience in CBNRM and their findings published in 2018. The review revealed that the programme was experiencing institutional, operational, legal and external challenges (GoZ 2018).

Exactly seven years after the mass poisoning of elephants, and following five years of workshops and deliberations, on 15 September 2020, the Zimbabwe government released the following Cabinet Statement (GoZ 2020): "Cabinet considered and approved proposals to re-focus and revitalize the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE). Implementing the proposals will result in a more effective and transparent CAMPFIRE that will benefit communities and further operationalise the devolution concept." The statement recognised that 90% of CAMPFIRE income came from trophy hunting and that there was need to diversify income streams. The proposed solutions focus on legislative and administrative arrangements between levels in local government to strengthen the devolution principles described 30 years earlier by Murphree (1991). Devolution should not end at District Council level, but at the local communities most effected by the costs and benefits of wildlife conservation. Prominent in the language of the review was the need for strong and effective – and scale sensitive – governance. CAMPFIRE, in policy at least, had come full circle.

8.6 The Lowveld Conservancies: Different Approaches Produce Different Outcomes

The ongoing socio-economic turmoil during the Mugabe era was not devoid of conservation success stories. Somewhat surprisingly, the project that has achieved the most notable and sustained success is that of the Lowveld Rhino Conservation project, implemented in the heartland of the Save River and adjoining conservancies. Despite the challenges faced by the Lowveld conservancies through the early 2000s (land invasion, human population growth, poaching, rejection of the CAMPFIRE system by traditional leaders) remarkable success has been achieved through a focused programme of rhino capture, translocation, reintroduction and protection within the conservancies. The project developed in parallel to CAMPFIRE, but with a different design and more focused objectives.

In the 1980s, the poaching of black rhino in the Zambezi valley was reaching alarming levels. The drama and intrigue that characterised the rhino poaching saga that embraced southern Africa is described in captivating detail by John Hanks in his book *Operation Lock and the War on Rhino Poaching* (Hanks 2015). In the late 1980s Hanks was Director for Africa at WWF International. Hanks sought funding to implement a proposal made by Zimbabwean ecologists Raoul du Toit and David Cumming to translocate the remaining rhino in the Zambezi valley to more secure areas, particularly the privately owned ranches of the arid southeast of the country. The rhino conservation project was instrumental in triggering the conservancy

concept among some owners of very large cattle ranches. As described earlier, severe droughts in preceding years had convinced cattle ranchers that the more resilient and species-rich wild ungulate populations offered better returns on investment than monospecific livestock. But the cost of capture, translocation and protection of rhino and other species rescued from the Zambezi valley and other vulnerable areas was a major financial challenge.

Serendipity catalysed an unexpected solution. In early 1988 John Hanks was alerted to a possible source of funding – the UK-based Beit Trust. The Trust, founded in 1906, had strong ties to Zimbabwe, where it had generously supported education, health and welfare projects over many decades. In 1988, Sir Alfred Beit, the nephew of the Trust's founder, learned of the plight of rhinos in the Zambezi Valley. He lobbied other Trustees to support a conservation project to save the rhino, a proposal that differed markedly from the long tradition of directing grants to people-focused applications. John Hanks, always agile in responding to such opportunities, worked with Raoul Du Toit, the scientific officer in Zimbabwe of the IUCN's African Elephant and Rhino Specialist Group, in preparing a compelling proposal to the Trust. The Trustees replied promptly, and ultimately approved not the usual US$50000 level of grant, but a major US$1 million grant which extended over eight years, on condition that the funding was administered by an NGO, and led by professionals such as Hanks and Du Toit. A protracted process of negotiation followed, with Zimbabwean government officials endeavouring to control both the project and the funding. The 87-year-old Alfred Beit did not compromise, and Hanks and Du Toit were respectively appointed Project Director and Executive Director of the Beit/WWF initiative from January 1991. Through a process reflecting all the elements of strategic opportunism, Du Toit succeeded, over the course of three decades, to rescue the Zimbabwean black rhino population. Globally, the Lowveld black rhino population is now second in number only to the rhino population of Etosha National Park, Namibia.

Du Toit (2016) describes the approach followed by the Lowveld Rhino Trust as a variant of the CBNRM model embraced by CAMPFIRE. His approach is based on a re-think of the traditional CBNRM model, pragmatically responding to a situation in which the essential enabling conditions for CBNRM had been eroded through the Mugabe era. He concluded that what reads well as the golden rules of CBNRM in theory can be untenable in practice (Du Toit 2016). Within the conservancies of the southeast Lowveld, a more sharply defined incentive scheme, targeting selected communities, has been successful. Support is linked to performance indicators such as the proportion of rhino poaching incursions reported by the local community, gradually changing negative perceptions of rhino to their being more useful to household economies. Positive engagement with the selected communities has been fundamental. The results are impressive.

In 1992, the Save Valley and other conservancies in the southeast Lowveld had a population of 81 rhinos (17% of the national rhino population). In mid-2022, the population of both black and white rhino (Fig. 8.10) had increased to 911 (87% of the national population). In common with many conservation success stories in Africa, the recovery of Zimbabwe's rhino population can be attributed to the vision

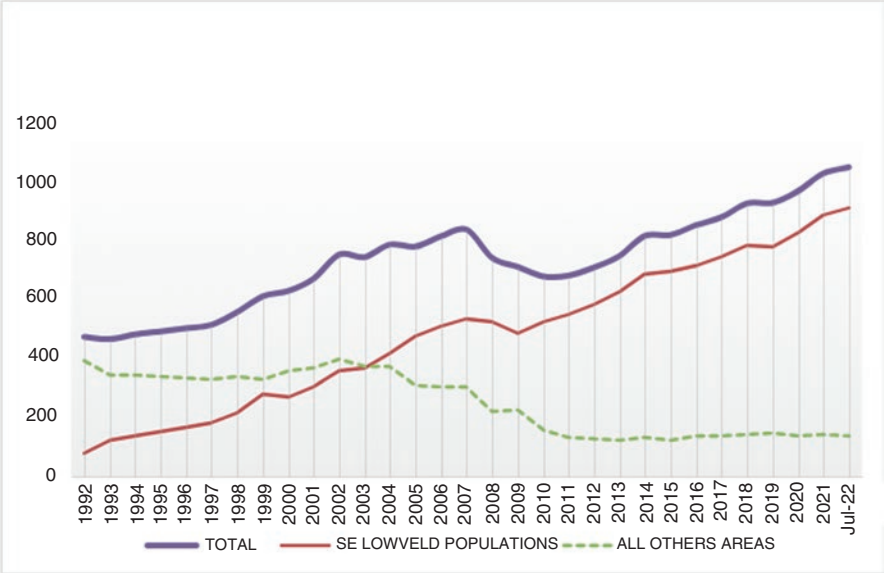

Fig. 8.10 Total black and white rhino population numbers in Zimbabwe, 1992–2022. (Graphic: Raoul du Toit)

and leadership of one person – Raoul du Toit – supported by the richness of Zimbabwean conservation experience, expertise and dedication.

8.7 Lessons Learned: Good Governance, CBNRM's Achilles' Heel

"There are no quick fixes but, properly done, effective CBNRM is attainable and worth fighting for" (Child 2019: p. 356).

It is beyond the scope of this chapter to repeat the elements of the rise and decline of Community-Based Natural Resource Management as experienced in Zimbabwe. The message in Child's scholarly volume, cited above, suggests that the devil is in the detail: 'properly done'. This sentiment applies to any conservation endeavour, most especially in Africa.

Child's succinct conclusion reflects the robust body of field experience on which it is built. But it is in the title of his book that his key message is located: "Sustainable Governance of Wildlife and Community-based Natural Resource Management." His thesis is that without good governance, all approaches to CBNRM will fail. CAMPFIRE, the project in which he played a central role, is a classic example of the critical importance of good governance in community-based programmes. Yet the paramountcy of good governance is ignored by nearly every starry-eyed

conservation biologist who sets grand goals in Africa. It is the topic on which most reporters on the success or failure of projects in Africa prefer to fall silent.

In the broader arena of governance, political history is also key. In southern Africa, especially South Africa, the failure of CBNRM initiatives is seldom attributed to the deep negative legacy of land expropriation (and consequent overcrowding of 'homelands') and the criminalisation of wildlife use (poaching) that extended from the 1880s until today. In the case of Zimbabwe, Murphree (2009) points to the dispossession of land and access to wildlife during colonial times, which led to the breakdown of ancient customs of governance of land and wildlife use. CAMPFIRE contributed effectively to the rebuilding of such customs and benefits, only to be eroded by the collapse of governance systems.

Child (2019) devotes a full chapter to the evolution of governance systems. He uses, as examples, the Glorious Revolution of 1688 and the subsequent declaration of the Bill of Rights of 1689 as the founding transformations leading to modern social order. The divine rights of kings and the feudal systems of land tenure were replaced by the rights of ordinary people to security and the ownership of property. But models of the importance of good governance in sustaining social, economic and environmental health go back much further than the Glorious Revolution, and need no scholarly reading of social history to comprehend.

Good governance is not a new concept, although treated by many conservation biologists as though it were a modern phenomenon – like capitalism, socialism and globalisation. The central role of good governance is nowhere better illustrated than in the fresco panels by the early Renaissance artist Ambrogio Lorenzetti, in the Palazzo Pubblico (Town Hall) of Siena, Tuscany (Lorenzetti 1339). The frescoes are as relevant to contemporary Africa as they were to fourteenth century Europe. Painted in 1339 as 'The Allegory and Effects of Good and Bad Government on the City and the Country', these huge frescoes adorn the walls of the hall in which the nine elected magistrates of the city state of Siena would meet to take decisions on government. The frescoes illustrate the benefits and costs of good and bad decisions taken by the nine councillors. Six panels occupy the three principal walls of the council chamber. Four scenarios are presented. A prosperous city with vibrant trade, commerce, teaching, people dancing in the streets and buildings under construction, is compared with a city of corruption, crime, poverty and collapsing infrastructure. A countryside of flourishing crops, forests, healthy livestock and prosperous farmers (Fig. 8.11) is contrasted with a landscape of burning fields and forests, eroded hills, abandoned buildings, roving bandits and mounted soldiers (Fig. 8.12). The contrast of peace and prosperity under the rule of law, with the chaos of anarchy and desolation, was a daily reminder to the city's governing body. Any observer of the towns and countryside of Zimbabwe today might appreciate the prescience of the allegory.

It is in this context that the Namibian model is so important. As the contributors to two detailed reviews of CBNRM projects across Africa have concluded, despite the general similarity of intent, the projects studied demonstrate wide divergences in approaches and levels of success (Roe et al. 2009; Africa Wildlife Foundation 2016).

Fig. 8.11 Good governance in the countryside – productive landscapes, with prosperous farmers taking their products to the market. (Ambrogio Lorenzetti (1339): Fresco, Palazzo Pubblico, Siena, Tuscany. Wikimedia Commons)

Fig. 8.12 Bad governance in the countryside -degraded landscapes, ruined villages, roaming bandits. (Ambrogio Lorenzetti (1339): Fresco, Palazzo Pubblico, Siena, Tuscany. Wikimedia Commons)

The Namibian model stands apart from all others in several respects (Jones 2016). First, Namibia has a very low population density. Second, it is an arid country with very low agricultural potential. Third, it has a great diversity of spectacular landscapes and charismatic wildlife species. Fourth, community rights over wildlife and tourism have been entrenched in legislation and clearly defined. Fifth, it has enjoyed strong support from government, NGOs and donors for over two decades. Sixth, and most importantly, it has, since independence in 1990, enjoyed a stable, transparent and relatively corruption-free system of governance. It is this last factor that separates it from its neighbours, and from most wildlife-rich countries in Africa. The hope for CBNRM is vested in the hope for Africa: good governance through democracy and the rule of law.

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Part lll
Conclusions: Lessons Learned on the Ground

Chapter 9
Twelve Fundamentals for Conservation Success

9.1 Identify an Urgent and Existential Crisis

The case studies of successful conservation and research projects described in Part ll illustrate the breadth and depth of experience built across southern Africa over the past several decades. The lessons learned from these projects demonstrate the value of strategic opportunism in overcoming challenges presented by the socio-political uncertainties and human and financial resource constraints in Africa. Part lll condenses the diversity of messages coming from the project narratives into twelve fundamentals, which, if applied in the conceptualisation and implementation of projects, might lead to the realisation of goals. The first fundamental is to identify an urgent and existential crisis.

Michael Soulé, in his seminal paper on the emerging science of conservation biology (Soulé 1985), characterised conservation science as a 'crisis discipline'. "In crisis disciplines" he noted "one must act before knowing all the facts: crisis disciplines are thus a mix of science and art, and their pursuit requires intuition as well as information. Tolerating uncertainty is often necessary."

All the case studies of this review relate to identified crises. Each demanded urgent action. In each case, the combination of crisis and urgency provided a compelling story on which interest in, and support for, action was mobilised. Crises come in many guises. In Africa, the most frequently published papers urging conservation action relate to species under threat, degrading ecosystems, or vulnerable protected areas. Here, this focus is exemplified by the chapters on Angola's giant sable antelope, feral cat eradication on Marion Island and the rehabilitation of Gorongosa National Park in Mozambique. Broad-scale approaches to address rural poverty and land degradation include the development of community-based natural resource management in Namibia and Zimbabwe. At a regional scale, the taxonomic impediment to botanical inventory in ten southern African countries, and the databasing of bird distribution, abundance and dynamics, were approached through new opportunities for collaboration which followed dramatic political change. Crises

B. J. Huntley, *Strategic Opportunism: What Works in Africa*, SpringerBriefs in Environmental Science, https://doi.org/10.1007/978-3-031-24880-1_9

might thus relate to threats to biodiversity on the ground, the challenges of weak information resources with which to plan strategies, or political barriers to regional partnerships – all of which are of fundamental importance to conservation in Africa.

The downside of a crisis management approach is the misuse of crises as instruments to raise funds – by governments, NGOs or by individuals. However, in none of the case studies has a crisis been invented or exaggerated to exploit or attract funding. The problems have been existential and urgent, and responded to by thoughtful governments, donors and stakeholders.

9.2 Present an Inspiring Vision, Clear Goals and Realistic Strategies

As the Cheshire Cat in Lewis Carroll's (Carroll 1866) *Alice in Wonderland* points out, "*If you don't know where you are going*, *any road will take you there*." An ambitious but clearly defined vision provides the necessary inspiration and focus for success in any challenging project. Each of the reviewed projects had clear vision statements and focused goals. The goals of some projects were narrow – 'Save the giant sable' or 'Eradicate feral cats', 'Rehabilitate Gorongosa'. Others were broad – 'Remove the taxonomic impediment', 'Assess the threats to the megaflora of South Africa' or 'Empower rural communities to take ownership of their wildlife resources'. In each case the vision and goals were backed by a convincing strategy to communicate with and embrace the commitment, over many years, of a wide diversity of stakeholders. An approach of 'think big, start small' guided implementation.

Some projects challenged existing paradigms and presented alternative models. Such were the CBNRM projects, reversing the 'command and control' tradition embedded in colonial-era protected area management practices. These initiatives presented new 'theories of change' before the concept entered the conservation lexicon. The projects were tested within specific communities where the proponents had long and respected knowledge bases and trusted community relations. Graham Child and Garth Owen-Smith saw the writing on the wall, and it was writ large – 'build socio-ecological resilience'. The method was to engage with local communities and empower bottom-up transformation.

Adaptable and flexible timetables are essential. The tyranny of logical framework approaches must be avoided. Work plans must accommodate changing funding frameworks, integrate feedback from research and implementation findings, and permit rapid response to new challenges and opportunities. The Marion Island project built on several decades of research and progressed through seven phases implemented over 25 years. Each phase, costing hundreds of thousands of dollars, required elaborately designed project plans, budgets and team structures. Each had to be modified as new information from research became available, or new logistical or financial challenges arose. Pedro Vaz Pinto had no elaborate strategy, no theory of change, and no budget. He used guts and grit to press on through nearly

impossible institutional challenges, unreliable technology and a hostile physical environment. Learning by doing, failing and failing again, but never giving up. Despite repeated setbacks, ultimate success was achieved and has saved the giant sable antelope from extinction.

9.3 Develop Networks of Synergistic Collaboration

While crises provide the triggers and catalysts for immediate conservation action, the development of collaborative networks and synergistic coalitions are important longer-term responses. Such conservation networks go back to the early 1900s, when the first conservation NGOs in Africa were established in South Africa (the Botanical Society in 1913, the Wildlife Society in 1926). These NGOs facilitated contacts across the region during the country's political and academic isolation from the 1950s to the 1990s, with amateurs and professionals remaining active in several conservation and scientific networks through the decades leading up to democracy. For more than a century, effective NGO involvement and the commitment of civil society stakeholders has remained essential for project success.

International non-governmental organisations were of major importance. Key among these were the Species Survival Commission (SSC) and the World Commission on Protected Areas (WCPA) of the IUCN (International Union for the Conservation of Nature) which provided novel approaches to conservation challenges. The International Union of Biological Sciences (IUBS) and the Scientific Committee on Problems of the Environment (SCOPE) of the umbrella body ICSU (the International Council of Scientific Unions) introduced new concepts to the global scientific arena. A simple process of 'thinking globally, acting locally' was followed. These new concepts, evolving in the debates on emerging problems of the environment (SCOPE), protected area management (WCPA), and global threats to biodiversity (IUBS, SSC), were communicated directly and implemented within southern African conservation and science agendas through interactions between local and visiting researchers. Especially valuable were the series of workshops involving leading thinkers from across southern Africa, and internationally, convened during the 1980s by the then Cooperative Scientific Programmes (CSP) of South Africa's Council for Scientific and Industrial Research (CSIR). These think tanks produced syntheses and conceptual models on savanna, fynbos and karoo ecosystems, fire ecology, the biology of invasive species, the conservation of threatened natural habitats, and on long-term environmental trends. Such syntheses, published locally as textbooks and freely distributed workshop reports, provided students with concise and accessible introductions to emerging ecological models and understanding.

The ICSU and IUCN traditions of voluntary networks were followed across southern Africa in the 1990s, and facilitated the creation of regional partnerships such as the SABONET, the African Plants Initiative and the Southern African Bird Atlas projects. At more local levels, coalitions between NGOs, universities, the

private sector and government institutions mobilised large, interdisciplinary initiatives such as the Savanna Ecosystem Project, the Fynbos Biome Project and plant and animal Red Listing programmes. These projects strengthened ecological understanding and research capacity, increasingly applied in guiding land-use management and planning. A fundamental criterion for fund allocation to CSP projects was the inclusion of the end-users of research within the planning and implementation processes. Since the advent of democracy in South Africa, large programmes with direct socio-economic and developmental objectives, such as the Working for Water project, have enjoyed enormous government support, simultaneously controlling invasive woody plants, increasing water flows from mountain catchments, and providing tens of thousands of work opportunities.

The Namibian Association of CBNRM Support Organisations (NACSO) and the Zimbabwean CAMPFIRE Association (CA) were created in the 1990s to achieve synergies between the countries' many community conservancies, private lodge owners and hunting outfitters, and government institutions. The shared experience and learning of these networks ensured cost effectiveness and common approaches to the solution of problems in countries with limited technical expertise and poorly resourced scientific institutions. The associations have continued to play supporting roles through difficult transitions in leadership, institutions and governments. An important and influential regional network at the time was the IUCN's Southern African Sustainable Use Specialist Group (SASUSG), which comprised ecologists, natural resource economists, wildlife veterinarians, social scientists and others from diverse backgrounds. SASUSG refined concepts and principles around sustainable use and CBNRM, ultimately influencing the Convention on Biological Diversity's approach to sustainable use of wildlife.

While the focus must be on synergistic partnerships with like-minded individuals and organisations, attention should also be given to positive engagement with parties that might have opposing views or agendas. Conservation endeavours by their very nature often have to confront those who recklessly exploit natural resources – through greed, ignorance or sheer desperation. Positive engagement with perceived enemies is the first step to problem resolution. It is a fundamental component of strategic opportunism.

9.4 Communicate Effectively with All Stakeholders

It is perhaps overstating the obvious to suggest that any conservation project should capture the hearts and minds of all its stakeholders. Vision statements can be too ambitious to be taken seriously. Goals and strategies might be too comprehensive and too complex to attract the attention beyond immediate project partners. Communication should be simple but inclusive. It should capture passion and dedication – the *sine qua non* for conservation.

The SABONET project ran its course before the advent of easy internet access across the ten participating countries. Websites had not evolved, nor had any other

form of social media. The project was held together by a quarterly magazine *SABONET News*, which published the outcomes of steering committee meetings, field expeditions, profiles of participating institutions and members, progress with national activities, contact lists, and much more. The hardcopy magazines were posted by normal mail to several hundred recipients. In the pre-internet days, postal services to even the most remote destinations were remarkably efficient. The SABONET Report series, which ran to 43 volumes, carried updated floristic checklists, expedition reports, training manuals and needs assessments. These hardcopy newsletters and reports were the glue that held participants together between workshops, training sessions and field trips.

While communicating with the active network of project participants is the first priority, vertical and lateral communication with decision makers, donors and the ultimate end-users are both equally important. Simplicity is critical. The military adage 'generals do not read' is pertinent. Succinct reports on key aspects of progress should not exceed two pages if they are intended to attract the attention of busy government officials or donors. Modern electronic communication systems provide remarkable opportunities to transfer information – but can easily exhaust the capacity of recipients if not used effectively. The most important mechanism for project leaders remains the practice of 'walking the talk'. This is especially the case in rural development projects, where many participants do not have access to electronic media and some might even be illiterate.

Some projects require high-level communication interventions to mobilise transformational change. One example illustrates the point. In 1980, at a workshop on Mediterranean Type Ecosystems, held in Hermanus, Western Cape, the topic of invasive plants drew much interest, as invasive Australian acacias and hakeas had become a serious threat to the unique fynbos vegetation of the Cape Floral Kingdom. Hal Mooney and Fred Kruger suggested that a project on the broader problems of invasive alien species be launched by SCOPE – the Scientific Committee on Problems of the Environment. The project soon attracted international interest and action, and over the following decade generated an impressive compendium of research findings synthesised in hefty volumes. But the ongoing problem of alien invasions in sensitive ecosystems simply accelerated. In 1993, at the annual meeting of the Fynbos Forum (a coalition of researchers and land managers jointly seeking solutions to problems in fynbos ecosystems) it was suggested that a presentation be made to decision makers highlighting a recent finding that invasive woody plants were decreasing, by 30%, the water supplies to the city of Cape Town. Little did they foresee that by 2018 Cape Town approached 'day zero' of the city's depleted water resources.

By the time the 'roadshow' on invasive plants was ready to proceed, the new, democratic South African government had been elected, and the new Minister of Water Affairs, Kader Asmal, was quick to see the opportunity to combine the urgent need for alien plant control with the even more urgent need to create employment for the rural poor. The result was the Working for Water programme, which in the succeeding 25 years invested over US$1000 million on invasive clearing activities

across South Africa, providing hundreds of thousands of work opportunities in the process – the largest investment in any such project, globally.

9.5 Synthesise Existing or Create New Biodiversity Knowledge and Understanding

A critical success factor in all the case studies has been the scientific evidence base underpinning project design and implementation. Whether driven by a lone biologist generating new knowledge from a zero base (giant sable), or by consortia of large scientific institutions with deep research traditions (Marion Island), the projects have been science-driven. The SABONET, African Plants Initiative, Southern African Bird Atlas and the Custodians of Rare and Endangered Wildflowers projects had large teams of professional and citizen scientists. Such collaboration focused on assembling large datasets backed by field observation, and systematic recorded in large and freely accessible electronic databases. Both the Namibian and the Zimbabwean CBNRM projects had, from their founding years, included strong socio-economic components, led by the thinking of innovators such as Elinor Ostrom and Marshall Murphree (Ostrom 1990; Murphree 1991). They were also founded on the richness of wildlife management and savanna ecological knowledge of Zimbabwean and Namibian researchers. Across southern Africa, the synthesis of knowledge and understanding in National Biodiversity Strategy and Action Plans, and National Biodiversity Assessments, supported by the CBD and the GEF, has guided policy and action and triggered many new and focused conservation initiatives. Emerging from these robust interdisciplinary conservation research agendas have been many new concepts on the resilience of socio-ecological systems and the dynamics of environmental change. Good science provides the essential evidence-base of successful conservation projects.

9.6 Secure Institutional Support and Develop Project Implementation Capacity

A key challenge in many African states is the weakness of national institutions, most especially those responsible for science. But conservation projects are not driven by researchers alone. They need many skills, most especially in the multiple tasks involved in project design, administration, convening meetings, preparing budgets, audits and reports to governments and donors. This is often where even the most elegant project plans can fail. Where local capacity has been lacking, national and especially international NGOs have stepped in. This has been both a blessing and a curse. While NGOs have played, and continued to play, essential roles in the design, funding and implementation of large conservation projects across Africa,

the post-donor legacy has often resulted in the loss of continuity of leadership and sustainability.

Because of its institutional link with and support from SANBI, the SABONET project, at the point of conclusion, was almost seamlessly followed by the African Plants Initiative. In Zimbabwe and Namibia, the CBNRM projects have enjoyed a succession of NGO and donor mentors and benefactors. But the collapse of governance systems and donor financing in Zimbabwe was followed by the demise of nearly all the once effective (but NGO and donor supported) conservancies. The success of the Namibian community conservancies is as much a result of government endorsement as it is of the joint ventures with tourist lodges and hunting safaris operated by the private sector, which provide mentoring and business management support. The Gorongosa Project has invested heavily in capacity building and development of a strong leadership team of Mozambican professionals, both in park management and in research.

The appointment of talented, early career professionals to key positions – in government or as project managers – contributed to the rapid advance and success of several – perhaps all – of the projects in this study. Raoul du Toit in the Lowveld Rhino Project, Brian Child in CAMPFIRE, Christopher Willis in SABONET, Chris Brown in Namibia, Marthán Bester on Marion Island, James Harrison in the Bird Atlas and Domitilla Raimondo in the Red List projects are classic examples of fortuitous appointments. In Angola, Pedro Vaz Pinto simply took the initiative to grab the (sable) bull by the horns and create a long-term project without institutional or financial security or a formal management structure. It was a simple, pragmatic and impulsive case of *carpe diem*.

The comparative advantage of South Africa's large research community and strong national institutions has benefitted neighbouring countries through sharing technical skills as diverse as studies on the molecular genetics and conservation needs of frogs to the immobilisation and long-distance transport of elephants. Scientific and technological collaboration knows no political borders.

9.7 Promote Champions and Nurture Strategic Leadership Talents

David Attenborough (2009) has summed up the characteristics of what is needed to make a conservation project succeed: "That one individual that has passion, that one individual that has fire in the belly, that one individual that is determined that something should be done."

In each of the case studies, one or more project champions founded the project, or emerged during the implementation process. These are persons with passion, vision, charisma, high intellectual maturity and often with a Machiavellian ability to navigate through the minefields of implementation processes. In Namibia, Garth Owen-Smith spent a decade exploring the landscapes, wildlife and peoples of the

Kaokoveld and testing novel approaches to resolving poaching and land-use problems. His insights fed into the thinking of a next generation of leaders (Chris Brown, Brian Jones), who took the problem into the political and legislative arena with resounding success. Similarly, the early work of Graham Child, David Cumming and Marshall Murphree in Zimbabwe was mobilized by the next cohort of ecologists and economists (Rowan Martin, Russell Taylor, Brian Child, Ivan Bond) in the CAMPFIRE project. On Marion Island, a wide base of multi-disciplinary research, conducted by dozens of researchers over several decades, supported the design and implementation of the cat eradication project. From this rich assembly of workers, Marthán Bester took the lead over three decades and proved the value of a charismatic, firm but sensitive leadership role. The experience of Pedro Vaz Pinto in Angola differed markedly from that of other case studies. Alone in a vast country with few professional conservationists or ecologists, Vaz Pinto had to rely on passion, determination and resilience to drive, almost single-handedly, a species recovery project over two decades. The taxonomic impediment project, initiated through regional consultation and the development of SABONET, required many years of strategic leadership to navigate the complexity of national interests across ten countries with widely differing socio-economic and science cultures. In all projects, the congruence of charisma, courage, tenacity and adaptive management was key. In retrospect, the role of many young innovators was not overlooked. These young professionals were given the opportunity by their senior managers to be adventurous. Even to make mistakes. A learning culture passed from one generation to the next.

9.8 Create and Capitalise on Quick Wins: Success Breeds Success

Ambitious conservation projects can take years, even decades to achieve their goals. Regardless of how committed and loyal stakeholders might be, the long march to success can stumble if participants do not see tangible evidence of progress. Kotter (1996), in describing the principles of transformative change, emphasises the need for short-term targets to be met and celebrated to demonstrate that the journey is producing meaningful results.

Passion and energy fluctuate with the passage of time. In the Marion Island cat eradication programme, after initial frustration with hunting and trapping approaches, the introduction of the feline panleucopaenia virus, brought quick results. But as the cats developed immunity, momentum dropped. As Bester el al. (2002) describe “Despair set in. Some doubt was expressed that the cats could ever be eradicated.” But renewed efforts using an integrated approach with teams of hunters, trapping and poisoning brought further quick results – excitement returned. Ten years on, the project concluded successfully, after a roller-coaster ride of waves of jubilation and disappointment.

The SABONET project also suffered successive moments of frustration and elation, through funding delays, bureaucratic hurdles and logistic challenges. But the highpoints were celebrated as expeditions in Botswana, Malawi and Mozambique met with remarkable success and resulted in the production of some benchmark books such as the beautifully produced *Plants of the Nyika Plateau* (Burrows and Willis 2005) and the monumental *Checklist of Flowering Plants of Sub-Saharan Africa* (Klopper et al. 2006). Similarly, the regular appearance of *SABONET News* provided a popular medium to celebrate small and large successes – effectively communicating across the ten-nation network.

In Angola, after 6 years of blood, sweat and tears, Pedro Vaz Pinto was able to rejoice on the success of the capture and translocation of a breeding herd of giant sable to a quarantine camp in Cangandala in 2009. Small triumphs, and some deep despair, marked each step along the way. The first trap-camera records in 2005, the first live sighting of a group of cows in 2006, and the confirmation of small herds of sable surviving in Luando in 2007, gave much needed bursts of energy to the project.

A key lesson from all projects is that success breeds success. Victory should never be announced prematurely, but even the smallest contributions of participants, and humble successes, should be recognised. It is the integrity and demonstrated passion, commitment and productivity of project teams that create quick wins, attract attention and guarantee the achievement of goals.

9.9 Recognise the Critical Importance of Good Governance

The dependence on good governance systems as an essential determinant of socio-economic and environmental health has been recognised ever since their depiction in the allegorical frescos of Ambrogio Lorenzetti (1339) as described earlier. Nearly seven centuries later, transparent, inclusive and democratic governance systems have proven fundamental to sustainable conservation programmes.

The existence of supportive legislation, policies, clear lines of authority and effective management and monitoring systems are also critical. Change in the legal frameworks governing natural resource use by the private sector, and later, rural communities – was fundamental to the success of the community-based conservancies in Zimbabwe and Namibia. However, the assumption that sound strategies, workplans, management competence, technological innovations and generous funding will bring success has been shown to be poorly founded. In Zimbabwe, the CAMPFIRE programme, developed within the context of all the above criteria and initially highly successful, was undermined and ultimately failed because of the collapse of national and local governance systems. In Namibia the same CBNRM implementation model has prospered because of political stability. But rare exceptions exist. The giant sable project has demonstrated that even in countries with challenging governance systems, success is possible.

9.10 Embrace the Unexpected Opportunities of Serendipity, Good Luck and Good Timing

Over the decades, I have come to believe in the value of chance occurrences of good luck and good timing. The congruence of chance, timing and responsive minds is called serendipity, a key component of strategic opportunism. On serendipity, Louis Pasteur commented: "Chance favours the prepared mind" – in other words, serendipity requires a sharp mind to recognise it when it presents itself (Abdulai 2009). It is also a product of hard work. The South African golfer, Gary Player, winner of nine major championships and 167 professional golf tournaments, is quoted as having said: "The harder I work, the luckier I get." In reviewing the case studies, several instances of what could be described as serendipity became evident. Many more no doubt occurred.

In the spring of 1965, with a meteorologist colleague, I summitted the highest peak on Marion Island. It was the first recorded ascent of the then perennially cloud-covered volcanic peak. By lucky chance, as we reached the summit, the clouds opened and I was able to photograph the ice plateau that covered the higher reaches of the mountain. The panoramic view was published in the expedition report (Van Zinderen Bakker Sr et al. 1971). Many years later, Meiklejohn (2011) published paired photographs, showing the retreat of the ice plateau between 1965 and 2009, relating the disappearing ice-cap to global warming and decreased rainfall. These two factors were confirmed by the detailed records kept since the meteorological station was established in 1948 (Hedding and Greve 2018). The chance of fine weather and panoramic photos taken on that spring day in 1965 provided the evidence that triggered long-term studies on the warming and drying of Marion Island. These findings are of direct bearing on the recently observed drying of mire vegetation, a surge in house mouse populations, and the predator/prey transfer from invertebrates to vertebrates, as mice now attack and kill many ground-nesting seabirds, from small prions to the massive and magnificent wandering albatross.

When Pedro Vaz Pinto was searching for evidence of the survival of giant sable in Cangandala National Park, over 2 years of failed camera-trapping passed before his cameras revealed a female giant sable at a salt lick. Further photos built up a profile of 23 individuals. But many of the animals had strangely long droopy ears, and unusual markings. Another year passed before he actually saw a herd with the naked eye. No adult males were present, but a lone male roan antelope accompanied the herd. The giant sable population was being hybridised into extinction. No crisis could trigger action faster than this evidence, especially when confirmed by microsatellite genetic studies. Funds were mobilised, a game capture team from Zimbabwe was called in, military helicopters were made available, and a pure male giant gable was captured in Luando Nature Reserve and translocated to the nine Cangandala females. A dozen years later, over 100 genetically pure, safe and healthy giant sable are at peace in Cangandala.

A final example of serendipity was the chance meeting in 2003 of the programme manager of a major philanthropic trust with an improvised digital scanning device.

The device was used for preparing electronic images of rare herbarium specimens at Royal Botanic Gardens, Kew. When William (Bill) Robertson of the Andrew W. Mellon Foundation saw the 'HerbScan' in use, he immediately connected the dots to a vision of an African-wide project to scan and make accessible digital images of all the type specimens of the flora of Africa south of the Sahara. Such access would go far towards resolving the urgent need to repatriate information on Africa's flora held in northern hemisphere institutions. Bill Robertson pulled together a small team of leaders of botanical institutions to consider his idea. A proposal was prepared and presented at a meeting of AETFAT, the network of African botanists, which met shortly thereafter in Addis Ababa. Within weeks, a generously funded project to prepare images of type specimens held in 73 herbaria across the world, was approved for funding. Five years later, the African Plants Initiative had concluded, having digitised 231,171 images of over 50,000 African plant species. The vast resources of 'northern' herbaria were made electronically available to botanists of the global south, at the mere touch of a computer keyboard. The congruence of chance, timing and responsive minds is called serendipity, a key component of strategic opportunism.

9.11 Seize the Political Moment of Changes in Governance

Political will is a prime driver of conservation success. This often comes with changes in leadership. Dramatic political changes might be inevitable with the passage of time, but the timing and nature of their impacts are seldom predictable. In a speech before the South African Houses of Parliament in 1960, British Prime Minister Harold Macmillan described the 'Winds of Change' then blowing across the political firmament of Africa, bringing unprecedented change to the continent's socio-political trajectory. In less than 12 months, independence came to 15 former West and Central African colonies of Belgium, Britain and France. After sweeping across East Africa through the 1960s, the winds of change only reached Mozambique and Angola a decade later (1975), with Zimbabwe (1980), Namibia (1990) and South Africa (1994) even later, in the wake of bitter political struggles characterised by violence. In Mozambique and Angola, independence was followed by extended civil wars.

Political change in southern Africa led to radical and positive reforms to colonial policy and law, of critical importance to future trajectories of conservation actions. The rare coincidence of the political moment and of extraordinary personalities led to the devolution of power over wildlife resources from central government to rural communities in Zimbabwe (1983) and Namibia (1996), providing the enabling legislation for launching effective community-based natural resource management systems.

Even wider benefits to conservation came with politically-led global environmental initiatives. Of fundamental importance was the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992, which established

the Convention on Biological Diversity (CBD) and the Global Environment Facility (GEF). For the first time, biodiversity was placed on a global political platform, and provided with the financial means to implement its objectives. The impact of the CBD and GEF has been transformational across Africa. Its history is well beyond the scope of this study. But at a regional level, the simultaneous political transformation in South Africa, and the emergence of the CBD and GEF, had resounding positive impacts on all the success stories related in this narrative.

The 11th February 1990 was auspicious both for the release of Nelson Mandela from prison and for the evolving SABONET project, conceived in Maputo, Mozambique, on that day. The access to GEF funding was the financial driver of the project for 8 years. Law reform and new institutions, which followed close on the advent of democracy in South Africa in 1994, widened the scope and reach of conservation programmes such as those on threatened species and habitats. Free movement of scientists and technical support from Botswana, Namibia, South Africa and Zimbabwe, to Angola and Mozambique, facilitated the capture and relocation of giant sable between Luando and Cangandala, and of multiple species for repopulating Gorongosa. SABONET and the African Plants Initiative would have been unthinkable without a democratic South Africa, the achievement of which coincided with the launch of these projects. Like serendipity, the opportunities created by political change required both sharpness of mind and speed of action to seize the political moments as they appeared.

9.12 Develop Creative Financing Strategies

Two contrasting conservation financial models have emerged in the past few decades. At one extreme, the GEF and aid agencies such as USAID, GTZ, DFID, etc., have made available billions of dollars for biodiversity projects around the globe. Much of this funding now sustains the major international NGOs, such as the WWF, Conservation International and African Wildlife Foundation, to name a few. As laudable as these organisations are, many are overburdened with excessive bureaucratic demands, are designed and implemented by international consultants, and some have weak legacies of local capacity to ensure sustainability. However, the important mentoring role of such large NGOs should not be discounted. They carry the high opportunity costs and risks that are experienced in the early stages of complex projects in countries with weak institutions. These projects can often be characterised by high costs and often relatively low impacts.

At the opposite extreme of financial models, the rapid growth of citizen science activities, facilitated by the use of the internet and social media, and operating on slender budgets, have proven the value of volunteer networks. They can have low costs and high impacts.

Regardless of the funding source, successful projects are those that have been able to access multiple financial streams. The early history of community-based conservation in Namibia is a history of living from hand-to-mouth, with the project

leader dependent on a series of minor grants interrupted by periods of anxious unemployment. The programme could only reach critical mass once a diversity of funding streams – government, donor, private and community-driven – came into play. The SABONET project had the good fortune of having a strong institutional base (SANBI), but even with such support, it would have failed if an unexpected source of seed funding from the IUCN regional office in Harare had not arrived, at a time when the goal posts for GEF approval kept moving. The Giant Sable Project has survived solely through the tireless efforts of the project leader to attract funds – large and small – from a wide range of sponsors and friends. The African Plants Initiative was somewhat unique. A single, philanthropic foundation provided for every need throughout the project, with generous, flexible and sustained funding, an absolute minimum of bureaucracy, and an admirable investment of intellectual support. Larger, long-term projects such as Gorongosa have required an innovative mix of strong donor, government, private sector, philanthropic and self-generated funding.

While the objectives and dimensions of projects might differ markedly, one characteristic is essential – transparent financial accounting and reporting. This is an area of great vulnerability in many African countries, not necessarily due to malign intent, but often due to inexperience in project management, monitoring and auditing. Risk management is part of any developmental programme. In Africa, the greatest risk is not to take risks.

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Chapter 10
Synopsis: Strategic Opportunism – Vision, Passion and Pragmatism

It is not the strongest of the species that survives, nor the most intelligent, but the one most adaptable to change.

A misquotation frequently attributed to Charles Darwin.

Fundamental changes have emerged in conservation thinking and wildlife management approaches in Africa over recent decades. The recognition that ecosystems are seldom in equilibrium, are usually heterogeneous, and are constantly responding to fluxes in external pressures, suggests that the utopian 'balance of nature' concept is a myth. Uncertainty and change in interactive social and ecological systems have stimulated the development of adaptive management approaches in conservation. Adaptive management requires pragmatism, flexibility and an experimental, learning by doing, philosophy.

Strategic opportunism is adaptive management writ large. It seeks to transform problems into solutions. It recognises serendipity and embraces unexpected opportunities and the political moment. The development and application of the concept is based on experience drawn from multiple projects, across ten countries, within biomes ranging from hyper-arid desert, to tropical savanna, and to sub-Antarctic tundra, and within dynamic socio-political landscapes. The concept and practice of strategic opportunism is not encountered in university curricula. It is found in practical applications in the real world. The selected projects demonstrate success that has been sustained for two or more decades, and which illustrate how goals can be met regardless of a nation's wealth, or of its cultural traditions.

The thesis of this book is that success depends on a clear and shared vision, within a flexible approach to project design and implementation, free of the straightjacket of development agency project formats and short-term funding horizons. These case studies provide guidance not only for the execution of conservation and research projects, but also for the development of the human and financial resources needed to achieve realistic goals. At the heart of success is the role of passionate and inspiring leaders committed to the long view of conservation and research.

B. J. Huntley, *Strategic Opportunism: What Works in Africa*, SpringerBriefs in Environmental Science, https://doi.org/10.1007/978-3-031-24880-1_10

In contrast to many ‘northern’ countries, the advantages of predictability and stability are not shared by the ‘global south’. The demand for flexibility is particularly critical for much of Africa, where more than half of the continent comprises deserts and arid savannas, with widely fluctuating spatial and temporal patterns of rainfall, of vegetation productivity, and of ecosystem resilience. Realistic research and conservation goals must be based on a long-term vision, thinking big but starting small.

Even more than in politics, conservation is the art of the possible. It is a slow and iterative process. All the projects described have histories of slow but incremental progress, never linear but always opportunistic, seizing the moment while imagining the future.

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