What makes the Namibian flora unique? Variable environmental conditions have created a diverse flora with mainly palaeotropical floral elements in the north, cold-temperate elements in the south, and transitional elements between the two. Apart from current conditions, climatic history plays an important role in determining the present floral composition of Namibia. Moister conditions in the distant past, prior to establishment of the Benguela Current, created relatively mesic conditions supporting a less arid-adapted flora. With increasing aridity since then, many tropical and cold-temperate species were forced to retreat to wetter habitats. Some of these species survived in favourable microhabitats even in the desert. The Namib escarpment harbours many relics from wetter periods in the past.

Apart from many taxa with an interesting history, the aridity which has prevailed for millions of years has fostered a variety of arid-tolerant species. Species with bizarre growth forms and strategies, such as *Welwitschia mirabilis*, have made the Namib a popular destination for scientists for over a century.

—Antje Burke

### 1.2 Social and economic features

Namibia is a dry land with a small human population, a young government, and an excellent modern infrastructure. Yet it also has a tormented and bitter sociopolitical history that might surprise visitors, who are normally impressed with its current peaceful stability and its multiparty democracy.

How have Namibia’s social, economic, political and historical contexts influenced our present-day environmental policies and institutions? What legacy have they left on processes of environmental management, scientific research, conservation and land use planning? More specifically, do these contexts have a specific bearing on the biological diversity conservation strategies we must develop? The following sections sketch out an overview of these factors, and attempt to draw broad conclusions about the social, economic and political contexts in which biodiversity conservation actions must proceed.

#### Human palaeoecology

People have roamed Namibia’s landscapes for an extraordinarily long time, as judged from a patchy but intriguing palaeoecological record. Stone tools from the south-central plateau of the country, for example, span a sequence dating back more than one million years. Perhaps the earliest inhabitants were related to the Khoi and San pastoralists and hunter-gatherers. While dating of archaeological sites is often controversial, pastoral sites date from at least two millennia before present, and foraging bands of San people have probably roamed southern Africa, including Namibia, for at least 20 000-30 000 years.

![Early ‘written’ records of Namibian biodiversity — rock engravings at Twyffelfontein. Courtesy L C Weaver](image1)

![The Naukluft holds many clues to early human settlement. Courtesy National Museum of Namibia](image2)
Kuiseb Delta, on the Atlantic coast, range from 1870 years ago to about 130 years ago. Traces of extinct freshwater springs can sometimes be found there, along with white mussels *Donax serra* and reeds *Phragmites australis*, which still inhabit patches of the coast today. From these we can infer a highly dynamic dune-lined coast, very similar to that of today, at which small groups of nomads used resources from both land and sea.

An orthodox pre-history of Namibia dates the major immigration waves of cattle-owning pastoralists from east-central Africa, the ancestors of today’s Herero- and Aayamba (Owambo)-speaking Namibians, to the 16th and 17th centuries AD. Such accounts were intended to establish the arrival of European explorers and Bantu-speaking people at about the same time, for political reasons, and have been thoroughly refuted by archaeological evidence. Williams draws on oral records to trace early Owambo settlements to the 10th century AD or before. Copper and other minerals were mined and smelted by people settled in the north of present-day Namibia for weapons, utensils and ornamentation. Well-established kingdoms andchieftancies, with diverse and structured economies, existed long before the arrival of Europeans in Namibia.

**Political history**

The written record of Namibia’s history has been mainly one of bitter resource conflict. The territory had certainly not been free of conflict before European exploration and settlement, but was characterised by periodic violent clashes of nomadic pastoral clans over grazing and other rights, and somewhat more peaceful relations between settled communities. Clashes between communities in the late 1800s allowed Europeans to negotiate advantageous land-for-weapons treaties with individual chiefs. One such agreement between trader Adolf Lüderitz and the Nama chief at the coastal port of Angra Pequena (now Lüderitz) concerned rights over land which later became one of the world’s most productive diamond-mining areas, and was seen as a pivotal historical event.

Namibia’s substantive written history begins around this time, with key events initiated, as if by remote control, by ambitious European leaders. In 1884, Chancellor Otto von Bismarck proclaimed a German protectorate in what is now Namibia, allowing for the expansion of German control into the interior with its lucrative rangelands. He dispatched Heinrich Göring (father of Nazi general Hermann Göring) as first Imperial Commissioner to ensure the acquiescence of Namibian kings and chiefs to German ‘protection.’ In Hamutenya’s words, since Germany was a late arrival to the scene of colonial expansion and conquest, it was hastier and more brutal than most of its colonial competitors. Merchants and speculators from that country had, by 1883, already acquired large chunks of Namibian land as private property and concessions. Defending the potential export markets and resource acquisitions of these early businessmen was a substantial additional reason for Germany to stake out an aggressive presence in Namibia.
The notorious Berlin Conference of 1884-85 consolidated the European hold over the entire African continent, dividing it into colonies and protectorates for political influence and natural resource exploitation. The new borders were based more on perceived resource distribution than on intrinsic cultural, geographic or ecological divides. This extraordinary process rapidly transformed Africa, including Namibia, into a ‘sphere of monopoly expansion and influence.’

The century following the Berlin Convention was frequently marked by appalling and brutal administrative and military policies on the part of successive German and South African colonial administrations. Policies and actions by the colonists to expropriate land, livestock, and other vital natural resources held by Herero- and Nama-speaking clans led to the ‘Great Uprising’ or ‘Great War of Resistance’ in 1904-1908. Of roughly eighty thousand Hereros, only about fifteen thousand survived, and many of these were driven across the Kalahari into Botswana. More than half of the Nama people, and at least a third of the Damaras, were exterminated. More than 17 000 survivors of these massacres were brutally thrown into concentration camps, where nearly half died. Africans living in the ‘Police Zone’ after 1908 were barred from owning cattle, forced into indentured labour on settlers’ farms, and progressively driven onto ethnically-divided ‘native reserves.’ This policy was continued with greater fervour by South African colonial planners.

The outbreak of World War I led to military occupation of Namibia by British South Africa in 1915, supported by many Namibian kings and chiefs, and marked the end of German rule. In 1920 the League of Nations granted South Africa a mandate to administer the land, with obligations to promote the welfare of Namibians which were generally ignored. A legislative assembly for whites, set up in 1925, constantly lobbied for the inclusion of Namibia into South African territory. Hopes for the restoration of land confiscated by the Germans were frustrated, as prime land was parcelled out to Afrikaans settlers under a costly subsidised settlement scheme in the 1920s and 1930s (Fig. 1.19). Two uprisings against such policies in the 1920s were violently crushed by South African police. The German colonial programme of resource exploitation and land theft, backed up by brutal armed force, was thus continued more systematically by the South Africans.

Resource conflicts also plagued Namibia’s efforts to free itself from South African rule, which was subject to Cold War meddling in the interests of political influence and land control. Namibia was declared a trust territory with rights of self-determination by the United Nations in 1945, just after the UN’s birth. It became a battleground for political posturing by South Africa, which rejected the UN’s authority, by the UN and Namibian resistance bodies, which rejected South Africa’s authority, and later by the USA, USSR and Cuba, which were engaged in wars for regional political and economic influence. The UN terminated South Africa’s mandate in 1966, set up a council with authority for the territory and appointed a commissioner in 1974. The Security Council called for UN-supervised elections, endorsing an International Court of Justice ruling on the illegality of South Africa’s occupation. All of this failed to force South Africa from the territory. Only in 1989, when UN-sponsored elections were imminent, did the South African media report that Pretoria’s war effort in Namibia and Angola was simply too costly to sustain, at a million rands per day.

Following Independence on 21 March, 1990, and the election of a multiparty democratic
government led by the Southwest African People’s Organisation (SWAPO), Namibia has finally made strides to redress the resource inequalities of the past century. The national constitution supports a unitary republic with a bill of rights, an executive president and strong prime minister, a two-chamber legislature, multiparty elections, and an independent judiciary. Ownership of land, water and other natural resources is vested in the State unless otherwise ‘lawfully owned,’ and the State must pay market-related compensation for property it nationalises or expropriates.

Land reform, so central and burning an issue throughout the colonial period, has been broached, but not substantially implemented eight years after Independence. Major public land reform conferences were held in 1991 and 1994; legislation to support reform is in effect or underway; and technical groups are studying ways to implement recommendations of the conferences. Yet public perception is that few, if any, real changes have taken place in the ownership of major enterprises, or in the distribution of land and wealth. This has posed difficulties for the government in striking a balance between its policy of national reconciliation, which aims to unite formerly divided communities, and its land reform policies, which aim to redress social and political inequality within a mixed economy (see below, ‘Land use and the economy’).

However, these statistics are deceptive. Namibia’s sparse population density has led to much complacency, as captured in a popular pre-Independence bumper sticker, ‘Sleep with a Southwester: we need more of them.’ The missing ingredient in this misguided sentiment is, of course, awareness of Namibia’s acute limitations in the physical ability of its land to support more people. The country’s dry climate, erratic and very localised rainfall, infertile soils, and large areas of saline groundwater make most of the land unable to support much higher population densities.

Combined with highly skewed distribution of wealth, low economic productivity and inequal access to resources and appropriate technology, these constraints in effect make some areas of Namibia already overpopulated, with unsustainable population densities and growth rates in several areas. Most sparsely populated regions of the country, such as in the south, cannot support significantly higher human densities due to the patchy availability of surface and non-fossil groundwater.

Namibia may have a low overall human density, but our estimated annual population growth rate of 3.1% is one of the world’s highest. It is the highest in southern Africa, which averages 2.4% population growth, even though our country is the region’s most arid. This rapid growth is certainly not sustainable. Per capita economic growth often lags behind population growth (Box 1.2; see Chapter 4). Namibia’s economy grew fast in the years after Independence, reflecting an optimistic investment climate and government commitment to stimulating the economy. However, our leaders face a herculean task to maintain our current political and economic stability in the face of this population pressure.

Bay enclave which was then under South African control, with a projected 1995 population of 1.61 million. Overall, there are about 1.7 people/ km². Dry countries of a similar size, such as Pakistan or Turkey, by contrast, have about 30 times the population.

Fig. 1.10 Independence Day 1990. Courtesy National Archives of Namibia

Demography

Descriptions of Namibia commonly note that we have one of the lowest human population densities in the world, and the third lowest in Africa after Western Sahara and Botswana. Namibia has nearly 3% of Africa’s total land area, but only about 0.2% of its population. The 1991 national census estimated our population at 1.43 million, including the Walvis
The government has made large strides in managing the daunting social and health needs of the Namibian population. For example, ambitious primary health care programmes, including family planning initiatives, were launched by the Ministry of Health and Social Services after Independence. These have involved massive investment in infrastructure, staff and training. Namibian women currently have an average of 6.1 children in their reproductive lifetimes. Yet a woman’s fertility decreases rapidly with increasing education (Box 1.3). Government efforts to improve access to health care and education, and combatting poverty, will thus help manage our population growth.

Fig 1.11 Water is often trucked to rural settlements with no potable surface water. Courtesy Ministry of Information and Broadcasting (M Namundjebo)

Fig. 1.12 Projected human population growth and postulated resource crises facing Namibia
Courtesy C Ashley

<table>
<thead>
<tr>
<th>Box 1.2 Population and economic growth in Namibia</th>
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<tr>
<td><strong>Annual real economic growth (averaged)</strong></td>
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<td>Real GDP growth</td>
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<td>Per capita real GDP growth</td>
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Source: NPC

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<th>Past and projected future population growth (averaged)</th>
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<td>1980-85</td>
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<td>Annual population growth</td>
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Source: WRI

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<th>Box 1.3 Human fertility in Namibia</th>
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<td><strong>Mean total fertility</strong></td>
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<tr>
<td>Rural</td>
</tr>
<tr>
<td>Urban</td>
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<td>All women</td>
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No education | 8.8 |
Completed grade 7 | 7.2 |
Completed grade 10 | 4.2 |
Completed grade 12 | 3.1 |

Source: NPC

No longer self-sufficient in water
No longer self-sufficient in wood
No longer self-sufficient in food

Competition and conflict over scarce resources

?
Land use and the economy

Namibia is mainly an agricultural and mining nation, with important marine fisheries. It depends heavily on both imports, such as food, manufactured goods, and technology, and exports such as beef, fish and minerals. Like many other arid developing countries, Namibia's economic output is highly sensitive to fluctuations in climate and world market prices, (see also Chapter 4).

Prior to Independence in 1990, mining and commercial agriculture jointly accounted for about 30% of Gross Domestic Product (GDP) and 75% of total exports. The mining sector has remained extremely influential, with diamonds, uranium and base metals mined mainly for export. This sector is a major landholder. Large areas on Namibia's arid southwest coast have been controlled by the diamond industry since 1908 (see Protected industrial areas, below). Namibia's stocks of minerals and various other natural resources are being factored into the national accounting systems as a tool for sustainable development planning (Box 1.5).

As an arid country with infertile soils, Namibia has large tracts of land that are unsuitable for livestock or crop production, and almost no potential for the expansion of irrigation. Food self-sufficiency by the year 2020, an oft-cited policy goal, is therefore conceivable only for specific items such as beef, mutton and fish. The subsistence farming sector produces only 1.5% of GDP, but is an essential means of livelihood for about 70% of the population. GDP statistics are therefore not a very meaningful index of economic activity for most Namibians. The gap between rich and poor is desperately large: income inequalities are believed to be the highest in the world.

Map 1.9 summarises the distribution of Namibia's major land tenure systems, which are outlined below.
Map 1.9  Major land uses in Namibia

Land Tenure

- State protected nature area
- Open communal area
- Sub-divided and surveyed communal farmland
- Tourist recreational area
- Restricted area for mining
- Commercial farmland

Major towns
Small state protected areas

Source:
Various Government Gazettes published by the Government of Namibia.
Ministry of Lands, Resettlement and Rehabilitation Division of Survey and Mapping 1:250000 maps.

© National Remote Sensing Centre 1997
**Box 1.5 Natural resource accounts**

Stocks and flows of natural resources are rarely reflected in national accounting systems, despite the overwhelming dependence of most countries on their natural resource base. Namibia, like many developing countries, depends on exports of natural resources. Ensuring that our national decision-making adequately reflects the true costs and benefits of natural resources requires a system of natural resource accounting, or NRA.

Together with support from New York University, Namibia's environmental economics unit at the Directorate of Environmental Affairs (DEA) has embarked on a programme to integrate NRA principles into the national accounting system by building 'satellite accounts' for natural resources. These accounts have many uses, such as helping the government assess whether it is maximising revenue from individual resources, or which uses of water are most valuable to the national economy. NRA analysis can also help governments plan for the ultimate obsolescence of industries based on non-renewable resources, such as minerals, by investing profits in sustainable industries. The Namibian NRA project began in 1996 and has already completed several valuable analyses for policy-makers.

— Rob Blackie

Land use practices in Namibia today, towards the close of the 20th century, stem directly from the massive social-engineering policies of the colonial past. The apartheid 'homeland' policies of the South African administration, and the German administrative distinction between 'Native Reserves' and 'Crown Land,' played dominant roles whose shadows are still cast on the country today. By reserving prime land for white settlers, both colonial powers gradually squeezed black Namibians onto land that was agriculturally marginal, prone to human or stock diseases, or both. This grim pattern was repeated throughout Africa wherever European settlers were a powerful political and economic force, but reached a zenith in South Africa and Namibia. Despite wartime disruption to South Africa's costly resettlement scheme for white farmers in Namibia, an ethnically based policy of land exclusion was well established by the 1930s.

Increasingly ostracised by the UN and world community for its apartheid policy and illegal occupation of Namibia, South Africa in 1971 went ahead to implement recommendations of the notorious Odendaal Commission report. This was Pretoria's most ambitious blueprint for 'separate development' in Namibia. It set up ethnic 'homelands' along the South African model, mostly at the edge of the commercially-farmed, white-occupied central highlands. The per capita allocation of land was 54 ha for blacks and 'Rehoboth Basters,' people of mixed racial descent, and 444 ha for whites. These homelands were never viable in structural or economic terms, but were a way of controlling a cheap labour pool for white-owned enterprises.

By the late 1970s, Namibia had a core of heavily subsidised ranching land in the 'white heartland,' surrounded by much more densely settled homelands which often had poorer soil or groundwater. This state of affairs is still largely intact today. Of the roughly 6100 commercial farms in Namibia, mostly large cattle and sheep ranches, about 89% are owned by local white farmers, 9% by non-Namibians, and 3% by black Namibians.

Other than mining and agriculture, conservation and tourism are collectively increasingly important in terms of land surface and GDP (see below and Chapter 4). Finally, urban development is a rapidly growing land use in Namibia, albeit on a smaller scale than in many countries (below).

**Agriculture and traditional land uses**

Namibian agriculture is in many ways typical of dryland farming throughout the world, with heavy emphasis on livestock production. Most farmers keep goats, cattle, sheep, ostriches, game mammals or a combination thereof. Much of the land zoned for agriculture in Namibia is suitable only for nomadic or rotational grazing due to poor surface water availability, erratic rainfall and thin, infertile soils in much of the country. Only about 6.5% is suitable for mixed arable farming, where soils are suitable and mean.
annual rainfall exceeds 500 mm. Less than 5% of Namibia is under irrigation. This is at or near the theoretical maximum due to water availability and salinisation risk. Namibia is thus essentially a range country, with reasonably diverse rangeland uses.

An extremely important sector in terms of human livelihoods is non-commercial or subsistence farming on communal land. Most communal farmers, in addition to stock management, plant small seed crops such as millet (omahangu) Pennisetum glaucum, sorghum Sorghum bicolor, beans Vigna unguiculata, pumpkin Cucurbita moschata, and melons (Citrus lanatus and Cucumis melo). Many people also gather wild foods and keep poultry (Chapter 4).

Traditionally, many of Namibia’s people were nomadic pastoralists, moving animals long distances to find water and grass where it was available. Pastoralism or ‘transhumance’ was widely practised in catchments of the western ephemeral rivers for at least 4000 years, but started to disappear with the arrival of Namibia’s first colonists in the nineteenth century. Movements of the OvaHimba people within the Khumib catchment were an excellent example of an appropriate rotational grazing system in arid rangelands.

The introduction of communal land areas as outlined in the Odendaal Commission report has interfered with this transhumance system, leading in some areas to environmental degradation. As a direct consequence of this, indigenous farmers lost their traditional ability to defend and manage their seasonal pastures or grazing areas. Historically many Namibian farmers were forced to live under reserve conditions, and those who worked as labourers on commercial farms had little or no land or livestock. The traditional management practises and ecological knowledge of communal farmers can greatly assist agrarian reform. While some traditional practices and knowledge may be incompatible with new technologies, it is better to foster the wisdom and knowledge contained in these practises, and accept them as an integral part of modern, environmentally sustainable range management.

Agricultural development in communal areas was neglected for many years. Formal extension services did not exist until recent decades, and trainers appointed to extension posts did not receive adequate guidance or supervision. Financial credit and agricultural extension assistance to communal farmers has greatly improved since Independence.

Beginning in the early 1960s, veterinary cordon fences known as the ‘Red Line’ were erected to restrict the southward movement of cattle raised on communal farmlands. These cordons were prompted by the risk of transmission of stock diseases such as bovine lungsickness (CBPP) and foot-and-mouth disease (FMD, see Appendix 6), and followed directly from a major outbreak of FMD in 1961. Discussions have gone on for some years about the possible removal of these fences to allow equal marketing opportunities for communal stock farmers, but the issue is highly controversial.
Namibian overview

The livestock export industry is based almost entirely in the commercial sector, south of the Red Line, and earns considerable foreign exchange. Currently, it is worth about N$800 million annually, with increasing export volumes making up for short term drops in meat prices. Eighty percent of commercial animal production (meat, meat products, live animals) is exported. Most meat exports have been to South Africa and the European Union. Trade in canned meat from communal areas north of the Red Line has been previously been authorised under EU regulations, but stringent hygiene and veterinary disease controls are more difficult to maintain in the less-developed communal farmlands.

Karakul sheep production, mainly in southern Namibia, has historically been the second most important branch of commercial agriculture after beef, but sensitivity to fluctuating international market prices for pelts has harmed the industry and greatly reduced its contribution to GDP. During the same period, wildlife farming has become increasingly important, as it is linked to the fast-growing tourism sector (see below).

Mining

Charles Darwin's cousin, the explorer Francis Galton, in 1851 noted Ovambo tribesmen smelting copper from surface deposits near Otavi. Commercial mining was established at about the same time in 1854-55 with the formation of the Walvisch Bay Mining Company to exploit copper.

Mining has long been the backbone of the Namibian economy, and remains the major contributor to the country's GDP and export revenues. Revenues are highly sensitive to world market prices and fluctuate accordingly, but commonly account for over 70% of export earnings, 11-25% of GDP, and roughly 25% of government revenues. Although in the early 1980s mining strongly dominated the economy, contributing over 40% of GDP, economic diversification and global market prices have gradually reduced this rate to about 11% in 1995.

Small to medium mineral deposits and mining claims occur throughout much of Namibia. The two main operations, NAMDEB Diamond Corporation in the Spergebiet (see below) and Rössing Uranium in the central Namib currently earn the country most of its minerals-related foreign exchange. The Spergebiet is by far the largest mining area and the only one legally proclaimed and restricted for mining. The 186 km² Rössing mining area, east of Swakopmund, was historically the major water consumer of the central Namib. It has significantly decreased its consumption and now features corporate measures to limit and monitor negative environmental and health impacts of mining.

Copper and other base metals are mined from several sites and smelted at Tsumeb, and gold is mined at the Navachab site near Karibib. A major copper mine at Haib in southern Namibia may commence operations in 1999, and the feasibility of exploiting extremely pure cathode zinc deposits at the Skorpion mine is under study. About 40 formal mining operations are active in the country, producing 30 commodities such as diamonds, uranium, semi-precious stones, base metals such as copper, gold and zinc, industrial minerals such as petalite and fluorspar, and dimension stones such as granite and marble.

Other resources of significance which are mined in Namibia include seabird guano and salt (Box 1.6). There are also sizeable offshore reserves of natural gas and oil, for which extensive prospecting has taken place.

Historical links between mining and abuse of the environment are clear. Namibia is littered with the rusting remains of abandoned and unrehabilitated mines. Although mining activities need not be contrary to the aims of environmental conservation, mines in Namibia were historically the realm of entrepreneurial frontiersmen who often worked the mines in conditions of great hardship and abandoned them in bankruptcy. Modern mining activities rely on increasingly sophisticated technologies. Although they are increasingly accompanied by environmental assessment and monitoring programmes, certain mining activities which may significantly threaten biodiversity.
Box 1.6 The guano harvesters

The guano mining industry of the past is an instructive example of the boom and bust exploitation of a natural resource. It has also become an example of a modern industry successfully integrating economic activity and environmental conservation. After the 1828 discovery of Namibian guano deposits and the 1840s ‘guano rush,’ it took less than 18 months to strip centuries-old deposits which lay 15 m thick in places. Guano mining threatened breeding red data seabirds such as penguins, cormorants, and gannets. In 1987 all islands were declared nature reserves to protect their seabird populations. Harvesting of guano off mud banks at Sandwich Harbour and Walvis Bay led to a dramatic drop in the cormorant population, and a corresponding decrease in the guano that could be collected at these sites. The balance between guano harvesting and seabird roosting was restored with the erection of artificial guano platforms which offer protection from human disturbance and predators. Today, the Namibian guano enterprise has evolved into a flourishing industry which balances economic development and conservation.

— Sources: Brown and J Terr

Fig. 1.17 Courting gannets. Courtesy C Beyers

The Namibian Government’s stated aim is to create real wealth through environmentally acceptable and sustainable mining development, and to minimise threats posed by mining activities to the environment and biodiversity. Therefore a new Prospecting and Mining Act (33 of 1992) was formulated, with provisions to ensure good mining practices which protect the environment during prospecting and mining. Combined with new fiscal incentives for operators to rehabilitate mines and repair environmental damage, these provisions now provide a basis for environmental protection. All mineral licenses require licensees to prepare an Environmental Assessment (EA), indicating the extent of any environmental pollution prior to the onset of prospecting or mining activities, together with an estimate of any potential impacts.

— Sem Shikongo

Fisheries

Commercial marine fisheries and subsistence inland fisheries are both important in Namibia (Chapters 2 and 3). In terms of the national economy, the marine sector is vastly more important, although freshwater fisheries form an essential component of many rural people’s livelihoods.

The marine fish resources of Namibia were, until recently, among the richest in the world. The Benguela Current off Namibia and South Africa is one of the world’s most powerful and productive upwelling systems, supporting lucrative marine industries (see Chapter 3).
Namibian overview

Following an all-too-familiar trend, however, heavy overexploitation of pelagic fish off Namibia in the 1960s and 1970s led to the collapse of populations of several economically important fish, especially pilchard or sardine Sardinops sagax. This was due to a potent mix of factors, including free-for-all exploitation by increasingly large fleets from countries such as South Africa, the former Soviet Union, and Spain; lack of local control and enforcement; inadequate scientific data for the accurate estimation of fish stocks; and lack of foresight or responsibility by individual authorities in the colonial period.  

This history badly crippled the potential for subsequent development of the industry. Even with moderate continued exploitation, many fish species take decades to recover from population bottlenecks (see also Chapter 3). The greatest prudence is thus needed to protect stocks sufficiently in order to free the industry from the effects of past greed and overexploitation.

Despite this history, marine resources remain an important, indeed increasingly important, sector of the Namibian economy. From 1980 to 1997, fishing and its associated secondary industry of fish processing grew, as a percentage of GDP, from 1.8% to 8.5% at current prices.  

Efforts in 1990 to secure protection of a 200 nautical mile (nm) exclusive economic zone have greatly reduced the uncontrolled overexploitation of fish resources. Resource protection could be further secured by a proposed convention to cede management control over the entire marine area between Angola, Namibia, South Africa and the mid-Atlantic islands of St Helena, Ascension and Tristan da Cunha to these governments. Regardless of the size of the area under local or regional management, however, the fishing industry remains highly vulnerable to environmental variability, as well as to local overharvesting.

Inland fisheries play a lesser role nationally, but are extremely important in the subsistence economies of many people in northern and northeast Namibia (section 2.9, Freshwater fish diversity). Fish from perennial and seasonal wetlands are harvested, in some cases probably unsustainably, mainly for subsistence, and are sold commercially only on a very limited basis. Aquaculture in freshwater systems has been little developed, but recent legislation is currently being drawn up by the Ministry of Fisheries and Marine Resources (MFMR), and a White Paper on inland fisheries policy was recently published.

Forestry and watersheds

Namibia has a relatively long, if chequered, history of forestry management. Before the colonial era, traditional leaders in many areas exercised control over the harvesting of trees. These controls may have been effective for many centuries, judging from oral records, although they depended on individual wisdom (see Box 1.7).

The first written regulations for woodland management date from the late 19th century. During the German colonial period (1884-1915), forest advisors such as government botanist Kurt Dinter developed management policies to support the increasing demand for timber and other wood products. A research station was started near Windhoek as early as 1900. Once South Africa took over the administration of Namibia in 1915, however, forest legislation enacted by the Germans was replaced with laws widely seen as weaker and virtually unenforceable. During South African rule foresters were answerable to Pretoria, not Windhoek, and were housed in numerous ethnically-based regional administrations.

Fig. 1.18 Charcoal production. Courtesy HH Kolberg
Box 1.7 Protected forest groves: the history of Chongo-camasaku Kakambi

The Chongo-camasaku Kakambi forest lies on the southern Chobe floodplain of east Caprivi, within the territory of the Subiya villages of Mahundu and Ibbu. It is a 15 ha hummock forest, typical of the landscape patches between wet floodplain and drier hillocks. Its main trees are Hyphaene petersiana (Munganda in the Silozi language), Lonchocarpus capassa (Mupanda), Dichrostachys cinerea (Muselesele), Pilostigma thonningii (Mubabama), Ficus sycomorus (Muchaba), Adansonia digitata (Mubuyu), Faidherbia albida (Muunga), Trichilia emetica (Musikili) and Kigelia africana (Mupolota). These all occur in a range of ages.

Old people in the villages say that 70 years ago this was not a forest, but a patch of bushes only as tall as a man. At that time, flooding in the Chobe was more regular and extensive than now, and this checked the growth of vegetation. Only on small islands could the more flood-sensitive species survive. As the floods diminish in extent, woodlands are expanding. In Chongo-camasaku Kakambi, what was 'bush' has now developed into a small forest grove. People have increased the species richness of the forest. Local people say that H. petersiana palms were introduced using seed brought from Mbalakalunga in Botswana.

The forest was also afforded protection for its very strong cultural significance. The traditional use of Chongo-camasaku by people of Mahundu and Ibbu villages was restricted because the area was historically a burial ground for Subiya families and a site for spiritual rain ceremonies. Traditionally, only one family was allowed to enter the forest — others who did would become lost. During the second Lozi empire in east Caprivi (1864–1909), Chief Chika Liswani authorised the Kakambi family to settle in the area to protect the centre of the Subiya territory from roaming Zulu and Ndebele groups. Before he died, people would gather at his homestead, and thereafter his burial site in the forest, to ask him to bring rain.

Restrictions on use of the forest were limited. People could collect fruit and fibre as they needed. However, they could only use the forest by day, and would suffer if they entered by night. With time, though, some of the traditional restrictions eroded. Fearing that traditions would be lost altogether, the Ibbu community decided to keep the history of the Chongo-camasaku alive and to revive protection of the forest. Headman James Munihango explains:

'Now we are deciding to re-originate our traditional culture as well as to secure this place. We have decided to protect this area on condition that it is important for our history and because of certain plant species like Munganda and Mubuyu trees, which can be found within the forest. Sometimes, also animals are found in this Chongo-camasaku.'

The community has decided to designate the site as a community forest. At present they are awaiting new legislation, which they hope will enable them to secure its legal protection.

— Charlotte Flower

The early German foresters had attempted to establish alien plantations to meet the demand for timber. However, even then, unsustainable timber exploitation in natural forests continued. Huge areas of woodland in the Okavango, Caprivi and Otjozondjupa regions (map 1.10) were heavily logged in the past. A good example is the virtual extinction in the mining region of Tsumeb and Otavi of tamboti Spirostachys africana, a tree exploited for use as mine props.

In places where tamboti was cut, encroachment by blackthorn Acacia mellifera detinens and sicklebush Dichrostachys cinerea africana occurred. Bush-encroached land has more recently been extensively cleared in some areas for the production of charcoal sold to the Tsumeb Corporation copper smelter, which burns about 450 tonnes per month. Yet bush encroachment remains a significant form of land degradation on nearly 12% of Namibia's land, and carries huge costs in terms of lost productivity (Chapter 4).
Box 1.8 Indigenous fruit tree development

Little is known of the ecology and physiology of indigenous fruit trees in Botswana and Namibia, despite their importance to rural people. Most species produce fruit even under harsh conditions, through adaptations to drought and marginal soils. Given present overharvesting in many areas of Namibia, fruit trees will no longer be abundant in a few years’ time.

Development of indigenous fruit trees could improve food security, reduce dependence on arable agriculture, help arrest soil erosion, and contribute to sustainable management of marginal areas in developing countries. With this in mind, a European Community-funded project called ‘Sustainable domestication of indigenous fruit trees: interaction between soil and biotic resources in some drylands of southern Africa’ began in 1997. The aim is to domesticate indigenous fruit trees and to study their effect on soils. Six species, promising both for their nutritional value and cultivation potential, have been selected in Namibia and Botswana: marula *Sclerocarya birrea*, manketti *Schinziphyton rautanenii*, monkey oranges *Styrchnos spinosa* and *S. cocculoides*, wild medlar *Vangueria infausta* and raisin bush *Grewia flava*. Researchers from different disciplines in Botswana, Israel, Italy, Germany and Namibia are studying germination requirements, nutritional value, nutrient uptake and growth enhancement through natural fertilisers such as seaweed extracts. The Namibian contribution will be done by University of Namibia MSc students.

— Sem Shikongo

Fig. 1.19 Sales of woodcarvings at Okahandja.
Courtesy HH Kolberg

Woodlands of course contribute directly to the national economy in numerous ways. The craft industry is a rapidly increasing source of income for rural craftspeople, with an annual sales turnover of tree-based crafts of over N$20 million. Okavango wood carvings, for example, may earn individual carvers N$1000-2000/yr. Woodlands contribute significantly to the economy through the charcoal industry, valued at approximately N$8 million/yr, and play an important role in the tourism industry in terms of wildlife habitat and forage as well as their inherent aesthetic value.

The Directorate of Forestry’s Strategic Plan holds as priorities:

- conserving natural ecosystems for their biodiversity and other values;
- enhancing agricultural productivity through soil and water conservation;
- supporting national efforts aimed at poverty alleviation and equitable development;
- restricting potential climate change.

One of the most significant functions of indigenous woodlands is the support they provide to the subsistence economy of people living on communal land. As a large majority of Namibians depend on woody plants for fuel, construction materials, tools, food and medicine (Chapter 4), the focus on ecosystem functioning, land productivity and
human development in the Forestry Strategic Plan reflects that poverty cannot be alleviated in degraded environments.

The most significant environmental functions of woodlands, in a global sense, are their role as repositories of genetic and other biological diversity, and their potential impact on global and regional climate by sequestering carbon and moderating humidity. Watershed (or catchment) forests play an extremely important role in the prevention of soil erosion and the regulation of water flow and quality. Where droughts and destructive floods frequently follow each other, as in many parts of Asia and Africa today, this is evidence of environmental damage to watersheds and riverine woodlands following deforestation and overgrazing. If Namibia is to avert the fate of countries such as Madagascar, Mauritius, Tanzania and Indonesia, it is essential that we protect our catchments carefully through enlightened management practices.

Woodlands in central Namibia are important protectors of the upper catchments of the west-flowing ephemeral rivers. Ephemeral rivers such as the Kuiseb, Swakop, Omaruru, Ugab, Huab and Hoanib drain the central plateau and bring life to the desert in one of Namibia’s most dramatic natural processes. Riverine woodlands are also important dry season grazing areas. They support an impressive variety of plants, animals and fungi (Chapter 2), as well as human and livestock populations. The perennial Kunene, Kwando, Okavango, Chobe and Zambezi Rivers in the north support dense human populations and many species of aquatic plants and fish (see below, and Chapters 2 and 4).

Namibia’s forest resources have, up to now, helped satisfy the basic needs of the country’s low-income rural and urban households for forest products. As human populations increase, however, there is an increasing need for vigilance to ensure that woodlands are protected and developed in a sustained way, so that they meet the diverse needs of present and future generations.

— Moses Chakanga & Phoebe Barnard

Conservation and tourism

Environment-centred tourism is a significant and rapidly increasing industry in Namibia. The country boasts an unusual blend of stark scenic grandeur, rich wildlife, diverse habitats and excellent infrastructure. Overall, tourism expanded by 166% annually in the early-1990s (Chapter 4). Before 1990, tourism was largely oriented towards self-catering South Africans in state-owned and -run resorts and angling spots. After Namibia’s Independence, the profile of foreign tourists began to shift towards wealthier, cosmopolitan visitors. Currently, a third of all foreign arrivals in Windhoek are South African, a third are German, and a third are a diverse mix of other nationalities. Many visit other countries in southern Africa as part of a regional ecotourism package.

Namibia’s Tourism Development Plan predicts 540 000 foreign tourists annually by the year 2000, with the creation of 20 000 jobs and gross foreign exchange earnings of N$1 billion. The Tourism and Safari Association of Namibia (TASA) in 1997 had 140 registered operators in Namibia catering for ecotourism, hunting safari and general tourism markets.

Fig. 1.20 Elephants in Caprivi Region. Courtesy P Tarr

Fig. 1.21 Luxury tourism lodge. Courtesy P Tarr
While capital-intensive tourism ventures have sprung up in Namibia from both foreign and local investments, these cater mainly for the wealthier foreign tourist. More recently, private individuals and rural communities are beginning to diversify their livelihoods into small-scale ecotourism ventures for the lower budget, more adventurous tourist (Chapter 4). Private guest farms, bed-and-breakfast concerns, small private lodges and community-run campsites have helped create a very diverse tourism industry based on scenic attractions and wildlife (Fig. 1.21).

How do these different ventures influence biological diversity conservation in Namibia? Indirectly, they have a strong positive effect in terms of income and job creation in environment-related fields at the private, community, or national levels (Chapter 4). Directly, they increase the proportion of habitats being protected in a relatively undisturbed state, considerably augmenting the network of state protected areas\(^2\) (Chapter 2). The Namibian government has long recognised that tourism depends heavily on a pristine and attractive environment, as reflected in the combined Ministry of Environment and Tourism (MET). More recently, associations such as the Namibian Community-based Tourism Association (NACOBTA) have been founded by private and community operators in the expanding environmental tourism market (Fig. 1.22).

For rural communities, small-scale tourism initiatives can mean the difference between a life of poverty exacerbated by drought, and one of enterprise, pride and modest financial success. People in communally-held areas of Namibia used to be alienated from rights to wildlife and other natural resources on that land. Since 1996, amendments to the Nature Conservation Ordinance have allowed well-defined communities to regain the rights to manage, use, and benefit financially from wildlife (Chapter 5).

Ecotourism has been one such avenue of benefit for rural people, and can potentially flourish even faster than private tourism ventures on commercial farmland.\(^7\) The advantages to communities are considerable, in terms of economic diversification, financial buffering against drought, job creation, use of local skills and knowledge, and training in new skills such as management, hospitality, and languages\(^3\) (Chapter 4). However, the direct influence on biological diversity of tourism ventures, and land management practices associated with them, is much less easily quantified. Where land is protected from other forms of development for overall scenic and pristine attractiveness to tourists, biological diversity is likely to be effectively conserved. Where game-viewing or hunting are specifically offered to tourists, however, the potential exists to manage land for the benefit of large, sought-after species, and not necessarily for the benefit of biodiversity as a whole (Chapter 4).

- The state protected area network

Namibia’s state-controlled protected area network (PAN) consists of 21 parks and reserves proclaimed under section 14 of the Nature Conservation Ordinance (map 1.9; Box 1.9). These state parks alone make up about 13.8% of Namibia’s land area. Two of our national parks, Etosha and Namib-Naukluft, are among Africa’s biggest and most important parks. Etosha National Park (previously ‘Game Reserve no. 2’) was dramatically reduced in size by over 70% to gain land for ethnic partitioning under the terms of the 1964 Odendaal Commission report.\(^4\) Prior to that, it was among the biggest parks in the world, with at least 88 000 km\(^2\) protected in a rugged and endemics-rich area stretching from Etosha Pan to the coast (Box 1.9).
## Box 1.9 Namibia’s state-controlled protected areas

<table>
<thead>
<tr>
<th>Park</th>
<th>Area (km²)</th>
<th>Established</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Etosha National Park</td>
<td>93,240.00</td>
<td>1907</td>
<td></td>
</tr>
<tr>
<td>amended</td>
<td>89,834.00</td>
<td>1947</td>
<td></td>
</tr>
<tr>
<td>amended</td>
<td>99,526.00</td>
<td>1958</td>
<td></td>
</tr>
<tr>
<td>amended</td>
<td>27,554.00</td>
<td>1963</td>
<td></td>
</tr>
<tr>
<td>amended</td>
<td>22,912.00</td>
<td>1975</td>
<td></td>
</tr>
<tr>
<td>2 Namib-Naukluft Park</td>
<td>49,768.00</td>
<td>1907</td>
<td></td>
</tr>
<tr>
<td>3 Gross Barmen Hot Springs</td>
<td>0.10</td>
<td>1968</td>
<td></td>
</tr>
<tr>
<td>4 Caprivi Game Park</td>
<td>5,715.00</td>
<td>1968</td>
<td></td>
</tr>
<tr>
<td>5 Hardap Recreation Resort</td>
<td>251.77</td>
<td>1968</td>
<td></td>
</tr>
<tr>
<td>6 Daan Viljoen Game Park</td>
<td>39.53</td>
<td>1968</td>
<td></td>
</tr>
<tr>
<td>7 Cape Cross Seal Reserve</td>
<td>60.00</td>
<td>1969</td>
<td></td>
</tr>
<tr>
<td>8 Ai-Ais/ Hunsberg Reserve Complex</td>
<td>461.17</td>
<td>1969</td>
<td>then called Ai-Ais Hot Springs Huns Mts incorporated</td>
</tr>
<tr>
<td>amended</td>
<td>3,461.17</td>
<td>1988</td>
<td></td>
</tr>
<tr>
<td>9 South West Nature Park</td>
<td>0.04</td>
<td>1970</td>
<td></td>
</tr>
<tr>
<td>10 Skeleton Coast Park</td>
<td>8,000.00</td>
<td>1971</td>
<td></td>
</tr>
<tr>
<td>amended</td>
<td>17,450.00</td>
<td>1973</td>
<td></td>
</tr>
<tr>
<td>11 Waterberg Plateau Park</td>
<td>405.49</td>
<td>1972</td>
<td></td>
</tr>
<tr>
<td>12 Von Bach Recreation Resort</td>
<td>42.85</td>
<td>1972</td>
<td></td>
</tr>
<tr>
<td>13 Nat’l West Coast Recreation Area</td>
<td>13,000.00</td>
<td>1973</td>
<td></td>
</tr>
<tr>
<td>amended</td>
<td>7,800.00</td>
<td>1974</td>
<td></td>
</tr>
<tr>
<td>14 Nat’l Diamond Coast Recreation Area</td>
<td>50.49</td>
<td>1977</td>
<td></td>
</tr>
<tr>
<td>15 Naute Recreation Resort</td>
<td>224.62</td>
<td>1988</td>
<td></td>
</tr>
<tr>
<td>16 Mangetti Game Camp</td>
<td>482.92</td>
<td>1988</td>
<td></td>
</tr>
<tr>
<td>17 Popa Game Park</td>
<td>0.25</td>
<td>1989</td>
<td></td>
</tr>
<tr>
<td>18 Mahango Game Park</td>
<td>244.62</td>
<td>1989</td>
<td></td>
</tr>
<tr>
<td>19 Khadum Game Park</td>
<td>3,841.62</td>
<td>1989</td>
<td></td>
</tr>
<tr>
<td>20 Mudumu National Park</td>
<td>1,009.59</td>
<td>1990</td>
<td></td>
</tr>
<tr>
<td>21 Mamili National Park</td>
<td>319.92</td>
<td>1990</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>114,079.98</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*a Updated from Baker. As not all parks have been precisely measured with modern techniques, size data for some are not yet definitive.

*b Pre-1963 data for Game Reserve no. 2 (now Etosha National Park) are probably inaccurate; the park may never have been larger than c. 88,000 km². (1963, 1974)
On its own, Namibia’s large, relatively very well-managed state protected area network is ecologically unrepresentative, and is thus not wholly adequate as a basis for protecting our biological diversity. In some cases, private and community conservation efforts help fill this gap, but additional protection measures are needed in others. Chapters 2 and 3 identify areas of unusual ecological value, many of which need additional protection.

- **Conservancies**

**Conservancies** are land units managed jointly for resource conservation purposes by multiple landholders, with financial and other benefits shared between them in some way. They occur on both commercial (private) and communal (tribal) land. Most aim to enhance habitat for, and numbers of, game species such as ungulates or gamebirds, and many draw income from tourism ventures. Over 10 000 km² of farmland has so far been consolidated into nine commercial conservancies, ranging in size from 600 km² to 2 300 km² and bound by constitutions and ecologically-sensitive land management plans. Other commercial conservancies are now being formed. Many are increasing in size, as previously skeptical landowners agree to join existing conservancies.

Communal land conservancies are also being developed by some rural communities, and will mainly be very large. As of late 1997, five large communal conservancies have submitted formal proposals for gazetting. One of these is an area of about 9 023 km² managed by Ju’Hoan (San) people at Nyae Nyae in the ecologically diverse Tsumkwe pan region. Another is an arid region of almost twice this size in the former western corridor of Etosha National Park, stretching along the eastern boundary of the Skeleton Coast Park. The proximity of state protected areas offers rural people in these regions considerable potential for financial and economic gain, making ecotourism and conservancy management very attractive land use options.

Conservancy management is a land use which complements, and does not necessarily exclude, traditional farming. It can thus diversify people’s livelihoods, broaden their resource dependence as a means of coping with drought, and potentially double household incomes. Many rural communities have been stimulated to form conservancies by the government’s recent policy to return resource management rights and responsibilities to carefully defined conservancy committees with an approved constitution. Most communities which have expressed a desire to form conservancies are expected to have formalised them by the year 1999. To compete with other land uses, however, all wildlife-based initiatives must remain financially and economically competitive, which means making optimal and sustainable use of wildlife resources. Any actions undermining the principle of sustainable wildlife use may therefore jeopardise biodiversity conservation aims in Namibia.

- **Private reserves and game farms**

Privately owned nature reserves and game farms can play a significant role in biodiversity protection in Namibia. Some are extremely rich in endemic species, unique landscape features, or both (Fig. 1.25). Both categories are fairly abundant on commercial farmland. As of 1995 there were 148 private nature reserves totalling 7642 km², or 0.9% of Namibia’s land area, registered with the Ministry of Environment and Tourism. Statistics for the number and extent of game farms are unavailable, but game farming has become a multi-million dollar local industry since 1967, when commercial landowners were granted rights to use and benefit from wildlife on their farms, subject to certain conditions.

Private reserves and game farms differ in legal status and management system (see also Chapter 5) and their success in conserving biodiversity has not yet been formally evaluated in Namibia. Regulations applying to private nature reserves are generally stricter than those for game farms, so private reserve owners who wish to hunt game for commercial purposes must first deproclaim their land. Largely for this reason,
there has been an average annual loss of about 3% of all private reserves between 1979 to 1994.\textsuperscript{85} Game farming can be both very lucrative and effective at conserving habitats. Yet because it involves deproclaiming conservation sites in the private network, it renders land less secure for conservation. Furthermore, management for desired game species may not necessarily conserve biodiversity in the broader sense.\textsuperscript{83}

Environmental conservation has only recently been recognised by the mining industry as an important by-product of its land tenure. The remoteness and prohibited status of the Sperrgebiet have kept large inland areas from being developed inappropriately. Coastal and intertidal habitats, however, have suffered major, if localised, ecological damage from mining (Chapter 3). Three Sperrgebiet habitat types or areas have been identified as environmentally most sensitive:\textsuperscript{16}

- **the Orange River valley** along the southern border is a scenically dramatic ‘linear oasis’ through arid terrain. It supports many succulent and fog-dependent species which occur nowhere else in the Namib or Namibia. The river mouth is a wetland of international significance, and the valley is immensely rich in marine and terrestrial fossils.

- **the Atlantic coast, offshore islands and coastal dune hummocks** harbour many endemic animals, breeding seabird colonies, and specialised fog-dependent lichens and hummock vegetation, as well as sites of historical, archaeological and palaeontological value.

- **the inland inselbergs, mountain ranges and rocky outcrops** are important ecological refuges for many highly restricted-range plant species and some rare or threatened animals. Once degraded, they are effectively impossible to rehabilitate. Mountains such as the Aurosberg and Roter Kamm meteorite crater combine unsurpassed scenic grandeur with a diverse and unique succulent flora.

These three zones must be stringently protected to ensure that biodiversity loss and other forms of habitat degradation cannot occur\textsuperscript{16} (Box 1.10).
Box 1.10 Options for the Sperrgebiet

How can the Sperrgebiet — unique, spectacular, largely undisturbed, agriculturally unproductive, with immense unrecognised value — best be used for Namibia’s present and future benefit? Currently, an agreement between the Namibian Government and NAMDEB restricts access as long as present mining operations continue, and until the possibility of further diamond reserves has been ruled out. What will then happen to the Sperrgebiet? Development strategies must be carefully scrutinised due to the vulnerability of the area. Any future mining and prospecting for diamonds or other minerals must be carried out with minimal damage to the environment. In the short term, Namibia can reap benefits from mining activities, but these accrue from non-renewable resources. A better alternative is to encourage sustainable ecotourism, thus drawing on the wilderness, scenic grandeur, scientific and historical value of the Sperrgebiet while protecting its largely pristine character. In the long run, this would be more compatible with the sensitivity of the area, and could generate considerably more revenue. Discussions about a sustainable management plan for the area have begun between the MET, MME, NAMDEB and other parties. Whichever paths are taken, Namibia should be careful not to forfeit the potential of the Sperrgebiet for future generations.

Sources: Pallett, 16 P Tarr & L van Rooyen27

The vast natural terrarium of the Sperrgebiet is of extraordinarily high value in terms of biodiversity and tourism. The area forms one of the last major refuges for red data mammals such as water mongoose Attilax paludinosus, grey rhebok Pelea capreolus, African wild cat Felis sylvestris, cheetah Acinonyx jubatus, aardwolf Proteles cristatus, Cape clawless otter Aonyx capensis, brown hyaena Hyaena brunnea, spotted hyaena Crocuta crocuta and bat-eared fox Otocyon megalotis.16 Many important red data wetland and seabirds rely on the Orange River mouth and islands off the Sperrgebiet coast. Over 700 plant species are believed to occur in the area, of which about 50 species (8%) are endemic to the Sperrgebiet.88 Dozens of highly restricted plants, some endemic to single mountains, may remain unclassified.88 We may expect this high plant endemism to be correlated with high insect endemism, through coevolutionary associations such as pollination and herbivory.16 Ninety lichen species, all highly fog-dependent, are found there. The area also has fascinating and impressive fossil deposits dating from the Cretaceous period about 85 million years ago.

Fig. 1.26 Central Sperrgebiet plain. Courtesy G Williamson

Wetlands

As Namibia is so arid, its wetlands have an ecological, economic and social impact greater than one might think. Most of its wetlands are ephemeral. Only five rivers, all with their headwaters in other countries, are
perennial: the Kunene, Okavango, Zambezi, and Kwando Rivers, shared with Angola, Zambia or Botswana, and the Orange River, shared with South Africa. Almost 5% of Namibia’s land area is classified as wetlands, both coastal and inland (section 2.1).

Inland wetlands are concentrated mainly in the northeast of Namibia, where rainfall is much higher. The Okavango, Kwando and Zambezi Rivers are located here, with their associated tropical wetlands covering over 5000 km². Further west is Namibia’s famous ephemeral wetland, the Etosha Pan/ Cuvelai inland delta complex with its oshana drainage channels. Many of the oshanas are fed by seasonal eundja floodwaters, originating in the Angolan highlands and sometimes flowing as far south as the Etosha Pan. Oshanas are ecologically and economically important, receiving irregular seasonal influxes of water and nutrients. They are a key source of fish and other wetland resources for rural people in the Cuvelai Basin. The seasonal Tsumkwe or ‘Bushmanland’ Pans in eastern Oshikoto Region are a stopover for migratory birds on their flights to and from overwintering grounds. Namibia’s other very important group of ephemeral wetlands is found in the catchments of the west-flowing rivers, which drain the central highlands through hyper-arid western Namibia to the Atlantic Ocean. These rivers are, in essence, linear oases for humans and many other species in the otherwise inhospitable desert.

Namibia’s coastal wetlands are few in number, but highly important ecologically. As the coastline is bleak, hyper-arid and forbidding to most non-marine life, the few sheltered bays and freshwater intrusions along its 1470 km length have assumed a disproportionate ecological significance. Coastal wetlands consist mainly of extensive mudflats, sheltered marine waters and small estuaries. Due to the productive marine upwellings of the Benguela Current (Chapter 3), and the inhospitable terrain between isolated wetland sites, Namibia’s coastal wetlands are rich in species and nutrients. Productivity of the central coast in terms of intertidal life is higher than that of the north and south.

Unfortunately, rather little is known of coastal wetland biota, with the exception of birdlife. Two coastal sites, Sandwich Harbour and Walvis Bay, host almost 200 000 migratory shorebirds during peak migration periods, and are the most critical coastal wetlands for birds in the entire southern African region. At our northern border with Angola, the Kunene River slices through extremely rugged and arid terrain to form a small but unusually rich estuary in the tropical warm-water zone. This lagoon is Namibia’s second most species-rich coastal wetland for birds, and fourth in importance for bird densities. It supports breeding Nile crocodiles Crocodylus niloticus, and two tropical turtles may breed there. The high avian species richness, tropical reptile fauna, and extreme isolation from other coastal wetlands make the Kunene mouth a unique and important site. It faces a significant threat from proposed upriver hydroelectric development.

Major threats to inland wetlands include habitat alteration through agriculture and intensive settlement, overfishing in perennial rivers, invasive alien species, and livestock overgrazing in floodplain vegetation. Main threats to the biological diversity of coastal wetlands include beach disturbance from intensive angling and motor vehicle use, pollution from offshore oil exploration, and other industrial or harbour development. In the west-flowing rivers, including the Kunene and Orange, imprudent disruptions of hydrological flow through dam construction will almost certainly cause local or national extinctions of organisms adapted to these very variable rivers.

Namibia acceded to the Ramsar Convention on wetlands of international importance in December 1995. It initially designated four wetlands as Ramsar sites: the Walvis Bay wetlands, Sandwich Harbour, the Orange River mouth (shared with neighbouring South Africa), and the Etosha Pan/Cuvelai inland delta complex. A further eight wetlands have been proposed for the list, as well as three of Namibia’s offshore islands.

Wetlands and riparian habitats are discussed in detail in section 2.1, Ecological diversity.

—Holger Kolberg & Rob Simmons
Map 1.10  Regions and major towns of Namibia

Regions and Towns

- Okavango
- Caprivi
- Ongwediva
- Oshana
- Oshikoto
- Ohangwena
- Kunene
- Otjozondjupa
- Oshetu
- Oshana
- Okahandja
- Okavango
- Oshana
- Oshikoto
- Okavango
- Kunene
- Otjozondjupa
- Oshana
- Oshikoto
- Okavango
- Kunene
- Otjozondjupa
- Oshana
- Oshikoto

Source:
Various Government Gazettes published by the Government of Namibia.

Ministry of Lands, Resettlement and Rehabilitation
Division of Survey and Mapping
1:250000 maps.

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Urban areas

By the year 2025, the United Nations estimates that two thirds of the world’s human population will live in urban areas, with 75% of these in developing countries.102 The whole of Africa is experiencing extremely rapid urban migration, and Namibia’s urban population grew from 22.7% in 1970 to 32% in 1991.103 Urbanisation in Namibia poses the same problems as in other countries: strained municipal services, squatter settlements, crime, unemployment and urban poverty. It also compounds the difficulties of managing limited water and other resources. The population of Windhoek, the capital city, has grown 5.4% per year in the last five years, tripling in size since 1970.103 Overall urban growth in the country is also about 5.4%.104

Cities and towns cover a tiny proportion of Namibia’s land area because of our small total population and industrial base. Only four towns in 1991 had populations of over 20 000 people: Windhoek, Oshakati, Walvis Bay and Rehoboth (map 1.10). Rapid urbanisation may therefore seem to pose less dramatic environmental, social and economic problems than in some nations. However, due to the country’s aridity and already overextended water resources, some water-thirsty towns are already effectively overpopulated at current consumption levels.17,103 Many towns are developing in sensitive or marginal areas, including riparian zones, and on diminishing or saline aquifers. Coastal development, especially at the rapidly growing port of Walvis Bay, has led to a 10 m drop in some areas of the Kuiseb alluvial aquifer.17 The western town of Khorixas has had an astonishing mean daily water consumption of nearly 500 litres per person, lowering water levels in its aquifer by 50 m in recent years.17

From a different angle, the drain of working people from the rural areas is a barrier to economic development and agricultural productivity there. Most urban migrants come from the northern regions of Oshana, Omusati, Ohangwena and Oshikoto, where population density is the highest of any rural or ‘peri-urban’ area in the country.103 Young men, especially, perceive their employment opportunities as better in towns and cities. Relative to the country as a whole, populations in urban areas are heavily skewed towards the 15-40 year age group, while rural populations have more children, more old people, and many fewer working-age adults. The adults, mostly women, who remain in rural areas end up shouldering a heavier daily burden of tending fields, looking after children and gathering natural resources.

Urban migrants in Namibia, as in other countries, mainly meet with frustration. In Windhoek, for example, unemployment is currently around 22%, with a further 19% of residents classed as ‘economically inactive’ housewives, students, retired workers and disabled persons. Unemployment inevitably hits the poorer suburbs the hardest, with over 33% unemployment in the Katutura area of Windhoek and 3.4% in the wealthier eastern and southern suburbs. Because it will be impossible to match economic growth to population growth, unemployment and crime will increase further, with urban tax bases and municipal services declining rapidly unless urban migration can be slowed.103