

Important Bird Areas of Namibia

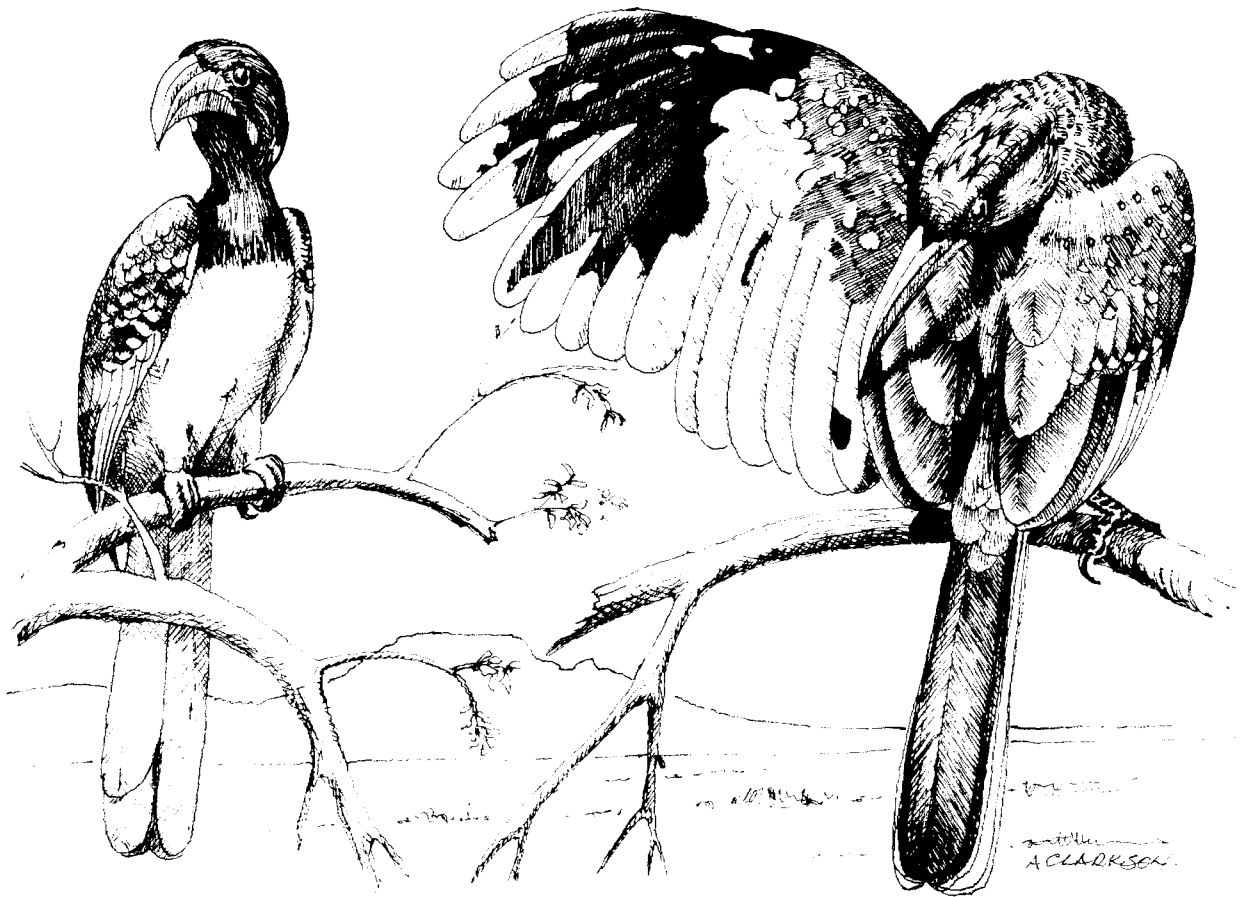
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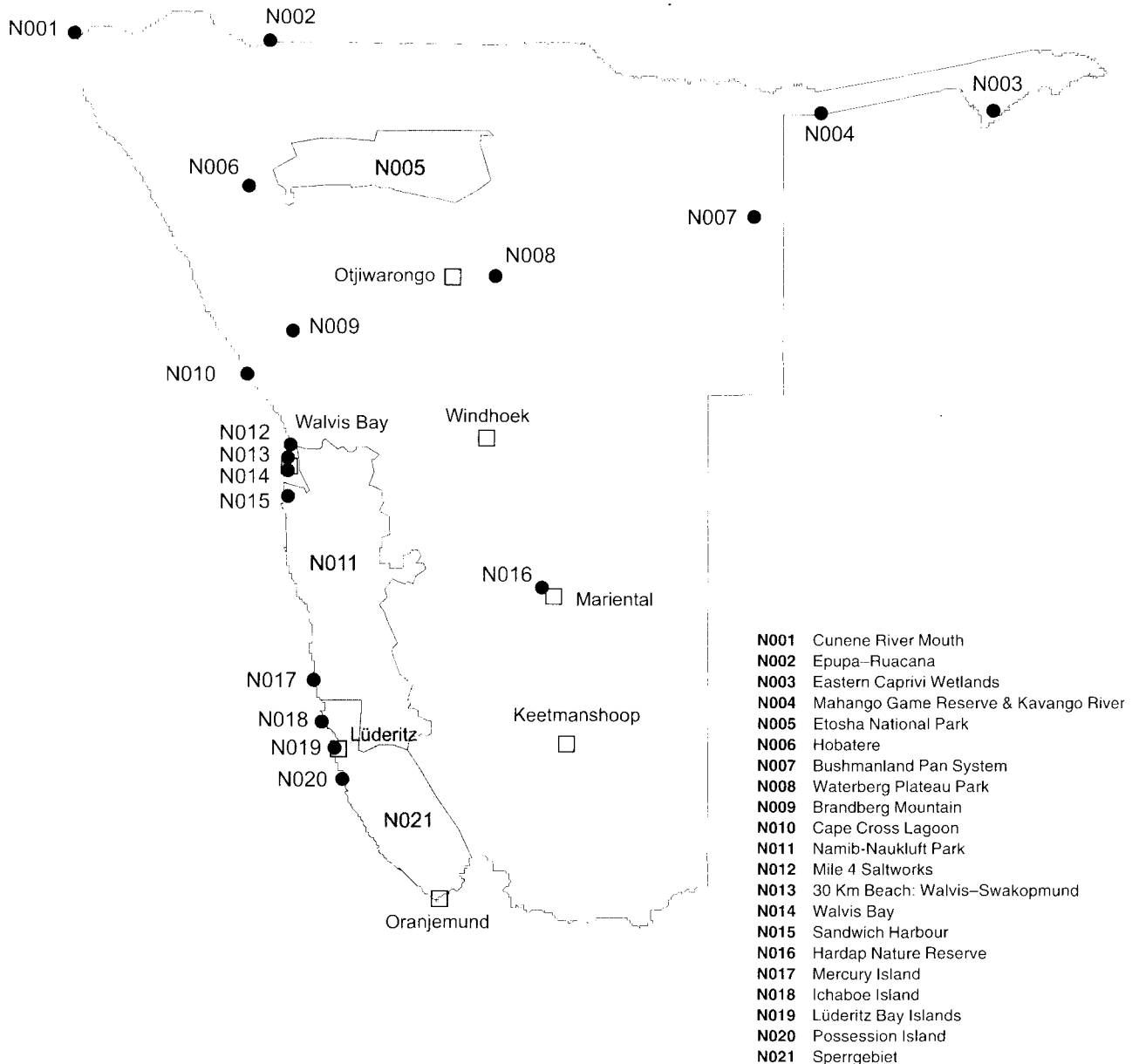
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Monteiro's Hornbill Tockus monteiri, a Kalahari-Highveld biome-restricted assemblage species, almost entirely confined to the Namib escarpment.

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General information

SIZE AND POPULATION

Namibia extends from about 17°S to 29°S and 14°E to 21°E. The total land surface area is 823 988 km² (Barnard 1998), making it the 31st largest country in the world, nearly four times the size of Germany. Namibia straddles the west coast of Africa, where it is bounded by the Atlantic Ocean and includes 1 470 kilometres of coastline (Simmons *et al.* 1988). It extends nearly 1 300 km from north to south and up to 930 km from west to east, with the Caprivi Strip extending a further 450 km to the east.

The 'stiletto-like' Caprivi Strip extends along the northern edge of Botswana, and was annexed by the German colonial authorities in the 19th century in an attempt to link German South West Africa to Germany's East African colonies. It extends over 450 km and covers approximately 20 000 km² (Mendelsohn & Roberts 1997). The Caprivi Strip borders Angola and Zambia along its northern edge, Botswana to the south and Zimbabwe to the east. Namibian independence in

March 1990 resulted in the country being restructured into 13 regions: Cunene, Omusati, Oshana, Ohangwena, Oshikoto, Okavango, Caprivi, Otjozondjupa, Omaheke, Erongo, Khomas, Hardap and Karas. Five regions form the border with Angola in the north, the Cunene, Omusati, Ohangwena, Okavango and Caprivi regions. The southern extent of the country, where it borders South Africa, is defined by the Orange River and the Kalahari Gemsbok National Park of the Northern Cape (SA).

The 1991 national census estimated Namibia to be home to 1.43 million people and with a population growth rate of 3.1% p.a. it is estimated that the country will support 1.84 million people in 1999 (National Planning Commission 1995). Population growth rates are variable, ranging from 2.5% in Windhoek to 4.2% in the rural northern areas. Mean fertility values in rural areas are 6.1 children/woman. Namibia's growth rates rank among the world's highest (National Planning Commission 1995).

With a total land surface area covering 3% of Africa, it

barely supports 0.2% of the continent's human population (Barnard 1998), and has one of the world's lowest population densities (Ashley 1995). People are distributed very unevenly in Namibia and 60% of the population lives north of Etosha Pan with 9 people/km² being the norm. This contrasts sharply with Namibia's southern regions where population densities are as low as 1 person per 4 km² (Katjuanojo *et al.* 1992). Twenty-eight percent of the population live in 57 urban areas; the remainder subsist in rural areas. Windhoek alone accounts for a third of the total urban population; the rest is divided among Oshakati, Rundu, Rehoboth, Swakopmund, Keetmanshoop and Tsumeb.

TOPOGRAPHY

Namibia's topography consists of four main landform categories (Mthoko *et al.* 1990). The Namib Desert and coastal plain cover about 15% of Namibia. The coastal plain stretches over 2 000 km from the Olifants River in South Africa to the Carunjamba River in southwestern Angola. This relatively narrow belt extends roughly 80–200 km inland, reaching an elevation of up to 1 000 m a.s.l., where it meets the Namib escarpment (Moyo *et al.* 1993). Wherever the escarpment is absent, the desert's contour is effectively delimited by the 100 mm annual rainfall isohyet (Seely 1992; Jacobson *et al.* 1995). Throughout its range, the Namib Desert is criss-crossed by many dry riverbeds. These ephemeral rivers occasionally flow after heavy rains (Jacobson *et al.* 1995). The most influential of these is the Kuiseb River, which, with its well-established, occasionally flowing waters, continually washes away sand of the Namib dunes as they attempt to cross the riverbed. North of the Kuiseb the dunes give way to vast gravel plains that extend uninterruptedly to the Ugab River. Dotted across this stark landscape are several inselbergs of granite, schist and limestone (Geological Survey of Namibia 1980). Where the coastal plain tapers northwards into Angola, the perennial Cunene River traverses it. The Namib escarpment forms a discontinuous narrow belt between the Orange and the Swakop rivers before disappearing in the central parts of Namibia. Three hundred kilometres farther north it emerges once again as a thin transition zone between the desert and the central highland plateau. The Naukluft (1 974 m a.s.l.), Gamsberg (2 347 m a.s.l.), Spitzkoppe (1 759 m a.s.l.), Erongos (2 319 m a.s.l.), Brandberg (2 573 m a.s.l.), Joubert Mts (1 869 m a.s.l.) and Baynes Mts (2 038 m a.s.l.) are Namibia's highest peaks, dispersed throughout this range (Mthoko *et al.* 1990). The altitudinal gradient, isolation, and ecotonal nature have been key factors influencing the escarpment's biological diversity. The extensive network of rivers and stream beds that cross it act as important microhabitat corridors for species moving across this rugged environment. Several endemic vertebrates, invertebrates and plants are known to occur in this zone (Barnard 1998).

Above the escarpment, the Central Plateau, Namibia's primary water catchment area, extends to the east (Jacobson *et al.* 1995). This zone extends from Otavi in the north to the Orange River in the south. The Kaokoveld Mountains in the northwest are characterised by broadly incised drainage valleys and occasional inselbergs. The central Khomas Hochland plateau varies in altitude, from 2 302 m a.s.l. to 1 000 m a.s.l., averaging 1 700 m a.s.l. (Moyo *et al.* 1993). The plateau abruptly meets the escarpment, giving rise to several steep mountain passes (e.g. Van Zyls, Gamsberg, Spreetshoogte, Bossua), leading into extensive drainage systems characterised by vast sedimentary plains (Jacobson *et al.* 1995). The most distinctive feature is undoubtedly the canyon carved by the Fish River in the south (Mthoko *et al.* 1990).

To the east, dropping off the plateau, a deep red sand sea known as Kalahari sandveld is encountered. Its western limit is Etosha Pan, where the characteristic white alkaline soils dominate. Kalahari sandveld is generally covered in grass and occasional thorn-tree species, becoming broadleaved further north. (Moyo *et al.* 1993).

CLIMATIC REGIONS

Rainfall scarcity and climatic unpredictability dominate Namibia's climate. It has an average rainfall of c. 250 mm p.a.; north-central Namibia receives on average 500 mm p.a. and all of the Caprivi Strip is above this mean. Namibia is classified as an arid country. More than 80% of the rain is recorded between November and March, occurring predominantly as thunderstorms. The extreme southwest is an exception, receiving most of its rain in winter, whilst the Namib Desert depends almost entirely on coastal fog for precipitation (Lovegrove 1993).

Rainfall increases from west to east and from south to north (Jacobson *et al.* 1995). Annual evaporation rates are as high as 3 700 mm p.a. (Dept. of Water Affairs 1990) and as much as 83% of precipitation is lost via evaporation. Of the remaining 17%, plants transpire 14%; only 2% enters drainage systems of which only 1% eventually reaches the groundwater table (Dept. of Water Affairs 1990).

Massive daily temperature fluctuations are frequent in Namibia, especially in the desert where temperature buffers, such as vegetation and moisture, are almost absent. Closer to the coast the ocean acts as a thermal moderator with temperatures seldom fluctuating more than 5°C (Lovegrove 1993).

The scarcity of water in the Namib region is the result of high-pressure air cells drifting south and anti-cyclonic winds from the equator descending over Namibia as dry air. Thick fog is generated along the coastline as pockets of moist air that reach the coast from the mid-Atlantic, cool over the Benguela current, and are subsequently pushed inland. These fogs are the only life-line for many species (Seely 1992; Lovegrove 1993).

Based on annual precipitation, the Namib can be divided into three sections: coastal, central and inland. Coastal zones receive less than 5 to 20 mm rainfall p.a. but up to 180 days of thick coastal fog. In the central Namib, 40–80 km from the shoreline, rainfall can be 20 to 50 mm p.a., temperatures are higher, and fogs reach here only 40 days a year. Farther inland, fogs are rare, temperatures rise sharply and mean annual rainfall varies from 50 mm to 85 mm p.a. (Barnard 1998).

HABITATS

Namibia has three broad vegetation types: desert, savanna and woodland.

(1) Desert (including Karoo)

The northern Namib, better known as the Skeleton Coast, is characterised by vast tracts of gravel plains and pale sand sparsely covered by the reed-like grass *Cladoraphis cyperoides* (Giess 1971). Gravel plains and a sea of small hummock dunes mark the central Namib, extending between the Huab and the Kuiseb rivers. This is the Namib sand sea overflow. A community of clustered shrubs such as *Zygophyllum clavatum*, *Psilocaulon salicornioides* and *Salsola* spp. have colonised this substrate. *Zygophyllum stapfii* and *Arthroa leubnitziae* grow in isolated patches in the vast inland gypsum plains (Strohbach-Fricke 1996). Although vascular plants are rare, over one hundred species of lichens occur throughout the

coastal plains, in hot, exposed environments where few plants survive. In this environment lichens are true fog plants sustaining themselves exclusively on coastal dew and fogs (Lovegrove 1993).

Inland, the vegetation becomes gradually denser and where water collects, such as in drainage lines and pans, *Acacia reficiens* and *Asclepias buchenaviana* are common. The onset of rains can often transform these areas into prairies of *Stipagrostis* spp. (Giess 1971). Confined to riverbeds, particularly the lower reaches of the Kuiseb, the !Nara *Acanthosicus horridus* grow abundantly (Lovegrove 1993). The *Welwitschia mirabilis*, the world's most bizarre tree, grows also in this sector of the Namib, along deep sand drainage lines and where water collects in crevices in rocky ground (Lovegrove 1993).

A sea of shifting sand dunes covers the southern Namib, which extends south from the Kuiseb River to Lüderitz, almost 350 km south. Only hardy grass species, such as *Stipagrostis gonatostachys*, *S. lutescens* and *S. sabulicola*, survive in this part of the desert (Strohbach-Fricke 1996).

South of Lüderitz, rainfall patterns switch from exclusively summer rainfall to winter rainfall, and the arid desert grades into a highly species-rich semi-arid Karoo, prolific in succulent species. A quarter of Namibia's flora is found in this area; many species are endemic to this portion of the Succulent Karoo including the well-known *Pachypodium namaquanum* or 'halfmens' (half human) (Strohbach-Fricke 1996). All of these vegetation types were incorporated within the Namib-Karoo (A12) biome for consideration under IBA category A3.

(2) Savannas

Southeast of Etosha Pan and covering the rising topography of the Central Plateau, one finds mountain savanna and Karstveld. Around Tsumeb, Grootfontein and Otavi, a pocket of higher rainfall, this savanna is characterised by tree species such as *Kirkia acuminata*, *Berchemia discolor*, *Fockea multiflora*, *Cyphostemma juttae*, *Combretum imberbe* and *Pachypodium lealii* (the northern territory counterpart of the 'halfmens'). *Lonchocarpus nelsii*, *Terminalia sericea* and *T. prunioides* are also present, but restricted to sandy substrata (Strohbach-Fricke 1996).

Further south a thorny dense savanna, aptly named thornbush savanna, sprawls southward to dominate most of Namibia's central region. Dense stands of intertwined *Acacia* canopies are a result of decades of intense grazing and consequent bush encroachment (Strohbach-Fricke 1996).

Highland savannas cover both the Khomas Hochland in central Namibia and the mountains surrounding Windhoek. *Acacia hereroensis*, *A. erubescens*, *Combretum apiculatum*, and *Tarchonanthus camphoratus* are common widespread species characteristic of this savanna. Large *Acacia erioloba* specimens are found along river beds and in deep alluvial deposits (Strohbach-Fricke 1996).

The shrubby landscape extending from Rehoboth south to the Orange River is known as dwarf shrub savanna. Large shrubs such as *Parkinsonia africana*, *Catophractes alexandri* and *Acacia newbournii* are common and *Boscia albitrunca* is occasionally interspersed between these.

The major part of the eastern half of the country is covered in vast stretches of deep, red sand dunes that form part of the Kalahari system. The vegetation in the southern Kalahari grows along distinct longitudinal red sand dunes, interspersed by hard calcrete dune valleys and pans. *Acacia haematoxylon*, *A. erioloba* and *Boscia albitrunca* dominate the landscape. Rain brings a prolific growth of grasses, annual herbs and Cucurbitacea. Camel thorn savanna stretches from east of

Windhoek to the Botswana border and is particularly common and widespread throughout the central Kalahari. It is an open savanna with trees gathered in small bush clumps, mostly consisting of *Acacia erioloba*, *A. hebeclada*, *Grewia flava*, *Rhus ciliata* and *Ozoroa paniculosa*. The arid savanna and Kalahari vegetation types were incorporated into the Kalahari-Highveld (A11) biome.

(3) Woodlands

Mopane woodland extends north of the Ugab River, covering the northern Cunene, Omusati and Oshana regions. Mopane *Colophospermum mopane*, which often forms large monospecific stands, is the most characteristic species of this woodland type (Strohbach-Fricke 1996).

Tall, woodier forest-type woodland is particularly prolific along Omurambas and around Oshanas (open flat pans) in the Oshikoto, Ohangwena and Oshana regions. Dense stands of wild date palm *Phoenix reclinata* are common along the Okavango River, whilst *Acacia hebeclada*, *Peltophorum africanum* and *Lonchocarpus nelsii* grow in riverine thickets on the alluvial banks of the river. To the northeast, this forest-type woodland gradually closes up, forming closed canopy woodland. Species such as *Pterocarpus angolensis*, *Burkea africana*, *Ricinodendron rautanenii*, *Strychnos cocculoides* and *Bauhinia* spp. are characteristic of these woodlands (Strohbach-Fricke 1996).

A unique woodland type grows along and in most ephemeral desert rivers along Namibia's western borders, including major rivers such as the Omaruru, Swakop and Kuiseb. Hardy, drought resistant species growing on the riverbanks include *Acacia karroo*, *A. erioloba*, *Faidherbia albida*, *Tamarix usneoides*, *Salix mucronata* and *Ziziphus mucronata*. These linear oases form corridors suitable for the migration of woodland species in an otherwise unsuitable desert environment. The woodland was incorporated into the Zambezian (A10) biome.

MAJOR ENVIRONMENTAL PROBLEMS AND THEIR CAUSES

Desertification, or land degradation, that results in reduced productivity in the arid, semi-arid and subhumid areas of Namibia is a major environmental problem. Indicators of desertification in Namibia include lowering of ground water tables; soil erosion; loss of woody vegetation, grasses and shrubs; bush encroachment; increased soil salt content and decreased soil fertility (Seely & Jacobson 1996).

Direct causes of desertification in Namibia include too many people and livestock occurring in one place for too long, contributing to over-grazing and tree cover reduction; inappropriate provision of artificial water points; inappropriate irrigation and other crop cultivation practices; absentee farm management and inappropriate fencing in arid areas. Attempts are being made to reverse desertification trends and manage Namibia's natural resources appropriately (Seely & Jacobson 1996).

Overgrazing by livestock, underbrowsing and too frequent burning has led to a dramatic bush encroachment problem in Namibia, especially the northern portions of the country, since the 1940s. The removal of grass makes more water and nutrients available for trees and bush, while the relative absence of browsers, such as game (e.g. Kudu, Impala), allows continuous recruitment for the bush to form dense thickets. Furthermore, severe grazing results in the decline of the more palatable perennial grasses and shrubs as unpalatable bush and plants ultimately replace them. Bush thickening results in a decrease in the carrying capacity of the affected areas. Depend-

ing on the degree of infestation, carrying capacities have declined between 20% and 80% (Bester 1996). Bush control and natural reduction of thornveld reduces the problem. The only long-term solution is to implement judicious range management, the emphasis being on maintaining realistic stocking densities and resting rangeland during its active growing season (Bester 1996).

Although Namibia holds only 1.6 million people, it is also the driest country south of the Sahara, and population growth is alarming, at 3.1% p.a. (Ashley 1996). Over 25% of Namibia's people live on 1% of the land, in the Cuvelai drainage area in northern Namibia (Bethune 1996). The primary concern is that Namibia has a very low and highly variable rainfall pattern. The country is classified as extremely arid and it experiences periodic droughts. To counteract the unreliable rainfall supply, many dams have been constructed, which dramatically affects the maintenance of ecosystem functioning in ephemeral rivers. It is envisaged that most of Namibia's water in the future will be drawn from the perennial northern wetlands. One of the projects is the Eastern National Water Carrier. This is an integrated long-distance water supply scheme that is designed to supply the drier central portion of Namibia with water from the Okavango River (which flows into Botswana to form the Okavango Delta). Only with good planning and management based on sound environmental assessments and a will to conserve water, the country's most precious natural resource, will

Namibia be able to meet the challenge and avoid conflicts over this limited, shared resource in the foreseeable future.

In certain places, mostly on the boundaries of the large national parks in the north, conflict exists between wildlife management and the neighbouring communities. Elephant and Hippo frequently move out of protected areas to raid and destroy crops. Lions are also problematic, eating domestic stock including donkeys, horses, sheep, goats and cattle (Jacobsohn 1996).

Mining has been an integral part of the Namibian economy for over 50 years. Mining, however, bears its environmental costs, including landscape alteration, damage to vegetation, which in the sensitive arid-zone landscape may take thousands of years to recover, and impacts on natural animal populations. Once mining is over, the area inherits abandoned, unrehabilitated mines with trenches, pits and mountains of earth littering the landscape (Mhopjeni 1996). It is possible to reduce these impacts and rehabilitate areas after the minerals have been removed. For the foreseeable future, mining will continue to anchor Namibia's economy, provide employment, and support a variety of secondary industries. But in the long term, it will be tourism, fisheries and agriculture that will provide employment. Namibia will therefore have to ensure that the life of its mines is maximised but that the impact on the environment is kept to a minimum (Mhopjeni 1996).

Ornithological importance

Namibia regularly hosts close to 660 bird species or c. 30% of Africa's and 5.8% of the world's avian species respectively. At least 459 terrestrial species breed within Namibia (Barnard 1998). Well-represented families include the typically arid-adapted Alaudidae (over 75% are endemic or near-endemic), Otidae and Glareolidae (Clancey 1986).

Namibia supports 10 globally threatened species and 14 globally near-threatened species, including important populations of Cape Gannet *Morus capensis*, African Penguin *Spheniscus demersus*, Bank Cormorant *Phalacrocorax neglectus*, Crowned Cormorant *P. coronatus*, Slaty Egret *Egretta vinaceigula*, African Black Oystercatcher *Haematopus moquini*, Wattled Crane *Bugeranus carunculatus*, Damara Tern *Sterna balaenarum*, Sclater's Lark *Spizocorys sclateri*, Herero Chat *Namibornis herero* and Cinderella Waxbill *Estrilda thomensis*. Red Lark *Certhilauda burra*, which does not occur in Namibia, was erroneously listed in Collar *et al.* (1994).

Despite the high incidence of localised and near-endemic taxa in Namibia, it only holds a tiny portion of a single EBA, the Western Angola EBA (Stattersfield *et al.* 1998). The only EBA species occurring in Namibia is the Cinderella Waxbill *Estrilda thomensis*. Stattersfield *et al.* (1998) also considered the Dune Lark *Certhilauda erythrochlamys* (the only bird restricted to geopolitical Namibia) and Herero Chat *Namibornis herero* to be non-overlapping restricted-range species. The recent recognition of two additional restricted-range lark species occurring in Namibia, Barlow's Lark *Certhilauda barlowi* and Cape Longbilled Lark *Certhilauda curvirostris* (Ryan *et al.* 1988; Ryan & Bloomer in press), suggests that there may be an unrecognised EBA in the Succulent Karoo at the Namibian/South African border.

It is widely recognised that the Namibian deserts and escarpment are evolutionary nodes holding many endemic taxa, including a suite of endemic and near-endemic birds (Clancey 1986) that have ranges exceeding 50 000 km²; their conservation is almost entirely Namibia's responsibility. Key species include Hartlaub's Francolin *Francolinus hartlaubi*, Rüppell's Korhaan *Eupodotis rueppellii*, Rüppell's Parrot *Poicephalus rueppellii*, Rosy-faced Lovebird *Agapornis roseicollis*, Monteiro's Hornbill *Tockus monteiri*, Gray's Lark *Ammomanes grayi*, Barecheeked Babbler *Turdoides gymnogynys*, Herero Chat *Namibornis herero*, Rockrunner *Achaetops pycnopygius* and Whitetailed Shrike *Lanioturdus torquatus*. Two other species, Violet Woodhoopoe *Phoeniculus d. damarensis* and Carp's Black Tit *Parus c. carpi*, are almost certainly endemics, but their specific status requires scrutiny.

To add to this remarkable terrestrial diversity Namibia has a varied coastline holding a string of rocky islands. These provide platforms for seabird breeding colonies. For six seabird species, African Penguin, Cape Gannet, Cape *Phalacrocorax capensis*, Bank and Crowned Cormorants and Hartlaub's Gull *Larus hartlaubii*, and one shorebird, the African Black Oystercatcher, the majority of their global populations breed on the offshore islands of the cold Antarctic-derived waters of the Benguela current, much of which is located in Namibia. The desert-breeding Damara Tern *Sterna balaenarum* is virtually restricted to Namibia. There are a few embayments and river mouths that are sufficiently protected to provide totally sheltered shorelines. The central Namibian coast has large areas of intertidal mudflats, and supports some of the largest concentrations of birds in Africa.

Conservation infrastructure and protected area system

THE PROTECTED AREA NETWORK

Namibia's State-controlled protected areas network consists of 21 parks and recreation areas. Their cumulative size accounts for 13.8% of Namibia's total surface area. Although the network is extensive, three protected areas (Etosha Pan, Namib-Naukluft and Skeleton Coast) account for over 80% of it (Barnard *et al.* 1998).

The suitability of adopting the IUCN protected areas classification into the Proposed Wildlife and Parks Management Act was considered at the 1997 workshop on the new Wildlife and Parks Management draft bill. Namibia's draft bill provides for seven categories that are modelled loosely on the IUCN system, including: strictly protected area, national park, multiple use park, people's park, site of interest, recreational interest and private park (Barnard 1998).

The Ministry of Environment and Tourism has recognised that the current body of legislation discriminates between communal and commercial farmer's rights on wildlife utilisation. This has inevitably spurred a negative attitude to conservation by people living in communal areas. The legislation is being amended so that all communities can benefit from wildlife through innovative management and sustainable resource utilisation. To achieve this, Namibia is implementing the community conservancy concept. Conservancies are portions of land set aside for resource conservation purposes that are managed by multiple landholders sharing its costs and benefits in an equitable manner (de Jager 1995; Barnard *et al.* 1998). Conservancies may be established on both commercial (private) and communal (tribal) land. By enhancing habitat protection and boosting wildlife populations, conservancies are intended to draw foreign capital from tourism and sustainable utilisation ventures (Barnes & de Jager 1996). Namibia presently supports nine commercial conservancies, covering 10 000 km² of consolidated protected habitat (Barnard 1998). Communal conservancies, encompassing huge areas, are being consolidated throughout the country. The Nyae Nyae conservancy alone encompasses 9 023 km² of the ecologically diverse Tsumkwe Pan region. To date, four communal conservancies have been gazetted and 15 others have submitted proposals for gazettement (L. Baker pers. comm.). Considering the unlikelihood of the State committing any further land to strictly protected areas, commercial and communal conservancies provide a suitable alternative.

Namibia also holds some 150 private nature reserves, encompassing 7 642 km² or 0.9% of Namibia's total area (World Conservation Monitoring Centre 1996). Since game farming developed into an industry, farmers have been granted rights to benefit from wild animals on their farms (Ashley & Barnes 1996; Barnes & de Jager 1996). However, since game farms and nature reserves differ in legal status, particularly concerning game hunting rights, there has been a 3% annual loss of private nature reserves since 1979 (Ministry of Environment and Tourism 1995). Nature reserves and game farms hold similar potential for species and habitat conservation.

A further 26 000 km² of land, known as the Sperrgebiet, effectively functions as a conservation area. Ever since the discovery of diamonds along the Namibian coast in 1908, this area has been declared off limits to anyone other than mining companies (Pallett 1995). The buffer zone around the actively

mined coastal strip has remained pristine and virtually free of disturbance (Williamson 1997). It is fortuitous that the area supports a high diversity of specialised flora and fauna, virtually endemic to the Sperrgebiet. An agreement exists between the diamond mining company, NAMDEB, and the Namibian Government to minimise environmental damage during prospecting and mining operations. NAMDEB and the Ministry of Mines and Energy have initiated discussions with the Ministry of Environment and Tourism to investigate the potential of sustainable ecotourism in the Sperrgebiet. This form of sustainable land-use may prove to be more compatible with the sensitive ecological functioning of the system and it may generate more long-term revenue (Barnard 1998).

LEGAL STRUCTURES

Namibia is in the process of adopting a coherent and comprehensive 'new' environmental law framework, as the present legal parameters were inherited from the old South West African subordinate legislation (Corbett & Glazewski 1995). Although the original body of legislation makes some provision to conserve biodiversity, it was clearly drafted with vague conservation ideals. The amendments to the Ordinance will explicitly bear in mind Namibia's unique and valuable biological diversity (Barnard 1998).

Parks and reserves are declared under the Nature Conservation Ordinance No. 4 of 1975, which, although outdated, is currently being revised and amended. However, Namibia is a party to a number of Conventions and Treaties that relate to resource utilisation and their conservation. In the case of forestry, the Forest Act (No. 72 of 1968) embodies the demarcation, protection, management and trade of forest products. Specific protection for certain trees species is granted by the Preservation of Forest and Trees Ordinance (No. 37 of 1952) (Corbett & Glazewski 1995).

To protect its marine resources, Namibia has claimed a 12 nautical mile territorial sea along its 1 470 kilometres of coastline, as well as a 200 nautical mile Exclusive Economic Zone. Both these areas are protected in terms of the Territorial Sea and Exclusive Economic Zone of Namibia Act (No. 3 of 1990). However, specific protection for its marine diversity, its monitoring and exploitation (harvesting quotas) is granted by the Sea Fisheries Act (No. 29 of 1992). Because Namibia depends largely on its harvestable marine products, such as Hake and Pilchard, the Ministry of Fisheries and Marine Resources is renowned for having one of Southern Africa's most aggressive and efficient law enforcement approaches (Corbett & Glazewski 1995).

From a non-renewable resource exploitation perspective, the Ministry of Mines and Energy has accepted that each new mining venture will aim to minimise environmental impact and will submit itself to an environmental assessment plan. This plan will address issues such as pollution, performance monitoring, environmental auditing and eventual decommissioning and rehabilitation. These aspects are incorporated in the Minerals Prospect and Mining Act (No. 3 of 1991), which incidentally makes similar stipulations on environmental protection with regard to offshore oil and gas exploitation in Namibian territory (Corbett & Glazewski 1995).

International measures relevant to the conservation of sites

RAMSAR CONVENTION

Namibia acceded to this convention in 1995 and is currently processing a list of sites (including eight wetlands and three islands) suitable for inclusion in the list of Wetlands of International Importance. Thus far, the Etosha Pan/Cuvelai inland delta, Walvis Bay Lagoon, Sandwich Harbour, and the Orange River Mouth (jointly with South Africa) have been accepted as Ramsar sites, and the Cape Cross Lagoon has been proposed as a Ramsar site (Frazier 1996).

THE CONVENTION ON BIOLOGICAL DIVERSITY

Namibia's President, Dr Sam Nujoma, signed the Convention on Biological Diversity at the Rio Earth Summit in 1992. Namibia's constitution addresses the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources. Furthermore, additional legislation claims sovereign ownership over all of Namibia's natural resources. Namibia is at present actively engaged in several biodiversity programmes, having employed, countrywide, a number of full-time professionals engaged in biodiversity re-

search, as well as a national biodiversity co-ordinator. Other activities, such as park management plans, regional profiles, environmental education, Red Data book compilation and Namibia's National Biodiversity Country study exemplify Namibia's commitment to the CBD (Tarr 1995).

DESERTIFICATION CONVENTION

Namibia's dubious honour of being the driest nation in sub-Saharan Africa prompted it, in 1994, to establish a National Programme to Combat Desertification (Tarr 1995), and it signed and ratified the Desertification Convention in 1997.

In addition, Namibia has been a signatory to the Convention for the Protection of the Ozone Layer since 1993, as well as a member of the Convention on Climate Change, which was signed at the Rio Earth Summit in 1992. Furthermore, although Namibia does not generate any nuclear waste, it does mine Uranium ore, and for this purpose, a strict Licensing and Security Act was drafted, where among other issues, the import of Hazardous waste into Namibian Territory is specifically banned. Namibia is in the process of acceding to the Basel Convention (Tarr 1995).

Overview of the inventory

Twenty-one sites in Namibia qualify as IBAs (19 Global and 2 Sub-regional IBAs). The sites are predominantly coastal, reflecting the importance of the Benguela current and coastal wetlands, boasting large numbers of breeding gannets, penguins, and cormorants, as well as the hundreds of thousands of Palearctic migrants that congregate on the central coast.

Because of Namibia's arid environment it is little surprise that inland wetland sites dominate the remaining IBAs. These include some already protected areas such Mahango Game Reserve (on the Okavango River), East Caprivi's extensive wetlands and Etosha National Park. However, unprotected sites include Bushmanland Pans in the Tsumkwe District and the stretch of Cunene River between Ruacana and the Epupa

Falls. Some of these have been amalgamated into very large areas because the systems are ecologically single units.

Specifically included is the best site for the birds endemic to the Namib escarpment, which extends into Angola. Interestingly this area, located to the east of Etosha National Park, encompassing three quarter-degree squares is predicted to contain 1% of the world's Herero Chats, a new finding. Hobatere lodge offers partial protection to this site, even though it is afforded no formal protection. All of Namibia's endemic and near-endemic birds are contained within the IBA network, including the newly elevated Barlow's Lark *Certhilauda barlowi* within the diamond mining area of the Sperrgebiet in southwestern Namibia.

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Site inventory

The Global (G) and Sub-regional (SR) IBAs of Namibia. Conservation status as (F) fully protected, (P) partially protected or (U) unprotected and the criteria used to select each IBA are provided.

Site name	Global/ Sub-regional	Conservation status	Criteria used to select site			
			A1	A2	A3	A4/C4
N001	Cunene River Mouth	SR				X
N002	Epupa–Ruacana	G	X	X	X	
N003	Eastern Caprivi Wetlands	G	X		X	X
N004	Mahango Game Reserve & Kavango River	G	X		X	X
N005	Etosha National Park	G	X		X	X
N006	Hobatere	G		X	X	
N007	Bushmanland Pan System	G	X		X	X
N008	Waterberg Plateau Park	G	X		X	
N009	Brandberg Mountain	G		X	X	
N010	Cape Cross Lagoon	G	X			X
N011	Namib-Naukluft Park	G	X	X	X	X
N012	Mile 4 Saltworks	G	X			X
N013	30 Km Beach: Walvis–Swakopmund	G	X			X
N014	Walvis Bay	G	X			X
N015	Sandwich Harbour	G	X			X
N016	Hardap Nature Reserve	SR				X
N017	Mercury Island	G	X			X
N018	Ichaboe Island	G	X			X
N019	Lüderitz Bay Islands	G	X			X
N020	Possession Island	G	X			X
N021	Sperrgebiet	G	X	X	X	X

Key to criteria

A1 – Regularly supports a significant number of globally threatened or near-threatened species.

A2 – Regularly supports a significant number of restricted-range species.

A3 – Regularly supports a significant number of species in one or more biome-restricted assemblages.

A4 – Site known or thought to hold, on a regular basis, more than 1% of a biogeographic population of a congregatory waterbird species, *or* more than 1% of the global population of a congregatory seabird or terrestrial species, *or* more than 20 000 waterbirds, *or* more than 10 000 pairs of seabirds of one or more species.

C4 – Site known or thought to hold, on a regular basis, more than 0.5% of a biogeographic population of a congregatory waterbird species, *or* more than 10 000 waterbirds of one or more species.

N001 Cunene River Mouth

Unprotected
Sub-regional IBA (C4i)

17°08'S; 11°53'E
500 ha

Site description

The Cunene River, like the Orange River, forms an east–west linear oasis of permanent freshwater across the arid western part of the Sub-region, where it crosses the northern Namib Desert to reach the Atlantic Ocean. The mouth is considered to be the lower part of the river within 4 km of the coast. The small lagoon that occurs immediately east and south of the mouth is a 2.3 km long stretch of mud and sand, which, at its widest point is 1.6 km across. The total area of exposed sand and mudflats when river flow is low is about 125 ha. The mouth itself, which varies from 30–80 m wide at low flows, is

small for a river this large. However, during high-flow years it may stretch to about 1 km in width. At high tide, fresh water backs up into the lagoon, which can expand to be up to 2 km wide. Shorebirds are concentrated in these areas. During low flow months however (July–November) little water backs up and large areas of sandflats are exposed. Although not traditionally seen as an estuary, saline water penetrates the lagoon. At the mouth, sandbars develop from both northern and southern shores, but they are obliterated by flood surges. Flow to the ocean is never cut off. Along the lower reaches of the river, only thin strips of wetland vegetation (e.g. *Phragmites australis*) occur, and the lagoon and vegetated islands at the mouth

are probably the most biologically productive areas on the lower Cunene. Large volumes of warm freshwater are apparent in the cold ocean for up to 100 km² north of the mouth.

Birds

Although this area never supports particularly large numbers of birds at any one time, it is thought to be important as a staging and feeding post for waders, which migrate to sites farther south, including Walvis Bay, Sandwich Harbour and the South African wetlands on the Atlantic coast. It is one of the most isolated coastal wetlands along the Atlantic flyway, with the nearest permanent wetland being almost 700 km away at Walvis Bay. It, however, regularly supports the second largest coastal wetland species total in in Namibia, with 72 wetland birds recorded. Important species include White Pelican *Pelecanus onocrotalus*, Chestnutbanded Plover *Charadrius pallidus*, and both breeding and migrating Damara Tern *Sterna balaenarum*. Less frequently recorded species include Black Stork *Ciconia nigra*, African Black Oystercatcher *Haematopus moquini* and the nocturnal Whitebacked Night Heron *Gorsachius leuconotus*. Curlew Sandpiper *Calidris ferruginea*, Little Stint *C. minuta* and Sanderling *C. alba* are some of the commoner waders, while Osprey *Pandion haliaetus*, rare in Namibia, almost always occur, fishing in the lagoon and at sea.

Other threatened/endemic wildlife

Nile Softshelled Terrapin *Trionyx triunguis* and Green Turtle *Chelonia mydas* utilise the river mouth and the former may breed here. It is the southernmost locality where these turtles occur on the west coast of Africa. The large freshwater prawn *Macrobrachium vollehoveni* also reaches its southernmost limit in Africa here. A variety of mammals including Elephant *Loxodonta africana*, Lion *Panthera leo*, Brown Hyaena *Hyaena brunnea* and Springbok *Antidorcas marsupialis* occasionally pass through the area. Among the 69 freshwater fish species in the lower Cunene, five are endemic to the river. A small population of Nile Crocodile *Crocodilus niloticus* occurs as far west as the mouth.

Conservation issues

The existence of this wetland, and some of the unique fauna that it supports, is threatened by a proposal to build a dam further

	Breeding (pairs)	Total numbers
Globally near-threatened		
*African Black Oystercatcher		OV
*Lesser Flamingo		OV
0.5% or more of population		
Damara Tern	Br	96 (av)
Other important populations		
*White Pelican		125(max)
*Greater Flamingo		OV
*Chestnutbanded Plover		112 (max)
*Swift Tern		46 (max)
*Caspian Tern		36(max)
* - Species does not meet IBA threshold		
F - Number of females (for polygamous species)		
group - Number of groups (for co-operative breeders)		
RR & BRA - Restricted-range and biome-restricted assemblage		
av - Yearly average (max count)	max - Absolute maximum	
Br - Confirmed breeding	Br? - Suspected breeding	
V - Vagrant	OV - Occasional visitor	

upstream at Epupa (see IBA N002). Feasibility studies reached their conclusion in 1997. During the filling of a dam at Epupa, which would take 1-4 years, the reduced or possibly zero water flow at the Cunene River mouth would have drastic effects on this wetland. Reduced water flow may either allow the mouth to close or salinity levels to increase, changing the character of the lagoon, perhaps irreversibly. Once in operation, the dam would introduce cold water into an unusually warm water system, possibly driving away the poikilotherms such as crocodiles, snakes and turtles. Fish utilising the lower Cunene might also be lost if flow patterns (and especially floods) are regulated or smoothed, reducing or eliminating breeding. The guild of piscivorous birds would then probably disappear. The fate of the river will be decided shortly.

Further reading

Bethune (1995); Braine (1990); Curtis (1991); Holtzhausen (1991); Noli-Peard & Williams (1991); Penrith (1970); Ryan *et al.* (1984); Simmons (1993); Simmons *et al.* (1993); Tarr & Tarr. (1987); van Zyl (1991a); Warwick (1996); Wipplinger (1960).

N002 Epupa-Ruacana

**Unprotected
Global IBA (A1, A2, A3)**

**17°18'S; 14°15'E
c. 28 000 ha**

Site description

The Cunene River, like the Orange River, forms an east-west linear oasis of permanent freshwater across the arid western part of the Sub-region, where it crosses the northern Namib Desert to reach the Atlantic Ocean. It is a warm river, with highly variable annual flow volumes differing as much as 14-fold between and high and low years. It also varies within years by as much as 11-fold between high flow in April and low flow in October. The lower Cunene is the 340 km stretch of river that forms the border between Namibia and Angola.

The mouth (IBA N001) is considered to be the lower part of the river within 4 km of the coast. Flow to the sea is never closed off, even though it may naturally slow to a trickle in September-October. Epupa Falls, about 190 km upstream, is the last major waterfall along this very steep river that flows for 1 050 km from source (in the Angolan highlands) to mouth. It also marks the proposed site for a hydro-electric dam, which would produce a body of water c. 75 km in length. Present hydro-power in Namibia is only generated from the diversion weir located at Ruacana, the end point of this IBA. Either side of the river, rocky cliffs, wind-stripped plains and dune fields

mark its progress through the hyper-arid desert. The river is typically confined to rocky gorges for most of its 340 km journey along the border of Angola.

Precipitation decreases from about 300 mm p.a. to 10 mm p.a. from east to west and evaporation is extremely high at 2–3 m p.a. Riparian and marginal (mainly *Phragmites australis*) vegetation is confined to narrow strips along the riverbank. Where the river widens and braids into several channels, or mist generated from waterfalls creates a relative humid environment, riverine vegetation occurs in profusion. *Hyphaene* palms are common and luxuriant at Epupa, attracting peripheral species found nowhere else in Namibia. Other riparian vegetation includes Water Fig *Ficus verruculosa*, *Phragmites mauritanicus*, large *Faidherbia albida* and *Ficus sycamorus* trees and clumps of *Salvadora persica*. On surrounding hillsides, mopane and *Commiphora* spp. dominate. Nomadic pastoralists, the Ova-Himba, descendant of the Herero, number about 5 000, and are reliant on the river for water in the dry season. Extremely high temperatures (40°C) are common here, and the river's effect as an oasis in an extremely hostile environment then becomes most apparent.

Birds

The river and surrounding areas support over 300 bird species. While two April river surveys have revealed only 30 wetland bird/10 km of river (comprising mainly herons), recent more comprehensive surveys revealed 63 birds/10 km at low flow – relatively high compared with other Namibian rivers. Where dense ribbons of palms fringe the river, birds occur at much higher densities than areas without palms. The riparian fringe is home to two highly localised species found nowhere else in the Sub-region. These are the near-threatened Cinderella Waxbill *Estrilda thomensis* and the Rufoustailed Palm Thrush *Cichladusa ruficauda*. Both are associated with *Hyphaene* palms and adjacent riverine thickets. Grey Kestrel *Falco ardosiaceus*, common elsewhere in Africa, peripherally occur in the Sub-region on the Cunene and further east in former Ovamboland. Several species also occur in disjunct distributions here, hundreds of kilometres from their stronghold in the Okavango and adjacent wetlands. These include Hartlaub's Babbler *Turdoides hartlaubii*, Jameson's Firefinch *Lagonosticta rhodopareia*, Golden Weaver *Ploceus xanthops*, Greyheaded Bush Shrike *Malaconotus blanchoti* and Pygmy Kingfisher *Ispidina picta*. However, a distinctive race of the Rednecked Francolin *Francolinus afer* also appears here, with the closest other southern African records being in eastern Zimbabwe. These species co-occur with near-endemics such as Barecheeked Babbler *Turdoides gymnogyns*, Herero Chat *Namibornis herero*, Rüppell's Parrot *Poicephalus rueppellii* and Whitetailed Shrike *Lanioturdus torquatus*. Other species recorded include 17 species of raptor, such as Osprey *Pandion haliaetus*, African Marsh Harrier *Circus ranivorus* and Martial Eagle *Polemaetus bellicosus*, with two species of owl uncommon in Namibia, Wood Owl *Strix woodfordii* and Barred Owl *Glaucidium capense*.

Other threatened/endemic wildlife

Elephant *Loxodonta africana* use the river as an oasis. A newly discovered (1997) species of fish may go extinct if the proposed dam development goes ahead, since it breeds in shallow water on flooded banks. Five species of fish are endemic to the river. Nile Crocodile *Crocodilus niloticus* inhabit most sections of the lower Cunene River. Freshwater prawns occur down stream (see IBA N001). A recently described Snake, the Cunene Racer *Coluber* sp., has just been discovered here; the

	Breeding (pairs)	Total numbers
Globally near-threatened		
Herero Chat		10–20
Cinderella Waxbill	100–200	200–500
RR & BRA		
Rüppell's Parrot		Common
Bradfield's Hornbill		Uncommon
Monteiro's Hornbill		Fairly Common
Stark's Lark		Common
Blackfaced Babbler		Common
Hartlaub's Babbler		Common
Barecheeked Babbler		Fairly Common
Kalahari Robin		Common
Herero Chat		Uncommon
Rockrunner		Rare
Whitetailed Shrike		Common
Burchell's Glossy Starling		Uncommon
Longtailed Glossy Starling		Common
Whitebellied Sunbird		Fairly Common
Cinderella Waxbill		Fairly Common
* – Species does not meet IBA threshold F – Number of females (for polygamous species) group – Number of groups (for co-operative breeders) RR & BRA – Restricted-range and biome-restricted assemblage av – Yearly average (max count) max – Absolute maximum Br – Confirmed breeding Br? – Suspected breeding V – Vagrant OV – Occasional visitor		

proposed dam would flood its known global range.

Conservation issues

The existence of this area is threatened by a proposal to build a hydro-electric scheme near Epupa Falls further upstream on the Cunene River. No fewer than 9 dams have been proposed for the lower reaches of the river, four between Epupa and Ruacana, within the IBA. The first, at Epupa Falls will be 17 times larger than Namibia's largest existing dam, flooding 75 km of river and an area of 200 km², including most of the IBA. During the time that it takes for the dam to fill and reach operational capacity (possibly 4 years), the resulting reduced or possibly zero water flow along the Cunene could have drastic effects on the river and its riparian vegetation. If the Epupa site (still optional) is chosen, the dam waters will inundate the primary area holding most of the Cinderella Waxbill and Rufoustailed Palm Thrush in Namibia. Owing to annual drawdown, it is expected that none of the riverine vegetation would re-establish, effectively eliminating the most speciose areas associated with the palm fringe. A dam at Baynes, the alternative site, would have a reduced impact owing to lower species richness and fewer palms. The effect of the Ruacana diversion weir has been to create fluctuations in water levels of 20–110 cm (depending on river width) within a 24 h period. Fish reliant on flooding of levees have been severely affected and may eventually go extinct if these short-term fluctuations persist.

Further reading

Barnard (1997); Bethune (1995); Braine (1990); Herremans & Simmons (1997); Holtzhausen (1991); Jarvis & Robertson (1997); Noli-Peard & Williams (1991); Simmons *et al.* (1993); Underhill & Brown (1997).

N003 Eastern Caprivi Wetlands

Partially protected
Global IBA (A1, A3, A4i)

17°40'S–18°30'S; 23°16'E–25°15'E
c. 468 000 ha

Site description

Located in the eastern Caprivi bulge, this wetland system forms Namibia's international borders with Botswana, Zambia and Zimbabwe, and stretches from the Kwando River in the west, to the Zimbabwean border post at Kazungula in the east. It is Namibia's largest single permanent wetland and is fed by two of Namibia's five perennial rivers. The area is divided into five geographically distinct zones: the Upper Kwando (137 km²), Lower Kwando and Linyanti Swamp (3 830 km²), the ephemeral Lake Liambezi (406 km²), the Chobe River and marsh (311 km²) and the Zambezi floodplains (1 800 km²).

The area is topographically featureless and almost completely flat – a key determinant in the unusual hydrological regime. Under flood conditions, the Kwando is essentially linked to the Zambezi, with water flowing from the Kwando into the Linyanti Swamps, about 10% of which finally reaches Lake Liambezi. This water is, however, insufficient to keep the lake level from dropping. When full, Lake Liambezi has an outlet to the Chobe River, which subsequently joins the Zambezi at Kazungula. When the Zambezi is in flood, the flow is reversed and water is pushed up the Chobe to Liambezi. Lake Liambezi and the floodplain zone are thus only intermittently inundated, while the Zambezi, Kwando, Linyanti Swamp and Chobe Marsh are permanent features. The abrupt change in the direction of the Kwando River as it merges into the Linyanti system is due to the extensive geological faulting present in the area. Floodwaters channel down the Kwando between June and August and then swing northeast along the Chobe fault into the Linyanti Swamps. It may take up to six months for water to percolate through the *Phragmites/Cyperus* dominated reed swamp as less than one third of the area is open water. By 1997 Lake Liambezi was a dry lakebed, completely overgrown and partly farmed; these long-term dry/wet periods appear to be cyclical. The Chobe Marsh, into which the Linyanti and Lake Liambezi drain when full, is more usually inundated by water backing up along the Chobe from the Zambezi River. The Zambezi floods typically last 4–6 weeks in March–April, before subsiding back into side channels and the main Chobe–Zambezi channels. The lower-lying floodplains however remain inundated for longer periods, and support vast papyrus and reed beds in a maze of small channels and islands. The climate of the region can be divided into two distinct seasons – a dry season between April and November, and a shorter wet season which stretches from the end of November to late March early April. This is the wettest place in Namibia with rainfall averaging 740 mm p.a., and sometimes exceeding 1 000 mm p.a. The monthly average maximum temperature is about 30°C.

The area is surrounded by pristine riparian fringes, which are extremely rare in Namibia, as they have mostly been destroyed by human activity. It is mostly dominated by Apple leaf *Lonchocarpus capassa*, African Mangosteen, Water Pear *Syzygium guineense* and Jackal Berry *Diospyros mespiliformes*. The floodplain consists of reedbeds, swamps, open flooded grasslands and papyrus. Two conspicuous species on the edge of the floodplain are the Wild Date Palm *Phoenix reclinata* and Baobab *Adansonia digitata*.

Birds

East Caprivi as a whole, and its wetlands in particular, hold one of the richest diversities of bird species anywhere in Namibia. The high diversity arises from a combination of wetland and tropical (passerine) species extending into this region. The most important features of this system are the swampy areas and floodplains, which are important breeding habitat for wetland birds, including Slaty Egret *Egretta vinaceigula*, Wattled Crane *Bugeranus carunculatus*, Rufous-bellied Heron *Butorides rufiventris*, Saddlebilled Stork *Ephippiorhynchus senegalensis*, Lesser Jacana *Microparra capensis*, Whitecrowned Plover *Vanellus albiceps*, Longtoed Plover *V. crassirostris*, Redwinged Pratincole *Glareola pratincola*, Pinkthroated Longclaw *Macronyx ameliae* and Montagu's Harrier *Circus pygargus*. The reed and bulrush beds on the margins hold Swamp Boubou *Laniarius bicolor*, Chirping Cisticola *Cisticola pipiens* and Greater Swamp Warbler *Acrocephalus rufescens*. The riverbanks hold African Skimmer *Rynchops flavirostris* and the mid-stream rocks hold Rock Pratincole *Glareola nuchalis*, while the densest riparian vegetation in certain areas holds Pel's Fishing Owl *Scotopelia peli*, African Finfoot *Podica senegalensis* and Whitebacked Night Heron *Gorsachius leuconotus*. While diversity is high, linear densities of wetland birds are low, possibly because of low-nutrient water.

The surrounding grassveld is also good for Palearctic migrants, holding numbers of Blackwinged Pratincole *Glareola nordmanni* and a few Caspian Plover *Charadrius asiaticus*. The area is rich in raptor species including common species such as Secretarybird *Sagittarius serpentarius*, White-backed Vulture *Gyps africanus* and Lappetfaced Vulture *Torgos tracheliotus*, Whiteheaded Vulture *Trigonoceps occipitalis*, Lesser Kestrel *Falco naumanni*, Dickinson's Kestrel *F. dickinsoni* and African Hobby Falcon *F. cuvierii* occur less frequently. A host of eagles is found here, including Tawny Eagle *Aquila rapax*, Ayres' Hawk Eagle *Hieraaetus ayresi*, Western Banded Snake Eagle *Circaetus cinerascens*, Martial Eagle *Polemaetus bellicosus* and Bateleur *Terathopius ecaudatus*. Typical open country species found most commonly around the open woodland include Kori Bustard *Ardeotis kori*, Blackbellied Korhaan *Eupodotis melanogaster*, Temminck's Courser *Cursorius temminckii*, Yellowthroated Sandgrouse *Pterocles gutturalis* and Burchell's Sandgrouse *P. burchelli*. Species preferring *Acacia* and broadleaved woodland include Bradfield's Hornbill *Tockus bradfieldi*, Redbilled Francolin *Francolinus adspersus*, Redcrested Korhaan *Eupodotis ruficrista*, Monotonous Lark *Mirafrapa passerina*, Crimsonbreasted Shrike *Laniarius atrococcineus*, Whitecrowned Shrike *Eurocephalus anguitemens*, Kalahari Robin *Erythropygia paena*, Pied Babbler *Turdoides bicolor*, Blackfaced Babbler *T. melanops*, Hartlaub's Babbler *T. hartlaubii*, Cape Parrot *Poicephalus robustus*, Southern Ground Hornbill *Bucorvus leadbeateri*, Greyrumped Swallow *Pseudhirundo griseopyga*, Longtailed Shrike *Corvinella melanoleuca*, Brown Firefinch *Lagonosticta nitidula*, Burnt-necked Eremomela *Eremomela usticollis*, Marico Flycatcher *Melaenornis mariquensis*, Whitebellied Sunbird *Nectarinia talatala*, Scalyfeathered Finch *Sporopipes squamifrons*.

Violetcreed Waxbill *Uraeginthus granatinus*, Shafttailed Whydah *Vidua regia*, Longtailed Glossy Starling *Lamprolornis mevesii* and Burchell's Glossy Starling *L. australis*.

Other threatened/endemic wildlife

Threatened mammals occurring here include Leopard *Panthera pardus*, Wild Dog *Lycaon pictus*, thousands of Elephant *Loxodonta africana*, Buffalo *Syncerus caffer*, Puku *Kobus vardonii*, Roan Antelope *Hippotragus equinus* and Sable Antelope *H. niger*. Red Lechwe *Kobus leche* are common on the floodplains of the lower Kwando.

Conservation issues

Until recently, there were no conservation areas in existence in East Caprivi. On 1 March 1990, two conservation areas were proclaimed: the wetland Mamili National Park (32 000 ha), which is centred on Nkasa and Lupala Islands near the Linyanti Swamps in the southwestern corner of East Caprivi. The surface area of water fluctuates, but at high floods, some 80% of the area is inundated. This area provides essential protection for many swamp and floodplain species. The Mudumu National Park (101 400 ha) is mainly woodland, with small areas of wetland on the western fringes where it borders the Kwando River. In dry years it is possible that these parks will be the only areas in Eastern Caprivi that are not overgrazed.

The two parks will, however, only be effective at maintaining the region's biotic diversity if legislation and enforcement are improved, and wildlife education and communication programmes for the surrounding rural communities are continued. Involvement of local communities in the management of buffer zones and running of tourist camps has helped alleviate current encroachment into these parks. The region's waterways have held the alien *Salvinia molesta* since the 1950s. This weed has caused massive problems by clogging waterways and altering the functioning of the wetlands, and locally threatening other macrophytes with extinction. Currently the *S. molesta* infestation is under control owing to a successful biological control programme initiated in 1981. The distribution of the weed has not changed, but the intensity of the infestation has been reduced and in some places is almost eradicated. Organised poaching for ivory and hunting for meat is thought to be responsible for the demise of the herbivores that once teemed this region. Uncontrolled army poaching during the guerrilla war also took its toll on wildlife. Campaigns by various government and non-government organisations have temporarily solved the problem; stocks are, however, drastically depleted and require a period to recover before sustainable harvesting can be implemented. Spraying of dieldrin and DDT to control Tsetse Fly and Malaria has been widespread in the past and occasionally still occurs. Monitoring programmes investigating toxicity levels in the resident human population and other non-target tertiary consumers is essential as these organisms could accumulate toxins.

	Breeding (pairs)	Total numbers
Globally threatened		
Slaty Egret	30–200	100–500
* Lesser Kestrel		OV
Wattled Crane	20–40	50–100
Globally near-threatened		
Blackwinged Pratincole		500–1 000
<hr/>		
RR & BRA	Status	
Dickinson's Kestrel	Fairly Common	
Burchell's Sandgrouse	Uncommon	
Copperytailed Coucal	Common	
Rackettailed Roller	Uncommon	
Bradfield's Hornbill	Common	
Blackfaced Babbler	Uncommon	
Hartlaub's Babbler	Common	
Kurrichane Thrush	Common	
Arnot's Chat	Common	
Kalahari Robin	Uncommon	
Barred Warbler	Uncommon	
Stierling's Barred Warbler	Uncommon	
Chirping Cisticola	Common	
Burchell's Glossy Starling	Common	
Longtailed Glossy Starling	Common	
Whitebellied Sunbird	Common	
Brown Firefinch	Common	
Broadtailed Paradise Whydah	Uncommon	
<hr/>		
* – Species does not meet IBA threshold		
F – Number of females (for polygamous species)		
group – Number of groups (for co-operative breeders)		
RR & BRA – Restricted-range and biome-restricted assemblage		
av – Yearly average (max count) max – Absolute maximum		
Br – Confirmed breeding Br? – Suspected breeding		
V – Vagrant OV – Occasional visitor		

The greatest other threat to the area is the grazing pressure exerted by a burgeoning population of over 100 000 head of cattle, 60% of which is estimated to be concentrated on the eastern floodplain (30% of the area). With the drying out of Lake Liambezi, local inhabitants intensively fish the Chobe River with mosquito nets. This unsustainable level and unselective procedure of fishing may have detrimental consequences on the recovery of fish populations once floods return. Human disturbance to African Skimmers from waves, caused by motorised boats, destroys nesting sites. Disturbance causes adult birds to abandon their nests, exposing eggs and chicks to intolerable heat and additional predation pressure.

Further reading

Mendelsohn & Roberts (1997); Olivier & Olivier (1993); Schlettwein *et al.* (1991).

N004 Mahango Game Reserve and Kavango River**Partially protected**
Global IBA (A1, A3, A4i)**18°15'S–18°20'S; 20°33'E–20°41'E**
24 462 ha**Site description**

This IBA includes the portion of the Kavango River in north-eastern Namibia between Andara Mission and the Botswana border on the western edge of the Caprivi Strip. The IBA includes the Mahango Game Reserve, which essentially consists of the vast floodplain along the Kavango River (the start of the panhandle of the Okavango Swamps) and its associated riverine forests and woodlands. Once the Kavango River leaves Namibia it flows into and creates the Okavango Delta in Botswana. High water occurs in April from rains in the highlands of Angola, and floods usually reach heights of 3–4 m above the low-level water in November. This flooding is essential for the functioning of all aquatic systems along the river. The climate can be divided into two distinct seasons – a dry season between April and November, and a shorter wet season from the end of November to early April. The monthly average maximum temperature is 30°C and about 80% of the region's rain (550–600 mm p.a.) falls between October and April.

Vegetation along the river is extremely diverse with 869 species from 88 families so far recognised, about 25% more species than the delta itself. The vegetated dunes that dominate the topography away from the river include extensive dry woodlands. Dominant species of the riparian woodland include African Mangosteen *Garcinia livingstonei*, Marula *Sclerocarya birrea*, Transvaal Ebony *Diospyros mespilliformis*, Knobthorn *Acacia nigrescens* and *Grewia* spp. The vegetation of the dunes is dominated by mixed Wild Teak (kiaat) *Pterocarpus angolensis*, Manketti *Ricinodendron rautanenii*, Buffalo Thorn *Ziziphus mucronata* and dense stands of Rhodesian Teak *Baikiaea plurijuga* and Sand Camwood *Baphia massaiensis* shrubs. The riparian vegetation is of particular importance. In Namibia, riparian woodland is increasingly rare as it is mostly destroyed during human settlement. The floodplain comprises reedbeds, swamps, open flooded grasslands and Papyrus *Cyperus papyrus*. Two conspicuous species on the edge of the floodplain are the Wild Date Palm *Phoenix reclinata* and Baobab *Adansonia digitata*.

Birds

The reserve's most important feature is the floodplain, which is critical habitat for breeding wetland bird species. About two-thirds of Namibia's bird species have been recorded in Mahango, and it boasts the highest species diversity in Namibia: a result of a diversity of both wetland and tropical terrestrial species. The floodplain supports important populations of rare wetland birds including Slaty Egret *Egretta vinaceigula*, Wattled Crane *Bugeranus carunculatus*, Rufousbellied Heron *Ardeola rufiventris*, Pinkbacked Pelican *Pelecanus rufescens*, Saddlebilled Stork *Ephippiorhynchus senegalensis*, Lesser Jacana *Microparra capensis*, Whitecrowned Plover *Vanellus albiceps*, Longtoed Plover *V. crassirostris*, Redwinged Pratincole *Glareola pratincola*, Pinkthroated Longclaw *Macronyx ameliae* and Montagu's Harrier *Circus pygargus*. The reed and bulrush beds on the margins hold Swamp Boubou *Laniarius bicolor*, Chirping Cisticola *Cisticola pipiens* and Greater Swamp Warbler *Acrocephalus rufescens*. The riverbanks and

rocks hold Rock Pratincole *Glareola nuchalis* and African Skimmer *Rynchops flavirostris*, while the fringing riparian vegetation supports Pel's Fishing Owl *Scotopelia peli* and Whitebacked Night Heron *Gorsachius leuconotus*. The surrounding grassveld also holds Palearctic migrants, including Blackwinged Pratincole *Glareola nordmanni*. The reserve is rich in raptor species (48 species recorded) including Secretarybird *Sagittarius serpentarius*, Whitebacked Vulture *Gyps africanus*, Lappetfaced Vulture *Torgos tracheliotus*, African Marsh Harrier *Circus ranivorus*, Dickinson's Kestrel *Falco dickinsoni*, Cuckoo Hawk *Aviceda cuculoides*; even Osprey *Pandion haliaetus* are recorded. Whiteheaded Vulture *Trigonoceps occipitalis*, Bat Hawk *Macheiramphus alcinus*, Lesser Kestrel *Falco naumanni*, African Hobby Falcon *F. cucvierii* and European Marsh Harrier *Circus aeruginosus* are less common. Several species of eagle are found here including Tawny Eagle *Aquila rapax*, Ayres' Hawk Eagle *Hieraetus ayresi*, Western Banded Snake Eagle *Circaetus cinerascens*, Martial Eagle *Polemaetus bellicosus* and Bateleur *Terathopius ecaudatus*. Typical open country species found most commonly around the open woodland include Kori Bustard *Ardeotis kori*, Blackbellied Korhaan *Eupodotis melanogaster*, Temminck's Courser *Cursorius temminckii* and Doublebanded Courser *Smutsornis africanus*.

Species preferring wooded *Acacia* and arid woodland bordering the riverine zone include Bradfield's Hornbill *Tockus bradfieldi*, Redbilled Francolin *Francolinus aspersionus*, Redcrested Korhaan *Eupodotis ruficrista*, Monotonous Lark *Mirafrapa passerina*, Crimsonbreasted Shrike *Laniarius atrococcineus*, Whitecrowned Shrike *Eurocephalus anguitimens*, Kalahari Robin *Erythropygia paena*, Pied Babbler *Turdoides bicolor*, Hartlaub's Babbler *T. hartlaubii*, Blackfaced Babbler *T. melanops*, Southern Ground Hornbill *Bucorvus leadbeateri*, Rufousbellied Tit *Parus rufiventris*, Longtailed Shrike *Corvinella melanoleuca*, Brown Firefinch *Lagonosticta nitidula*, Barred Warbler *Calamonastes fasciolatus*, Burntnecked Eremomela *Eremomela usticollis*, Marico Flycatcher *Melaenornis mariquensis*, Whitebellied Sunbird *Nectarinia talatala*, Scalyfeathered Finch *Sporopipes squamifrons*, Violeteared Waxbill *Uraeginthus granatinus*, Shaft-tailed Whydah *Vidua regia*, Sharptailed Glossy Starling *Lamprolornis acuticaudus*, Longtailed Glossy Starling *L. mevesii* and Burchell's Glossy Starling *L. australis*. Grey-rumped Swallow *Pseudhirundo griseopyga* is commonly seen hawking over the floodplain. The riparian forest supports the rare Cape Parrot *Poicephalus robustus*, Emerald Cuckoo *Chrysococcyx cupreus* and Wood Owl *Strix woodfordii*.

Other threatened/endemic wildlife

Threatened mammals occurring in the reserve include Leopard *Panthera pardus*, Wild Dog *Lycaon pictus*, Elephant *Loxodonta africana*, Roan Antelope *Hippotragus equinus* and Sable Antelope *H. niger*. Uncommon species include Red Lechwe *Kobus leche* (decreasing), Puku *K. vardonii*, Waterbuck *K. ellipsiprymnus*, Sitatunga *Tragelaphus spekei*, Oribi *Ourebia ourebi* and unsubstantiated reports of Blackfooted Cat *Felis nigripes*. The vulnerable Spottednecked Otter *Lutra macuollis*, which requires pristine aquatic habitat, is found

here. It is the second most species-rich area for mammals in Namibia with 99 species. The Spotted Rubber Frog *Phrynomantis affinis*, with only five specimens known, occurs here. About 71 species of fish occur in the Kavango River, including two threatened species.

Conservation issues

Declared a conservation area by the former Kavango Executive Committee in 1983, Mahango was opened to the public three years later in 1986. The reserve was officially proclaimed in 1989. After Namibian Independence (1990), ownership of the reserve was transferred to the Ministry of Environment and Tourism. Mahango is part of a comprehensive planning programme in the Caprivi Strip called the Northeast Parks Project, largely funded by the German Development Bank (KFW). The project involves development planning for tourism infrastructure and wildlife management.

The management of the riparian strip and floodplain is of utmost importance. Any dramatic alteration of the Namibian portion of this river will affect the Okavango Delta (IBA B003) in neighbouring Botswana. The entire portion of the river in Namibian territory needs careful management planning since 78% of the 120 000 people who live along the Kavango occur within 5 km of the river and the pressure for resources is intense. Measures to mitigate human impacts on the floodplain and adjacent riparian strip and alternative options to slash and burn agriculture need to be sought. Education campaigns on sustainable utilisation of the river's resources and its surrounding habitats are a priority. Threatened species such as Elephant and Red Lechwe migrate out of the park and are threatened by poachers in the neighbouring areas. Furthermore, uncontrolled growth in the Elephant population is of some concern, as they modify habitat at a dramatic rate, especially in the highly sensitive riparian zone, which has suffered enormous impact from elephants in the last few years. Human disturbance to the African Skimmer is caused by the wake generated by motorised boats destroying sand-bank nesting sites. Disturbance by humans also causes adult birds to abandon their nests, exposing eggs and chicks to intense heat and additional predation pressure. Uncontrolled fires in the Kavango region can also cause extensive damage to wildlife and reduce plant species diversity. Pesticides used annually to control malarial mosquitoes and Tsetse Fly (DDT and dieldrin) are found in the river and occur mainly from the astonishing practise of rinsing equipment and occasionally by simply dumping extra supplies directly into the river. That this happens in the 'protected' Mahango Reserve is cause for great concern.

If future water abstraction occurs at Rundu to feed the growing population of Windhoek, off-take during flooding

	Breeding (pairs)	Total numbers
Globally threatened		
Slaty Egret	Br	15–100
^v Lesser Kestrel		OV
Wattled Crane	Br	6–10
Globally near-threatened		
Blackwinged Pratincole		200–300
<hr/>		
RR & BRA	Status	
Dickinson's Kestrel	Fairly Common	
Burchell's Sandgrouse	Common	
Copperytailed Coucal	Common	
Rackettailed Roller	Rare	
Bradfield's Hornbill	Common	
Rufousbellied Tit	Uncommon	
Blackfaced Babbler	Uncommon	
Hartlaub's Babbler	Common	
Kurrichane Thrush	Common	
Arnot's Chat	Rare	
Kalahari Robin	Common	
Barred Warbler	Uncommon	
Chirping Cisticola	Common	
Burchell's Glossy Starling	Common	
Longtailed Glossy Starling	Common	
Sharptailed Glossy Starling	Uncommon	
Whitebellied Sunbird	Common	
Brown Firefinch	Common	
<hr/>		
^v – Species does not meet IBA threshold		
F – Number of females (for polygamous species)		
group – Number of groups (for co-operative breeders)		
RR & BRA – Restricted-range and biome-restricted assemblage		
av – Yearly average (max count) max – Absolute maximum		
Br – Confirmed breeding Br? – Suspected breeding		
V – Vagrant OV – Occasional visitor		

periods may reduce flooding levels below the critical threshold required for spawning fish. Non-selectivity of fishing gear has led to an almost total absence of larger fish. It has been suggested that fishing be restricted in some areas to allow fish stocks to recover.

Further reading

Curtis & Appleton (1987); Griffin & Channing (1991); Hines (1987); Merron & Bruton (1989); Skelton & Merron (1987).

N005 Etosha National Park

Fully protected
Global IBA (A1, A3, A4i, iii), Ramsar site

18°30'S–19°28'S; 14°20'E–17°10'E
2 291 200 ha

Site description

Etosha, 'the great white place', is enclosed within a National Park c. 400 km north of Windhoek and 120 km south of the Angolan border. The primary feature within the park is the Etosha Pan, a salt pan some 4 760 km² in size, up to 129 km long and 72 km wide, covering almost one-quarter of the Park. Numerous smaller salt and clay pans exist to the west and north of the main pan, some of which lie just outside the Park boundaries. The Park comprises an area of inland drainage on the great African plateau. Most of the year the pan lies dry, appearing barren and desolate, but during the wet season the pan is inundated with water from the Ekuma and Oshigambo rivers, which drain catchments in former Ovamboland and southern Angola. Inflow from the east through the Omuramba Ovambo may also be important in flooding Fischer's Pan and the southern ancient river course on the pan. The extent of the flooding is dependent on the amount of rain that falls in the catchment area and not on surface rainfall. In exceptionally rainy years the pan becomes a shallow lake a few centimetres deep. Geologically the area comprises calcareous sand, gravel and limestone with dolomite outcrops in the west. Soils are shallow and alkaline. The temperature is one of extremes ranging from below freezing on some winter nights to above 45°C during the day in mid-summer. Pan surface temperatures can then reach 60°C. Annual rainfall averages 300 mm p.a. in the west and 500 mm p.a. in the east.

The vegetation is primarily arid savanna, shrub and thorn scrub in the west, tending towards tree savanna and broad-leaved woodland in the east. *Acacia* woodland is found throughout the region with mostly *Acacia tortilis*, *A. reficiens* and *A. newbournii* dominating. Patches of *Colophospermum mopane* and *Combretum* spp. are also characteristic of the Park, especially in the eastern broadleaved savanna belt. All these plant species can vary physiognomically from shrub to tree and occur throughout the Park. Dominant grass genera include *Anthephora*, *Enneapogon*, *Aristida*, *Stipagrostis*, *Eragrostis* and *Sporobolus*.

Birds

This Park supports at least 340 bird species. The main pan is of particular importance as large numbers of both Greater *Phoenicopterus ruber* and Lesser Flamingo *Phoeniconaias minor* regularly breed here when rainfall exceeds 440 mm p.a. Historical numbers of up to 1.1 million flamingos have been recorded in exceptional rain years. Etosha is one of only two regular breeding sites for these species in southern Africa, the other being Sua Pan in the Makgadikgadi Salt Pans (IBA B005) in Botswana. Unfortunately, breeding success is very limited, and the pan cannot be considered to hold a viable breeding population. In recent years the pan has regularly held over 20 000 waterbirds during the wet season. Apart from flamingos, White Pelican *Pelecanus onocrotalus* and Chestnutbanded Plover *Charadrius pallidus* also breed here in large numbers in years of good rainfall. Rarities are also attracted at such times and Slaty Egret *Egretta vinaceigula* and Striped Crake *Aenigmatolimnas marginalis* are unusual visitors. The pan and its surrounding grassveld is also good for Palearctic migrants, including impor-

tant numbers of Blackwinged Pratincole *Glareola nordmanni* and Caspian Plover *Charadrius asiaticus*. The pan also supports large numbers of Cape Teal *Anas capensis* and Redbilled Teal *A. erythrorhyncha*. Occasionally small numbers of Redwinged Pratincole *Glareola pratincola*, Saddlebilled Stork *Ephippiorhynchus senegalensis*, Wattled Crane *Bugeranus carunculatus* and Crowned Crane *Balearica regulorum* occur on the pan in the wet season. Etosha also supports the only breeding population of Blue Crane *Anthropoides paradiseus* outside South Africa; a tiny population of about 60 birds known to have declined in the last 10 years.

The Park is particularly rich in raptors with 46 species recorded. It supports all vultures found in Namibia, including Cape Vulture *Gyps coprotheres*, Lappetfaced Vulture *Torgos tracheliotus* and the locally rare Egyptian Vulture *Neophron percnopterus*. Scavengers such as Tawny Eagle *Aquila rapax* and Bateleur *Terathopius ecaudatus* are particularly common since they are unaffected by poisons here. Greater Kestrel *Falco rupicoloides* and Rednecked Falcon *F. chicquera* breed. Whiteheaded Vulture *Trigonoceps occipitalis*, Pallid Harrier *Circus macrourus*, Montagu's Harrier *C. pygargus* and Lesser Kestrel *Falco naumanni* are less common. A host of eagles (12 species) are found here including Martial Eagle *Polemaetus bellicosus* and the migrant Steppe *Aquila nipalensis* and Lesser Spotted *A. pomarina* during the rains.

Good rains also bring in Chestnut Weaver *Ploceus rubiginosus*, which form large breeding colonies. The far western woodland (not accessible to the public) holds small populations of endemics and near-endemics including Violet Woodhoopoe *Phoeniculus d. damarensis*, Carp's Black Tit *Parus c. carpi*, Monteiro's Hornbill *Tockus monteiri*, Bradfield's Hornbill *T. bradfieldi*, Rosy-faced Lovebird *Agapornis roseicollis*, Rüppell's Parrot *Poicephalus rueppellii*, White-tailed Shrike *Lanioturdus torquatus*, Rockrunner *Achaetops pycnopygius*, and Hartlaub's Francolin *Francolinus hartlaubi*. This western edge of Etosha where *Acacia* woodland largely gives way to broadleaved woodland is an area of overlap (and confusion) between two near-endemics (Carp's Tit *Parus c. carpi* and Rüppell's Parrot *Poicephalus rueppellii*) and their widespread southern African congeners (Southern Black Tit *Parus niger* and Meyer's Parrot *Poicephalus meyeri*).

Typical open country species found most commonly around the pan include Kori Bustard *Ardeotis kori*, Ludwig's Bustard *Neotis ludwigii*, Blackbellied Korhaan *Eupodotis melanogaster*, Burchell's Courser *Cursorius rufus*, Temminck's Courser *C. temminckii*, Doublebanded Courser *Smutsornis africanus* and all of southern Africa's sandgrouse species including the rarer Yellowthroated Sandgrouse *Pterocles gutturalis* and Burchell's Sandgrouse *P. burchelli*. Species preferring wooded *Acacia* and partial cover include Redbilled Francolin *Francolinus adspersus*, Redcrested Korhaan *Eupodotis ruficrista*, Monotonous Lark *Mirafra passerina*, Crimsonbreasted Shrike *Laniarius atrococcineus*, Whitecrowned Shrike *Eurocephalus anguitimens*, Kalahari Robin *Erythropygia paena*, Pied Babbler *Turdoides bicolor*, Blackfaced Babbler *T. melanops*, Barecheeked Babbler *T. gymnogenys*, Barred Warbler *Calamonastes fasciolatus*, Burntnecked Eremomela *Eremomela usticollis*, Marico Flycatcher *Melaenornis mariquensis*, Whitebellied Sunbird

Nectarinia talatala, Cape Penduline Tit *Anthoscopus minutus*, Pririt Batis *Batis pririt*, Scaly-feathered Finch *Sporopipes squamifrons*, Violeteared Waxbill *Uraeginthus granatinus*, Shafttailed Whydah *Vidua regia*, Longtailed Glossy Starling *Lamprotornis mevesii* and Burchell's Glossy Starling *L. australis*. Wherever trees are large enough to support their massive nests, Sociable Weaver *Philetairus socius* and the associated Pygmy Falcon *Polihierax semitorquatus* occur.

Other threatened/endemic wildlife

Threatened mammals occurring in the Park include Leopard *Panthera pardus*, Cheetah *Acinonyx jubatus*, Elephant *Loxodonta africana*, Roan Antelope *Hippotragus equinus*, Black Rhinoceros *Diceros bicornis bicornis*, and Hartmann's Mountain Zebra *Equus zebra hartmannae*, and the endemic Blackfaced Impala subspecies *Aepyceros melampus petersi*. The Namibian near-endemic Damara Dik-Dik *Madoqua kirkii* also occurs here. Efforts to re-introduce African Wild Dog *Lycan pictus* have failed thus far. Reptiles include the African Python *Python sebae*, Dwarf Python *P. anchietae*, Kalahari Star Tortoise *Psammobates oculiferus*, Leopard Tortoise *Geochelone pardalis* and Etosha Agama *Agama etoshae*.

Conservation issues

Originally established in 1907, Etosha Game Reserve covered 9 324 000 ha; it was gradually reduced to 2 314 000 ha in area between 1947 and 1953. In 1958, it was officially designated a National Park under Section 37 of the Nature Conservation Ordinance 31, and on the recommendation of the Commission of inquiry into South West Africa's Affairs (Odendaal Commission), the size of the Park was increased to include sections of the Skeleton Coast, enlarging the area to 9 952 600 ha. By 1970 the Park's borders had once again been deproclaimed to its current size to provide land to Herero speaking tribes; the size has been reduced by 72% since 1907.

Etosha faces several persistent management challenges. It is surrounded on its southern and western borders by commercial farmland: double electric boundary fences, primarily designed to keep Lion *Panthera leo* and Elephant in the Park and poachers and domestic animals out of the Park have been erected. This has resulted in serious disturbance to ungulate migratory patterns. In particular, wildebeest migration was blocked by the northern fence, with a resultant decline from 25 000 to 2 300 animals in the space of 25 years. Elephant, however, still migrate out of the Park in the wet season and may then create problems in adjacent commercial and communal farming areas. Additionally, many borrow pits were dug during road construction; these pits filled during rains and were assumed for many years to harbour anthrax bacteria. This was later proven incorrect, but anthrax remains a problem, killing many species of herbivore. Another disease, Feline Immune Deficiency Virus (FIV) affects cats, particularly Cheetah. Fire control in the past permitted the transition of the vegetation from

	Breeding (pairs)	Total numbers
Globally threatened		
* Slaty Egret		V
* Lesser Kestrel		OV
* Wattled Crane		2-4
Blue Crane	20-30	40-60
Globally near-threatened		
Lesser Flamingo	Br	1 594 (av)-1 000 000
Pallid Harrier		20-50
Blackwinged Pratincole		200-300
RR & BRA		
Status		
Hartlaub's Francolin		Uncommon
Ludwig's Bustard		Fairly Common
Burchell's Sandgrouse		Common
Rüppell's Parrot		Uncommon
Bradfield's Hornbill		Common
Monteiro's Hornbill		Uncommon
Stark's Lark		Common
Blackfaced Babbler		Uncommon
Barecheeked Babbler		Fairly Common
Kurrichane Thrush		Rare
Kalahari Robin		Common
Barred Warbler		Common
Rockrunner		Uncommon
Whitetailed Shrike		Uncommon
Burchell's Glossy Starling		Common
Longtailed Glossy Starling		Uncommon
Palewinged Starling		Uncommon
Whitebellied Sunbird		Common
Sociable Weaver		Common
Blackheaded Canary		Common
Breeding (pairs)		
Total numbers		
1% or more of population		
White Pelican		622 (av)-3 000 (max)
Greater Flamingo		9 770 (av)-100 000 (max)
Chestnutbanded Plover		166 (av)-550 (max)
Caspian Plover		119 (av)-382 (max)
* - Species both globally and nationally threatened		
* - Species does not meet IBA threshold		
F - Number of females (for polygamous species)		
group - Number of groups (for co-operative breeders)		
RR & BRA - Restricted-range and biome-restricted assemblage		
av - Yearly average (max count) max - Absolute maximum		
Br - Confirmed breeding Br? - Suspected breeding		
V - Vagrant OV - Occasional visitor		

open savanna to woodland, which allowed a concomitant increase in Elephant numbers from 100 in 1955 to 1 500 at present. Drought periods between 1979-1996 have further complicated issues, as ungulates have been unable to migrate away from drought stricken areas. High predation rates and levels of anthrax serve to reduce ungulate populations well below levels that would be sustained by the available food resources. Many of the Lion dispersing from the Park are shot in the adjacent commercial and communal Districts where they are perceived to be a threat to livestock. The individuals that escape the gun become the famous coastal lions that disperse down the rivers to the Skeleton Coast, where they scavenge on seals and beached whales. Communal farmers in the rivers exterminate these too.

Recent research has shown that while flamingos occur in spectacular numbers, they rarely breed successfully (1 in 9 years) because the water rapidly evaporates, exposing chicks and fledglings to predators and eliminating food sources adjacent to the colony. The low breeding success in the last four decades has shown that the pan does not support a self-sustaining population. Scientific research to find solutions to management problems is conducted through the Etosha Ecological Institute, which is located at Okaukeujo.

Further reading

Archibald (1991); Archibald & Nott (1987); Aves (1992); Berry (1972, in press); Berry *et al.* (1973, 1987); Brown (1992c); Brown *et al.* (1987); Clinning & Jensen (1976); Fox *et al.* (1997); Gasaway *et al.* (1996); Jensen & Clinning (1976); le Roux *et al.* (1988); Simmons (1996a); Simmons *et al.* (1996).

N006 Hobatere

Partially protected
Global IBA (A2, A3)

19°15'S; 14°00'E
c. 222 000 ha

Site description

This IBA is one of the best areas holding Namibian-escarpment endemics and near-endemics. Its identification arose directly from research co-ordinated by the Ministry of Environment's Ornithology Section, aimed at identifying the most important areas for Namibia's near-endemic birds. The Namibian escarpment forms the interface between the interior plateau and coastal plain, varying in altitude from 400–2 500 m a.s.l. The most important node within this broad zone is the area surrounding Hobatere tourist lodge, immediately west of the eastern boundary of Etosha National Park. This east–west orientated block falls in communal farmland, just to the west of commercial farmland in the Sesfontein–Kamanjab area. The IBA is part of the western catchment of the Ombonde/Hoanib River, one of the largest ephemeral rivers in northwestern Namibia. Rainfall in this region averages 200–300 mm p.a. and altitude varies from 900 to 1 500 m a.s.l. Rainfall gradients from east to west across this region are very steep, varying from 300 mm p.a. in western Etosha to 15 mm p.a. on the coast, a mere 160 km away. The river valleys running through this area enhance diversity as several species exhibit particularly high abundance in rivers' riparian vegetation. Several private lodges running safaris and small hunting operations have opened in the area; the land is being leased from the government and is afforded protection by the operators. To the west, low-use communal farms are concentrated in the ephemeral Ombonde River tributaries.

Birds

Although the area holds only one restricted-range species, the Herero Chat *Namibornis herero*, it also hosts a plethora of species with global ranges slightly larger than the restricted-range species cut-off of 50 000 km². All of these species are endemic to the Namibian escarpment and Namib Desert, which stretch into neighbouring Angola.

Included are the 10 'inland' endemics, excluding the three desert larks and Damara Tern *Sterna balaenarum*. These taxa are, in decreasing order of population size, present within this IBA, Whitetailed Shrike *Lanioturdus torquatus* (11 900 birds), Carp's Tit *Parus c. carpi* (5 800 birds) and Monteiro's Hornbill *Tockus monteiri* (2 360 birds), each found in dry woodland where large trees are common. The shrike is the commonest of this trio, while the main centre of distribution for the hornbill and tit occur somewhat east (higher rainfall) of this IBA. Herero Chat and Rockrunner *Achaetops pycnopygius*, common within the IBA, occur predominantly on rocky hillsides. These two species are erroneously perceived to be rare when they are

in fact cryptic and found commonly in more remote areas of Namibia's rocky escarpment. Herero Chat density (1 870 birds) is very high in this area while Rockrunners (680 birds) are most common far to the southeast of this area. Populations for both species in Namibia are estimated at about 100 000 birds, and more than 1% of Herero Chats occur in this IBA. Rüppell's Korhaan *Eupodotis rueppellii* (580 birds) is found on open plains mainly in the western portion of this IBA.

The river valleys running through this area enhance diversity as several endemics exhibit particularly high abundances in riverine woodland, and collect there in winter periods. The Barecheeked Babbler *Turdoides gymnogenys* (335 birds) is a bird of mopane woodland, which favours riverbeds, where it occurs in groups averaging 6 birds. Rüppell's Parrot *Poicephalus rueppellii* (450 birds) occur at good densities in the river valleys, but this bird is nowhere common, with a Namibian population estimate of only 29 000 birds. One of the rarest of the endemics is Hartlaub's Francolin *Francolinus hartlaubi* (450 birds), a bird found on inselbergs and koppies throughout this region. The rarest and most enigmatic endemic taxon

RR & BRA

RR & BRA	Status
Hartlaub's Francolin	Uncommon
Ludwig's Bustard	Uncommon
Rüppell's Korhaan	Fairly Common
Burchell's Sandgrouse	Common
Rüppell's Parrot	Fairly Common
Monteiro's Hornbill	Common
Stark's Lark	Uncommon
Blackfaced Babbler	Uncommon
Barecheeked Babbler	Uncommon
Kalahari Robin	Common
Herero Chat	Common
Layard's Titbabbler	Fairly Common
Barred Warbler	Fairly Common
Rockrunner	Fairly Common
Whitetailed Shrike	Common
Burchell's Glossy Starling	Common

† – Species does not meet IBA threshold

F – Number of females (for polygamous species)

group – Number of groups (for co-operative breeders)

RR & BRA – Restricted-range and biome-restricted assemblage

av – Yearly average (max count) max – Absolute maximum

Br – Confirmed breeding Br? – Suspected breeding

V – Vagrant OV – Occasional visitor

is the Violet Woodhoopoe *Phoeniculus d. damarensis* (35–70 birds), a species difficult to distinguish from the morphologically similar Redbilled Woodhoopoe *P. purpureus*, with which it hybridises. Only found close to large rivers with large trees, the Namibian population is predicted to be a mere 1 800 birds.

Many non-endemic species occur within this IBA, and raptors are fairly numerous with 33 species recorded. Notable among these are Cuckoo Hawk *Aviceda cuculoides*, Egyptian Vulture *Neophron percnopterus* and Peregrine Falcon *Falco peregrinus*. Other species recorded here with relatively large populations in Namibia include Shorttoed Rock Thrush *Monticola brevipes*, Stark's Lark *Eremalauda starki* and Rosy-faced Lovebird *Agapornis roseicollis*. A total of 215 species occur in this region, about half the number recorded in the most speciose areas of northeastern Namibia.

Other threatened/endemic wildlife

Black Rhinoceros *Diceros bicornis* occur, while Elephant *Loxodonta africana* and Lion *Panthera leo* commonly occur in this region and may come into conflict with commercial farmers. The area is extremely rich in endemic frogs, reptiles, mammals and plants; but these are too numerous to mention and are presented in a special issue of Biodiversity & Conservation (April 1998).

Conservation issues

The main concern is that the rich vein of Namibian escarpment

endemism of birds, mammals, frogs, reptiles and plants falls squarely in between Namibia's main protected areas – the Etosha National Park in the east and the Skeleton Coast Park in the west. It has been suggested that a park that joins the two would be ideally situated to protect many of these endemic taxa, as well as act as corridor for large mammals that regularly move between Etosha and the Skeleton Coast Park. Conservancies at Sesfontein and Bergsig will improve the situation.

Farming practices are of relatively low intensity but on communal lands overstocking may occur where goats congregate around waterholes. The dry river courses to the coast are inhabited by pastoralists that regularly shoot Lions (and other large mammals) that threaten their livestock. A protected area may prevent this, and effectively help fill the Skeleton Coast Park with mammals that once naturally occurred there. Among the bird endemics, only Rüppell's Parrot is under direct threat since it is illegally trapped for the wild bird trade. Hundreds of birds are taken from the population per year, but recent breakthroughs in catching bird trappers may help reduce this problem.

Further reading

Clinning & Tarboton (1972); du Plessis (1997); Jarvis & Robertson (1997); Jensen & Jensen (1971); Robertson (1993); Robertson *et al.* (1995, 1998); Simmons *et al.* (1998).

N007 Bushmanland Pan System

Unprotected
Global IBA (A1, A3, A4i)

19°15'S–20°00'S; 20°33'E–20°41'E
c. 120 000 ha

Site description

Widely known as Bushmanland after the inhabitants of this region, the new name is the Tsumkwe District. The original name has been retained because of its widespread acceptance. This very extensive wetland system of northeastern Namibia has developed on a broad, flat watershed, on the eastern edge of the Kalahari Basin, situated between the Nhoma and Daneib drainage systems. Here, surficial hardpan calcretes, granite and quartzites restrict drainage and, as there are no major drainage lines out of the area, these pans, flooded grasslands and *Acacia* woodlands can remain wet throughout the dry season in years of above average rainfall. The town of Tsumkwe lies in the centre of the area, which is inhabited by the Ju/'hoan Khoi. Livestock, so common in other parts of Namibia, are largely absent from the area, since a hunter-gathering lifestyle was until recently practised by all the inhabitants. However, cattle farming has been introduced, and will, in time, replace the traditional nomadic lifestyle.

The climate of Bushmanland is characterised by high summer temperatures and seasonal rainfall between October and April. During this period, the rain shows considerable spatial and temporal variation in distribution. The average rainfall for the area is c. 450 mm p.a., with a minimum of 110 mm p.a. and maximum of 1 200 mm p.a.

The Bushmanland Pans System is centred on the Nyae-Nyae wetlands, which run in a broad arc southeast of Tsumkwe.

The Nyae-Nyae Pan itself consists of a large deflation basin comprising both grassland and open wetlands. Also included are the Pannetjies Veld wetlands 25 km east of Tsumkwe, comprising mainly flooded woodland, the Klein Dobe wetlands (2 pans of 30 and 50 ha) 15 km north of Tsumkwe and the CinQo wetlands 40 km northeast of Tsumkwe. The wetland system as a whole is both extensive and variable.

The wetlands are widely interconnected and many wetland types intergrade into one another, including: (1) Unvegetated open water pans with highly alkaline evaporite basins; these pans are the last to dry up and can be up to 1.5 m deep. (2) Doline pans appear to be sinkholes formed in areas underlain by calcrete. When full, these are more than 2 m deep and unvegetated. (3) Open water pans form where the underlying soils are not very alkaline. Vegetation is dominated by floating and submerged macrophytes such as *Persicaria limbata*, *Scirpus* spp., *Nymphaea* spp., *Aponogeton* spp., *Elytrophorus globularis*, *Eragrostis viscosa* and members of the Characeae. Where grasses dominate, the commonest species are *Oryzidium barnardii*, *Echinochloa colona* and *E. stagnina*. Other common plants include *Sesbania macowantana*, *Ottelia kunenensis*, *Aeschynomene indica* and the fern *Marsilea unicornis*. The pans are of medium size and the water in them can persist for three months. A second type of open water pan develops where shallow calcareous sands make the pans more alkaline. The vegetation is dominated by Cyperaceae and floating mats of *Persicaria limbata* which form in the deeper

parts of the system. (4) Grass pans are small pans where organic clays have impeded the drainage: these are dominated by *Echinochloa holubii* and *E. colona*. Other grass pans dominated by *Diplachne fusca* are the commonest pans in the system. (5) Hygrophilous grasslands develop on calcareous sands where the period of inundation is short. *Digitaria* spp., *Odysea paucinervis*, *Sporobolus coromandelianus* or *Eriosperrnum bakerianum* dominate; prolonged inundation leads to domination by *Diplachne fusca*. (6) During periods of extreme inundation on clay soils, flooded woodland develops. The overstorey is dominated by typical woodland species like *Combretum imberbe*, *Acacia luederitzii*, *Combretum hereroensis* and a grass layer including *Melinis repens*, *Sporobolus* spp., *Aristida rhinochloa*, *A. hordeacea* and *A. adscensionis*. Occasionally scrubby areas of *Grewia flava* and *Croton* spp. become periodically flooded in years of very high rainfall. The high lying areas surrounding the pans hold palms like *Hyphaene petersiana*.

Birds

The variety of wetland habitats, ranging from unvegetated open water systems to hygrophilous grasslands, supports a diverse assemblage of flora and fauna. This area holds important numbers of rare and threatened bird species; it regularly holds more than 10 000 waterbirds of 84 species when wet. The most important species include breeding Slaty Egret *Egretta vinaceigula*, and non-breeding Wattled Crane *Bugeranus carunculatus* and Great Snipe *Gallinago media*; the cranes occur in larger numbers than anywhere else in Namibia. These wetlands are also known to be important for rallidae, especially migratory Palearctic and intra-African crakes. The pans occasionally support thousands of both Greater *Phoenicopterus ruber* and Lesser Flamingo *Phoeniconaias minor* (probably on passage between Etosha and Makgadikgadi Pans in Botswana) as well as thousands of Blackwinged Stilt *Himantopus himantopus*. Other common species include Dabchick *Tachybaptus ruficollis*, White Pelican *Pelecanus onocrotalus*, Little Egret *Egretta garzetta*, Dwarf Bittern *Ixobrychus sturmii*, breeding Openbilled Stork *Anastomus lamelligerus*, Marabou Stork *Leptoptilos crumeniferus*, breeding Glossy Ibis *Plegadis falcinellus*, Redbilled Teal *Anas erythrorhyncha*, Southern Pochard *Netta erythrophthalma*, Pygmy Goose *Nettapus auritus*, African Marsh Harrier *Circus ranivorus*, Lesser Moorhen *Gallinula angulata*, Painted Snipe *Rostratula benghalensis*, Curlew Sandpiper *Calidris ferruginea* and rarely Redshank *Tringa totanus*. Wood Sandpiper *Tringa glareola* and Ruff *Philomachus pugnax* may be particularly numerous with over 1 000 birds present. The pans support some important populations of wetland and grassland bird species of Sub-regional conservation concern including Rufousbellied Heron *Ardeola rufiventris*, Saddlebilled Stork *Ephippiorhynchus senegalensis* and Redwinged Pratincole *Glareola pratincola*.

The surrounding grassveld holds Palearctic migrants, including large numbers of Blackwinged Pratincole *Glareola nordmanni* and Caspian Plover *Charadrius asiaticus*. Large mixed breeding colonies of Blacknecked Grebe *Podiceps nigricollis*, Whiskered Tern *Chlidonias hybridus*, Redknobbed Coot *Fulica cristata*, Purple Gallinule *Porphyrio porphyrio*, Lesser Moorhen *Gallinula angulata*, stilts and a handful of Baillon's Crakes *Porzana pusilla* form in flooded grasslands around Nyae-Nyae. It is in the top 20 atlas squares for overall avian species richness in Namibia.

Raptors can be particularly numerous (60 species recorded) over the grasslands of this ephemeral pan system and include

Secretarybird *Sagittarius serpentarius*, Whitebacked Vulture *Gyps africanus*, Lappetfaced Vulture *Torgos tracheliotus* and Dickinson's Kestrel *Falco dickinsoni*. Whiteheaded Vulture *Trigonoceps occipitalis*, Bat Hawk *Macheiramphus alcinus*, Lesser Kestrel *Falco naumanni*, Montagu's Harrier *Circus pygargus*, Pallid Harrier *C. macrourus* and African Hobby Falcon *Falco cuvierii* are of less common occurrence. A host of eagles is found here including Tawny Eagle *Aquila rapax*, Martial Eagle *Polemaetus bellicosus* and Bateleur *Terathopius ecaudatus*.

Typical species found most commonly in the open woodland include Kori Bustard *Ardeotis kori*, Blackbellied Korhaan *Eupodotis melanogaster*, Temminck's Courser *Cursorius temminckii*, Doublebanded Courser *Smutsornis africanus* and all of southern Africa's sandgrouse species including the rarer Yellowthroated Sandgrouse *Pterocles gutturalis* and Burchell's Sandgrouse *P. burchelli*. Species preferring *Acacia* woodland include Bradfield's Hornbill *Tockus bradfieldi*, Redbilled Francolin *Francolinus adspersus*, Redcrested Korhaan *Eupodotis ruficrista*, Monotonous Lark *Mirafra passerina*, Crimsonbreasted Shrike *Laniarius atrococcineus*, Whitecrowned Shrike *Eurocephalus anguitemens*, Kalahari Robin *Erythropygia paena*, Pied Babbler *Turdoides bicolor*, Blackfaced Babbler *T. melanops*, Ground Hornbill *Bucorvus leadbeateri*, Greyrumped Swallow *Pseudhirundo griseopyga*,

	Breeding (pairs)	Total numbers
Globally threatened		
Slaty Egret	0-29 (max)	15-200
† Lesser Kestrel		OV
Wattled Crane		38 (av)-95 (max)
Globally near-threatened		
Lesser Flamingo	475 (av)-2 634 (max)	
Pallid Harrier		20-50
Great Snipe	12 (av)-33 (max)	
Blackwinged Pratincole		50-100
RR & BRA		
Dickinson's Kestrel		Status
Burchell's Sandgrouse		Uncommon
Bradfield's Hornbill		Common
Blackfaced Babbler		Common
Kurriehane Thrush		Uncommon
Kalahari Robin		Fairly Common
Barred Warbler		Common
Burchell's Glossy Starling		Common
Whitebellied Sunbird		Common
	Breeding (pairs)	Total numbers
1% or more of population		
Greater Flamingo	740 (av)-3 950 (max)	
Blackwinged Stilt	391 (av)-1 140 (max)	
Caspian Plover		50-200
† - Species does not meet IBA threshold F - Number of females (for polygamous species) group - Number of groups (for co-operative breeders) RR & BRA - Restricted-range and biome-restricted assemblage av - Yearly average (max count) max - Absolute maximum Br - Confirmed breeding Br? - Suspected breeding V - Vagrant OV - Occasional visitor		

Longtailed Shrike *Corvinella melanoleuca*, Barred Warbler *Calamonastes fasciolatus*, Burntnecked Eremomela *Eremomela usticollis*, Marico Flycatcher *Melaenornis mariquensis*, Whitebellied Sunbird *Nectarinia talatala*, Scalyfeathered Finch *Sporopipes squamifrons*, Violeteared Waxbill *Uraeginthus granatinus*, Shafttailed Whydah *Vidua regia* and Burchell's Glossy Starling *Lamprotornis australis*.

Other threatened/endemic wildlife

The temporary wetland system supports the near-endemic Shortridge's Mouse *Mastomys shortridgei*. Threatened mammals occurring in the area include Leopard *Panthera pardus*, Cheetah *Acinonyx jubatus*, Wild Dog *Lycaon pictus*, Elephant *Loxodonta africana*, Tsessebe *Damaliscus lunatus* and Roan Antelope *Hippotragus equinus*.

Conservation issues

Overall threats to temporary wetlands in the area are low since it is used mainly by traditional hunter-gathering Khoi or

Ju/'hoan. Developments in the tourism industry and recently introduced subsistence livestock farming may have negative impacts if they are not adequately controlled. Tourism is on the increase in eastern Bushmanland, and the pans of the Nyae-Nyae area may be heavily utilised. The area was gazetted as a conservancy on 16/2/1998 and land-use plan policies have been initiated. Threats to birds come largely from disturbance of breeding waterfowl, and 4 x 4 vehicle users driving through the wetland areas for reconnaissance. Livestock farming in the Gautcha area has already led to overgrazing of upland sites which may change drainage patterns, ground water percolation and vegetation development. Continued monitoring of these wetlands over a long period of time, encompassing both wet and dry phases, could give important insights into arid-zone wetland functioning. Careful assessment of the threats to this system, particularly tourism, is required.

Further reading

Bieseles & Weinberg (1990); Hines (1989, 1993, 1996); Jones (1988); Mendelsohn & Ward (1989); Olivier & Olivier (1993); Robertson *et al.* (1998); Simmons *et al.* (1998).

N008 Waterberg Plateau Park

Fully protected
Global IBA (A1, A3)

20°25'S; 17°13'E
c. 40 500 ha

Site description

Waterberg Plateau Park is located some 30 km east of Otjiwarongo. The primary feature within the Park is the Waterberg Plateau, which rises to 1 800 m a.s.l. on the western and southern sides. The major part of this differentially weathered sandstone plateau is at 1 600 m a.s.l., some 150–200 m above the surrounding plain. The plateau consists mostly of near-vertical cliffs on the east and west, up to 140 m high. In the north the plateau gradually widens and dips to join the plain. Below the cliffs the ground slopes steeply but evenly away from the base of the mountain; the slopes are covered by sandstone scree weathered from the summit. The plateau comprises an undulating landscape with deep sand and scattered granite koppies. It is an erosional relic of a hard Etjo sandstone casing that covered large parts of Namibia millions of years ago. Most of the ancient plateau was carved up over aeons, but the resistant Etjo sandstone prevented the erosion of the Waterberg. To the south of the main plateau lies the Klein Waterberg, an inselberg rising to 1 930 m a.s.l., which is now part of a large conservancy surrounding the Park. The summer months are hot, with temperatures reaching 40°C, winter is cool with temperatures falling below zero. About 85% of the region's 400 mm p.a. rainfall is recorded between November and March. Owing to the altitudinal variation, the Park supports a clearly demarcated variety of woodland, and some 60 tree species are known from the Park.

On the plateau summit thick broadleaved woodland occurs right to the edge of the escarpment. The broadleaved tree and shrub savanna is dominated by *Terminalia sericea*, *Burkea africana*, *Combretum collinum*, *C. psidioides* and *Peltophorum africanum*. Isolated grass savanna valleys are dominated by *Aristida meridionalis*, *Antheophora pubescens* and *Eragrostis superba*. Below this and surrounding the plateau for thousands of square kilometres lies a sea of dense, bush-

encroached, *Acacia* scrub, dominated by *Acacia mellifera* and *Dichrostachys cinerea*.

Birds

This Park supports over 200 bird species, including Namibia's only surviving colony of Cape Vultures *Gyps coprotheres*, which breed on the cliffs of Okarukuwisa Mountain (1 884 m a.s.l.) in the Waterberg range. It is the only area in Namibia where Booted Eagles *Hieraaetus pennatus* are known to breed. Other cliff-nesting raptors breeding on the Waterberg include Peregrine Falcon *Falco peregrinus* and Black Eagle *Aquila verreauxii*. Vultures include Lappetfaced *Torgos tracheliotus*, Whiteheaded *Trigonoceps occipitalis* and White-backed Vulture *Gyps africanus*. Other raptors include Secretarybird *Sagittarius serpentarius*, Bateleur *Terathopius ecaudatus*, Martial Eagle *Polemaetus bellicosus* and Tawny Eagle *Aquila rapax*. The plains occasionally support Kori Bustard *Ardeotis kori* and Blackbellied Korhaan *Eupodotis melanogaster*. The Sociable Weaver *Philetairus socius* and associated Pygmy Falcon *Polihierax semitorquatus* occur at the base of the plateau. The woodland, kloofs and gorges, which are typically spring-fed throughout the year, hold some interesting near-endemics, including Monteiro's Hornbill *Tockus monteiri*, Bradfield's Hornbill *T. bradfieldi*, Rosy-faced Lovebird *Agapornis roseicollis*, Rüppell's Parrot *Poicephalus rueppellii*, Bradfield's Swift *Apus bradfieldi*, Rockrunner *Achaetops pycnopygius* and Hartlaub's Francolin *Francolinus hartlaubi*. The *Acacia* savanna holds several species typical of southern Africa's arid woodlands, including Redbilled Francolin *F. adspersus*, Burchell's Sandgrouse *Pterocles burchelli*, Monotonous Lark *Mirafra passerina*, Crimsonbreasted Shrike *Laniarius atrococcineus*, Whitecrowned Shrike *Eurocephalus anguitemens*, Kalahari Robin *Erythropygia paena*, Pied Babbler *Turdoides bicolor*, Barecheeked Babbler *T. gymnogenyis*,

Barred Warbler *Calamonastes fasciolatus*, Burntnecked Eremomela *Eremomela usticollis*, Marico Flycatcher *Melanornis mariquensis*, Violeteared Waxbill *Uraeginthus granatinus*, Shafttailed Whydah *Vidua regia*, Scalyfeathered Finch *Sporopipes squamifrons* and Burchell's Glossy Starling *Lamprotornis australis*.

Other threatened/endemic wildlife

Threatened mammals occurring in the Park include Leopard *Panthera pardus*, Cheetah *Acinonyx jubatus*, Roan Antelope *Hippotragus equinus*, Sable Antelope *H. niger*, White *Ceratotherium simum* and Black Rhinoceros *Diceros bicornis*. The Namibian near-endemic Damara Dik-Dik *Madoqua kirkii* is common here.

Conservation issues

Originally established as the Eland Game Reserve in 1965, the Waterberg Plateau Park was declared in 1972. The Cape Vulture colony numbered over 500 in the 1950s, but this crashed to 20 birds by 1980 and an all-time low of 14 birds in 1987, with only 3 pairs breeding in 1996. Vultures have declined as a result of indiscriminate use of poisons by farmers to control vermin and severe bush encroachment at the base of the mountain preventing efficient foraging. These birds are now exceptionally vulnerable, and a single irresponsible poisoning event could result in this species going extinct in Namibia. This may have happened in 1995 when breeding suddenly stopped and the population dropped from 25 to 5 birds. In an attempt to prevent the extinction of this colony a vulture restaurant was established in 1984, to supplement the diet of these birds. A simultaneous farmer-awareness programme was initiated.

Other conservation problems include severe bush encroachment around the plateau and on adjoining farmland. In 1997 a private conservancy was established completely surrounding the plateau; this is one of the first to be established in Namibia. The plateau features a core (18 600 ha) wilderness area where human activities are kept to a minimum. The Park was originally established to resettle and breed rare and endangered large mammal species. To date Roan Antelope, Sable

	Breeding (pairs)	Total numbers
Globally threatened		
Cape Vulture	3-5	10-25
† Lesser Kestrel		OV
RR & BRA		
Hartlaub's Francolin		Uncommon
Burchell's Sandgrouse		Uncommon
Rüppell's Parrot		Common
Bradfield's Hornbill		Fairly Common
Monteiro's Hornbill		Common
Barecheeked Babbler		Common
Kalahari Robin		Fairly Common
Barred Warbler		Common
Rockrunner		Fairly Common
Burchell's Glossy Starling		Fairly Common
Palewinged Starling		Common
Whitebellied Sunbird		Common
† - Species does not meet IBA threshold F - Number of females (for polygamous species) group - Number of groups (for co-operative breeders) RR & BRA - Restricted-range and biome-restricted assemblage av - Yearly average (max count) max - Absolute maximum Br - Confirmed breeding Br? - Suspected breeding V - Vagrant OV - Occasional visitor		

Antelope, Eland *Taurotragus oryx*, Giraffe *Giraffa camelopardalis*, Blue Wildebeest *Connochaetes taurinus*, White Rhinoceros, Black Rhinoceros and Buffalo *Syncerus caffer* have been reintroduced. The Park is rich in cultural heritage with many rock engravings from Stone Age inhabitants.

Further reading

Brown (1985a,b); Brown & Cooper (1987); Jankowitz & Venter (1987); Olivier & Olivier (1993).

N009 Brandberg Mountain

Unprotected **21°08'S; 14°35'E**
Global IBA (A2, A3) **50 000 ha**

Site description

Brandberg (2 606 m a.s.l.) is Namibia's highest mountain; this massive conical mountain is an ancient granitic volcanic plug situated in the central section of the Namib Desert. Rainfall averages 100 mm p.a. Basalt plains envelop the northern slopes, supporting slightly different vegetation assemblages to elsewhere. The mountain is uninhabited, but the ephemeral Ugab River flows past its northern extremities and supports traditional pastoralists. Owing to higher cloud cover, and accumulations of water on top of the mountain, relative to the surrounding area, many of the grasses on the mountain's plateau-like summit are perennial, replacing the annuals common on the plains below. Grass composition may, however, change in decades with poor rainfall when both plants and some ver-

tebrates disappear. The western side of the mountain receives coastal fog and supports higher vegetation biomass than other slopes. The valleys and gorges also differ in plant community composition because of the higher run-off in these areas. Some species found at higher altitudes (e.g. *Sterculia quinquiloba*) are replaced by close relatives (e.g. *S. africana*) on lower slopes. Woody vegetation is commoner on the plateau and flanks than on the barren plains below. At high altitudes the woody vegetation is often manifested in stunted forms, together with dwarf shrubs (such as *Ruellia brandbergensis*) and narrowleaved heath-like vegetation which has no connection with Cape Fynbos. Wild Olive *Olea europaea africana* and *Acacia hereroensis* are common species on the plateau, where *Euphorbia* spp. and endemic *Lithops* are also found.

Birds

The mountain is rich in raptors (18 species). Lappetfaced Vulture *Torgos tracheliotus*, Black Eagle *Aquila verreauxii*, Tawny Eagle *A. rapax* and Martial Eagle *Polemaetus bellincosus* are uncommon breeding residents, while Pale Chanting Goshawk *Melierax canorus* and Rock Kestrel *Falco tinnunculus* are abundant. The Brandberg inselberg and the Ugab River to the north hold many of the typical Namib species. The flat plains below the inselberg are home to Kori Bustard *Ardeotis kori*, Ludwig's Bustard *Neotis ludwigii*, Rüppell's Korhaan *Eupodotis rueppellii*, Doublebanded Courser *Smut-sornis africanus*, Gray's Lark *Ammomanes grayi*, Stark's Lark *Eremalauda starki* and Tractrac Chat *Cercomela tractrac*. Typical Namibian near-endemic species which occur in the gorges and valley's around the mountain include Hartlaub's Francolin *Francolinus hartlaubi*, Rosy-faced Lovebird *Agapornis roseicollis*, Rüppell's Parrot *Poicephalus rueppellii*, Monteiro's Hornbill *Tockus monteiri*, Barecheeked Babbler *Turdoides gymnogenys*, Violet Woodhoopoe *Phoeniculus d. damarensis*, Herero Chat *Namibornis herero*, Rockrunner *Achaetops pycnopygius*, Shorttoed Rock Thrush *Monticola brevipes* and Whitetailed Shrike *Lanioturdus torquatus*. Species preferring *Acacia* woodland and partial cover include Redbilled Francolin *Francolinus adspersus*, Kalahari Robin *Erythropygia paena*, Crimsonbreasted Shrike *Laniarius atrococcineus*, Pririt Batis *Batis pririt* and Scalyfeathered Finch *Sporopipes squamifrons*. Bradfield's Swift *Apus bradfieldi* nest in fissures in the rock face, and more atypical species such as Hamerkop *Scopus umbretta* and Cape White-eye *Zosterops pallidus* may be attracted to the mountain in wetter periods. In total about 150 species have been recorded on this mountain, twice as many as found on the surrounding gravel plains.

Other threatened/endemic wildlife

Recent analyses show that Brandberg is the epicentre of a rich vein of endemic mammals, reptiles, amphibians and plants that runs north-south through western Namibia from the Sperrgebiet in the south to the Otjihipa Mountains in the north. No other area is as rich in endemics as the Brandberg Massif; among the 90 plants endemic to Namibia, eight are found nowhere else, three of the country's six near-endemic frogs, eight of 14 near-endemic mammals, 49 of 59 near-endemic reptiles, and 11 of 14 near-endemic birds occur on, or around, this outstanding inselberg. This is not unexpected given that speciation is particularly common on isolated rocky areas in arid regions. Brandberg supports a greater combination of endemic plant, reptile, amphibians, birds and mammals than any other place in Namibia. As such it is a critical conserva-

RR & BRA species	Status
Hartlaub's Francolin	Common
Ludwig's Bustard	Fairly Common
Rüppell's Korhaan	Common
Rüppell's Parrot	Common
Monteiro's Hornbill	Common
Stark's Lark	Fairly Common
Gray's Lark	Uncommon
Barecheeked Babbler	Uncommon
Tractrac Chat	Fairly Common
Kalahari Robin	Common
Herero Chat	Fairly Common
Layard's Titbabbler	Fairly Common
Rockrunner	Common
Palewinged Starling	Common
Whitetailed Shrike	Common
Sociable Weaver	Common

* - Species does not meet IBA threshold

F - Number of females (for polygamous species)

group - Number of groups (for co-operative breeders)

RR & BRA - Restricted-range and biome-restricted assemblage

av - Yearly average (max count) max - Absolute maximum

Br - Confirmed breeding Br? - Suspected breeding

V - Vagrant OV - Occasional visitor

tion area in Namibia. Details can be found in the special issue of *Biodiversity & Conservation* Vol. 7 (April, 1998).

Conservation issues

Brandberg is famous for its prodigious quantities of rock art left by nomadic people who inhabited the mountain from about 4 000 to 500 years before present. The enigmatic 'white lady' painting is visited by thousands of tourists each year. Thus this mountain is of particular importance within Namibia, ecologically, culturally and historically, and for these reasons it has been proposed as Namibia's first World Heritage Site. The local community experiences problems with visitors as they derive no benefits from tourism. Community programmes similar to that at nearby Spitzkoppe may alleviate these problems, providing custodianship and some protection to the species and rock art unique to the mountain.

Further reading

Brown (1991); Craven (1989, 1997); Griffin (1998); Kinahan (1986, 1991); Maggs *et al.* (1998); Nordenstam (1974); Robertson *et al.* (1998); Simmons *et al.* (1998).

N010 Cape Cross Lagoon

Unprotected

Global IBA (A1, A4i, iii), proposed Ramsar site

21°45'S; 13°50'E

500 ha

Site description

Longshore drift of sediments from south to north along the coast, driven by the Benguela Current, has led to the formation of a sand barrier across what was formerly a coastal embayment just south of the rocky promontory of Cape Cross.

The inner part of the embayment remains a series of saline lagoons. These receive saline oceanic water from seepage through the sand barrier and, during extreme high tides or storms, by water washed over the sand barrier. The lagoons vary in size and number depending on water-level, and are controlled by two main factors: evaporation and seawater

input. Desiccation of the eastern borders of the embayment has produced sterile salt pans and flats. These salt deposits are worked commercially on a small scale. Three wooden platforms with a total area of 68 000 m² have been erected in some of the lagoons to provide roosting and breeding places for seabirds, as their guano is commercially harvested. Guano from these platforms probably serves to enrich the micro-flora and fauna of the lagoons. There is an irregular fringe of salt marsh vegetation along the coastal edge of the lagoons; the species composition of this vegetation has not been documented. Inland of this region are the rocky gravel plains of the Namib Desert.

Birds

The lagoons, and their platforms, have been known to support up to 14% of the global population of Cape Cormorant *Phalacrocorax capensis* (30 600 pairs), but estimates as high as 900 000 cormorants were made from aerial counts in 1974. Counts indicate that, in addition to cormorants, these lagoons regularly support up to 11 000 other birds. In total, the lagoon and platforms regularly support over 20 000 birds, including up to 16% of the southern African endemic subspecies of the Blacknecked Grebe *Podiceps nigricollis gurneyi* and large numbers of Greater *Phoenicopterus ruber* and Lesser Flamingo *Phoeniconaias minor*, Chestnutbanded Plover *Charadrius pallidus*, Curlew Sandpiper *Calidris ferruginea*, Little Stint *C. minuta*, Kelp Gull *Larus dominicanus*, Hartlaub's Gull *L. hartlaubii*, Damara Tern *Sterna balaenarum*, Swift Tern *S. bergii* and large flocks of Common Tern *S. hirundo*.

Other threatened/endemic wildlife

A massive mainland breeding colony of the near-endemic Cape Fur Seal *Arctocephalus pusillus*, numbering 156 000 adult and subadults, occurs here. This is one of two populations in Namibia that is harvested commercially, mainly for pelts.

Conservation issues

Currently, this wetland is registered as a Private Nature Reserve. The purpose of this registration was to restrict access to

	Breeding (pairs)	Total numbers
Globally near-threatened		
Lesser Flamingo		779 (av)–1 435 (max)
Damara Tern		4–20
1% or more of population		
Blacknecked Grebe	Br	120 (av)–2 187 (max)
Cape Cormorant	1 200–30 600 (max)	2 420 (av)–60 000 (max)
Greater Flamingo		1 354 (av)–1 961 (max)
Kelp Gull		126 (av)–300 (max)
Swift Tern		265 (av)–500 (max)
Other important populations		
‡ Chestnutbanded Plover		32–112 (max)

† – Species does not meet IBA threshold
 F – Number of females (for polygamous species)
 group – Number of groups (for co-operative breeders)
 RR & BRA – Restricted-range and biome-restricted assemblage
 av – Yearly average (max count) max – Absolute maximum
 Br – Confirmed breeding Br? – Suspected breeding
 V – Vagrant OV – Occasional visitor

the public who might disturb birds on the guano platforms. It is also a seal reserve, visited by 40 000 tourists per year. Substantial quantities of guano either fall into the wetland areas or are washed off the birds when they bathe. The effect of this guano-enrichment on productivity of micro-organisms has not been assessed, but algal production is likely to be enhanced. This area qualifies for registration as a wetland of international importance under the Ramsar Convention. The large number of seals may potentially threaten the seabirds which feed in the area since a small fraction of seals are known to take young birds at sea. The ministries of (1) Environment & Tourism and (2) Fisheries & Marine Resources have joint jurisdiction over the area and co-operation between these bodies needs to be fully explored.

Further reading

Berry (1976b); Cooper *et al.* (1982); Noli-Peard & Williams (1991); Olivier & Olivier (1993); Simmons (1991, 1992); Tarr (1996); Williams (1991).

N011 Namib-Naukluft Park

Fully protected **22°35'S–26°40'S; 14°25'E–16°22'E**

Global IBA (A1, A2, A3, A4i) **4 976 800 ha**

Site description

This massive conservation area, one of the largest in Africa, incorporates a large portion of the Namib Desert, which some authorities consider the oldest desert in the world. The Park contains the gravel plains of intensely weathered schists, marbles, quartzites and granites, with some gypsum crusts, calcrete and desert pavement. River canyons are intermittent and sand-filled. Extensive sand dunes, which form a dune sea, run parallel to the coastline for up to 120 km inland. The

Naukluft Mountains are part of the high-rising escarpment that marks the western edge of the interior highlands of Namibia. The flat, plateau-like summit of the mountain complex is separated from the adjacent highland plateau to the south by impressive near-vertical cliffs, while in the northwest and west its highest peaks loom almost 1 000 metres above the plains of the Namib Desert.

The Naukluft forms part of a large triangular plateau, which is higher than the main Namibian Plateau and separated from it by almost unbroken cliffs, 500 m high. The plateau consists

mainly of dolomite and limestone formations. Dissolution of the dolomite and limestone by waters over many millennia has given rise to karstification of the plateau and an extensive underground drainage system. In some of the deeply incised kloofs, discharge from this underground water reservoir occurs as crystal clear springs and streams. Soils are shallow except on the less pronounced slopes. The southern portion of these mountains holds the Sesriem Canyon, where the Tsauchab River has carved a spectacular gorge into the gravels deposited some 15 to 18 million years ago. It is thought that the Tsauchab once flowed to the Atlantic Ocean, but that it was blocked by encroaching sand dunes some 70 km inland approximately 60 000 years ago. Over thousands of years the Tsauchab River has, nevertheless, managed to keep open parts of its course, ending at Sossusvlei, a clay pan 65 km southwest of Sesriem.

The sand dune desert is manifested as widely dispersed patches north of the Orange River eventually transforming into a vast sea of dunes north of Lüderitz until it is abruptly halted by the Kuiseb River, which forms an impermeable barrier. The mean daily temperature in the desert is 20°C with almost no frost; mean annual rainfall is as low as 23 mm p.a., but fog precipitation, which, on average occurs on 60 days of every year, accounts for a further 31 mm p.a. near the coast. The mountains have hot summers with a mean maximum temperature of 35°C and summer convective storm precipitation of 200 mm p.a., and cool winters with occasional frosts. Large portions of the desert are devoid of vegetation for long periods of time. After good rains, or when conditions permit, hardy, resistant, ephemeral species grow rapidly and flower quickly.

Vegetation is extremely sparse on the shifting dunes of the sand-sea; occasionally grassy pockets of dune grass *Stipagrostis sabulicola* develop in more stable slacks. Following good rainfall, grasses also develop on the gravel plains, which are otherwise mostly devoid of cover. Plants that can tolerate the extreme aridity on a permanent basis include the lichens and succulents that dominate on inselbergs and pegmatite dykes, making use of moisture in the fog and dew. Lichens include *Parmelia hottentotta*, *P. namaensis* and *Caloplaca elegantissima*. Succulent genera include *Hoodia*, *Lithops*, *Sarcocaulon*, *Euphorbia*, *Aloe* and *Mesembryanthemum*. Sandy wastes support halophytes such as *Zygophyllum stapfii*, *Z. simplex* and *Aizoon dinteri*. The plains also hold the bizarre *Welwitschia mirabilis*, the only species of its family.

The riverbeds near the coast are colonised by *Tamarix*, *Lycium* and *Salsola* and inland by a denser growth of *Acacia erioloba* and *Faidherbia albida* with some Orange River Ebony *Euclea pseudebenus* and *Salvadora persica*. The fruit of the !Nara *Acanthosicyos horridus*, which occurs in the Kuiseb River Valley, is a valuable source of water and nutrition in the desert. The vegetation of the Naukluft Mountains is complex and relatively diverse owing to the wide variation in aspect and edaphic conditions. The plateau surface plain is a mosaic of smaller communities dominated by low scattered scrub interspersed with bare ground or clumps of perennial grass. The southern slopes of the mountain are covered mainly by grass and short shrub species including *Commiphora*, *Euphorbia*, *Boscia albitrunca*, *Maerua schinzii*, *Aloe dichotoma* and *Moringa ovalifolia*. Uncommon species include *Aloe sladeniana*, *Lithops*, *Huernia*, *Stapelia*, *Aloe striata* ssp. *karasbergensis* and *Cyphostenma* spp.

Birds

The Park is rich in raptors, and Secretarybird *Sagittarius serpentarius*, Whitebacked Vulture *Gyps africanus*, Lappet-faced Vulture *Torgos tracheliotus*, Tawny Eagle *Aquila rapax*,

	Breeding (pairs)	Total numbers
Globally threatened		
African Penguin	230	500
Globally near-threatened		
Bank Cormorant		100–200
Crowned Cormorant		50–150
Lesser Flamingo		200 (max)
African Black Oystercatcher	Br	30–50
Damara Tern	220	560
<hr/>		
RR & BRA species	Status	
Hartlaub's Francolin	Uncommon	
Ludwig's Bustard	Fairly Common	
Karoo Korhaan	Fairly Common	
Rüppell's Korhaan	Common	
Rüppell's Parrot	Uncommon	
Monteiro's Hornbill	Uncommon	
Dune Lark	Common	
Stark's Lark	Common	
Gray's Lark	Common	
Blackeared Finchlark	Uncommon	
Tractrac Chat	Common	
Karoo Chat	Common	
Kalahari Robin	Common	
Herero Chat	Uncommon	
Layard's Titbabbler	Uncommon	
Karoo Eremomela	Uncommon	
Barred Warbler	Common	
Cinnamonbreasted Warbler	Uncommon	
Rockrunner	Uncommon	
Whitetailed Shrike	Uncommon	
Palewinged Starling	Common	
Sociable Weaver	Fairly Common	
Blackheaded Canary	Common	
<hr/>		
	Breeding (pairs)	Total numbers
1% or more of population		
Kelp Gull	Br	250–350
Common Tern		10 000 (max)
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* – Species does not meet IBA threshold		
F – Number of females (for polygamous species)		
group – Number of groups (for co-operative breeders)		
RR & BRA – Restricted-range and biome-restricted assemblage		
av – Yearly average (max count) max – Absolute maximum		
Br – Confirmed breeding Br? – Suspected breeding		
V – Vagrant OV – Occasional visitor		

Martial Eagle *Polemaetus bellicosus* and Greater Kestrel *Falco rupicoloides* are very common. Whiteheaded Vulture *Trigonoceps occipitalis*, Pallid Harrier *Circus macrourus*, Black Harrier *C. maurus* and Lesser Kestrel *Falco naumanni* are of less common occurrence. In the east, the Naukluft Mountains hold breeding Black Eagle *Aquila verreauxii* and Black Stork *Ciconia nigra*. Several typical karoo species reach the northern limit of the distribution in the southern portion of the Park, including Karoo Korhaan *Eupodotis vigorsii*, Layard's Titbabbler *Parisoma layardi*, Karoo Eremomela *Eremomela gregalis*, Cinnamonbreasted Warbler *Euryptila subcinnamomea*, Blackheaded Canary *Serinus alario* and Blackeared Finchlark *Eremopterix australis*.

Other species more typical of northern Namibia penetrate the northern section of the Park around the Naukluft Mountains, including Hartlaub's Francolin *Francolinus hartlaubi*, Rüppell's Parrot *Poicephalus rueppellii*, Monteiro's Hornbill *Tockus monteiri*, Herero Chat *Namibornis herero*, Rockrunner *Achaetops pycnopygius*, Shorttoed Rock Thrush *Monticola brevipes* and Whitetailed Shrike *Lanioturdus torquatus*. Typical desert dune and gravel plains species include Kori Bustard *Ardeotis kori*, Ludwig's Bustard *Neotis ludwigii*, Rüppell's Korhaan *Eupodotis rueppellii*, Burchell's Courser *Cursorius rufus*, Temminck's Courser *C. temminckii*, Doublebanded Courser *Smutsornis africanus*, Dune Lark *Certhilauda erythrochlamys*, Gray's Lark *Ammomanes grayi*, Stark's Lark *Eremalauda starki*, Karoo Chat *Cercomela schlegelii*, Tractrac Chat *Cercomela tractrac* and Rufouseared Warbler *Malcorus pectoralis*.

Species preferring wooded *Acacia* and partial cover include Redbilled Francolin *Francolinus adspersus*, Pied Babbler *Turdoides bicolor*, Kalahari Robin *Erythropygia paena*, Barred Warbler *Calamonastes fasciolatus*, Marico Flycatcher *Melaenornis mariquensis*, Crimsonbreasted Shrike *Laniarius atrococcineus*, Rosy-faced Lovebird *Agapornis roseicollis*, Cape Penduline Tit *Anthoscopus minutus*, Pirit Batis *Batis pirit*, Scalyfeathered Finch *Sporopipes squamifrons*, Violeteared Waxbill *Uraeginthus granatinus* and Shafttailed Whydah *Vidua regia*. Wherever trees are large enough to support their massive nests, Sociable Weaver *Philetairus socius* and the associated Pygmy Falcon *Polihierax semitorquatus* are found.

The coastline holds roosting and foraging areas for small numbers of African Black Oystercatcher *Haematopus moquini*, Damara Tern *Sterna balaenarum*, Bank Cormorant *Phalacrocorax neglectus*, Crowned Cormorant *P. coronatus*, Hartlaub's Gull *Larus hartlaubii* and large numbers of Common Tern *Sterna hirundo*. The coastline also holds the only mainland-breeding colony of African Penguin *Spheniscus demersus* in Namibia. When wet, Sossusvlei may hold several wetland birds, including flamingos.

Other threatened/endemic wildlife

This Park supports many species that are endemic to Namibia and the small portion of Angola into which the Namib Desert extends. Unique threatened or endemic plants include *Aloe namibensis*, *A. sladeniana*, *A. karasbergensis*, *Welwitschia mirabilis*, *Lithops schwantesii*, *Trichocaulon* spp. and the

resurrection plant *Myrothamnus flabellifolius*. Interesting endemic invertebrates include *Onymacris unguicularis* and *Lepidochora* spp. Reptiles include Webfooted Gecko *Palmatogecko rangei*, Anchieta's Spade-snouted Worm Lizard *Aporosaura anchietae* and the Sidewinder *Bitis peringueyi*. Endemic and threatened mammals include Desert Golden Mole *Eremitalpa granti*, Hairyfooted Gerbil *Gerbillarus tytonis*, Leopard *Panthera pardus*, Cheetah *Acinonyx jubatus* and Hartmann's Mountain Zebra *Equus zebra hartmannae*.

Conservation issues

Namib Desert National Park was first established as a game reserve in 1907. The Sandwich Bay (IBA N015) area was incorporated into the game reserve in 1941. In 1956, the name was changed to the Namib Desert Park, and the reserve was enlarged to include the Kuiseb Canyon, Swakop River Valley, and the Welwitschia Plains. In 1966, the Naukluft farm was purchased and two years later the Naukluft Mountain Zebra Park was established. The parks were amalgamated in 1979 by a 30-km-wide corridor; the size increased from 2 244 150 ha to its present size in 1984. The area was officially proclaimed as a National Park in 1986 when the remainder of Diamond Area II was added under Nature Conservation Ordinance No. 31.

The Topnaar Hottentots have lived in the Kuiseb River Valley for many generations. They farm goats and cattle and are permanently resident in the Park. Illegal nomadic farming on the Kuiseb floodplain is a conservation concern and is being stopped. Three large inactive mining concessions remain in the Park. Prospecting in the region prior to park establishment has left visible scars in several areas. Natural migration patterns of Gemsbok *Oryx gazella* may be forced to change because the numerous springs of the escarpment are being utilised too intensely. The area has been well studied, particularly through the endeavours of the Desert Ecological Research Institute, which was established in 1963 and is located at Gobabeb on the banks of the Kuiseb River. Studies have concentrated on the physiological and behavioural adaptations of beetles, ants and lizards to extreme desert conditions.

Further reading

Boyer & Bridgeford (1988); Brown (1987); Jarvis & Robertson (1997); Olivier & Olivier (1993); Simmons *et al.* (1998).

N012 Mile 4 Saltworks

Fully protected
Global IBA (A1, A4i, iii)

22°39'S; 14°33'E
3 400 ha

Site description

This coastal area comprises a private nature reserve of 400 ha and a salt works. It lies adjacent to the sea on the central Namib Desert coast and has been extensively altered to create numerous evaporation ponds. Immediately inland lie the gravel plains of the Namib Desert. The salt works are situated about 7 km (4 miles) north of Swakopmund, off route 76 to Terrace Bay. Production of the concentrated brine at the salt pan, known as Panther Beacon, began in 1933, but by 1952 the salt source was exhausted. Seawater has since been pumped into open evaporation and concentration ponds from which

crystallised salt is removed with mechanical scrapers. The pans are shallow and of varying salinity. A large wooden commercial guano platform covering 31 000 m² has been built in one of the northern pans. Apart from a few halophytes, the salt works are devoid of vegetation.

Birds

Mile 4 occasionally supports massive numbers of waterbirds and the guano platform has supported up to 700 000 Cape Cormorant *Phalacrocorax capensis* in the past; an average of 45 000 birds has been supported in recent years. Cormorants

aside, the area may support more than 50 000 other waterbirds, including large numbers of Greater *Phoenicopterus ruber* and Lesser Flamingo *Phoeniconaias minor*, African Black Oystercatcher *Haematopus moquini*, and up to 100 000 Common Tern *Sterna hirundo*. Breeding species include Damara Tern *S. balae-narum*, Chestnutbanded Plover *Charadrius pallidus*, Kelp Gull *Larus dominicanus*, Hartlaub's Gull *L. hartlaubii* and Caspian Tern *Hydroprogne caspia*.

White Pelican *Pelecanus onocrotalus* probably would breed on the platforms but their disruption of cormorant breeding, and their poor quality guano, means they are dissuaded by the owners. In 1997, the area witnessed the first recorded attempt of Greater and Lesser Flamingo breeding in coastal areas. Just over 100 nests were built in the salt pan and eggs were laid but presumed disturbance by Blackbacked Jackal *Canis mesomelas* led to early failure. Recent breeding attempts on islands in the salt pans by Bank Cormorants *Phalacrocorax neglectus*, and the occurrence and possible breeding of the near-endemic Gray's Lark *Ammomanes grayi*, immediately inland, add to the reserve's importance.

Other threatened/endemic wildlife

Brown Hyaena *Hyaena brunnea* occur at the nearby Swakopmund dump and scavenge along the beaches in this area.

Conservation issues

The proprietors of the salt works have registered the aquatic portion of this wetland, which encompasses 400 ha, as a private nature reserve. The Richwater Oyster Company has been cultivating oysters on the pan since 1985. Oyster production and guano scraping appears to be compatible with maintaining good populations of wetland birds, judging by the large numbers present, and the breeding of terns, cormorants and plovers in and around the salt works. The value of these commercial salt pans as habitat for waders and other birds is

	Breeding (pairs)	Total numbers
Globally near-threatened		
Lesser Flamingo	40 (once)	883 (av)–1 996(max)
African Black Oystercatcher		21 (av)–34 (max)
Damara Tern	9–12	12 (av)–88 (max)
1% or more of population		
Cape Cormorant	Br	45 400 (av)–700 000 (max)
Greater Flamingo	64 (once)	1 306 (av)–2 688 (max)
Kelp Gull	120	372 (av)–706 (max)
0.5% or more of population		
Chestnutbanded Plover	20	50–200 (max)

† – Species does not meet IBA threshold
 F – Number of females (for polygamous species)
 group – Number of groups (for co-operative breeders)
 RR & BRA – Restricted-range and biome-restricted assemblage
 av – Yearly average (max count) max – Absolute maximum
 Br – Confirmed breeding Br? – Suspected breeding
 V – Vagrant OV – Occasional visitor

obvious from biannual wetland counts (up to 93 000 birds of c. 35 species at any one time). Management options that enhance the value of these systems, for breeding flamingos for example, should be sought; although the owners are not keen on attracting large numbers of visitors who may disturb the breeding cormorants. Substantial quantities of guano either fall into the pans or are washed off the birds when they bathe. The effect of this guano-enrichment on productivity of micro-organisms in the pan has not been directly assessed, but oysters are grown commercially here and no eutrophic conditions are reported. The site can be considered secure as long as guano harvesting remains commercially viable.

Further reading

Berry (1976a,b); Cooper *et al.* (1982); Crawford & Dyer (1995); Noli-Peard & Williams (1991); Simmons (1992); Tarr (1996).

N013 30 Km Beach: Walvis–Swakopmund

Unprotected
Global IBA (A1, A4i)

22°42'S–22°56'S; 14°31'E–14°31'E
c. 2 100 ha

Site description

This coastal IBA is situated in central Namibia, on the border of the Namib Desert, between the harbour town of Walvis Bay and Swakopmund. It is essentially a 30 km x 0.7 km stretch of beach comprising mainly sand, with isolated rocky outcrops forming less than 5% of its length. Two small resorts occur in an otherwise uninhabited section of coast, namely Langstrand and Dolphin Strand. Rainfall here is highly variable averaging about 15 mm p.a., but precipitation from coastal fog occurs on 1 of every 3 days. Line fishing is common along the northern sections, while swimmers and surfers are concentrated around the two resorts. The area is the focus of an intense oceanic upwelling system that begins in Lüderitz, where

nutrients are brought to the surface, and algal and zooplankton blooms form as the water is swept north by the Benguela Current. Between Walvis Bay and Henties Bay inshore winds push large quantities of nutrients inland, supporting an abundance of invertebrates on the sandy and rocky shores. Invertebrate densities on both shore types are higher than any other beach in southern Africa. Furthermore, the effect of the Pelican Point sandspit is to refract waves around and into the bay, concentrating the nutrients still further on these shores. Little vegetation occurs, although washed-up Kelp is seen on some sections and there provides a rich microhabitat for kelp flies and associated shorebirds. Associated with this beach is the only bulge along an otherwise straight beach, known as Caution Reef (or Patrysburg). This is an area of sand flats

immediately behind a shingle beach, rising to a raised plateau overlooking the shore about 600 m inland. The national road between Swakopmund and Walvis Bay acts as boundary to the area c. 1 km inland.

Birds

This site is not only the richest shoreline in terms of shorebird density anywhere in southern Africa but it supports the densest colony of breeding Damara Terns *Sterna balaenarum* known. Surveys 20 years ago showed the beach to hold peak shorebird numbers of 448 birds/km. Similar densities were recorded in 1996 (451 birds/km). Individual 10 km sections, which include the rocky shores between Caution Reef and Swakopmund, peak even higher at 770 birds/km. Totals for this 30 km stretch of beach therefore exceed 13 000 shorebirds of approximately 31 species, most of which are Palearctic migrants. The most abundant Charadrii are Turnstone *Arenaria interpres*, Curlew Sandpiper *Calidris ferruginea*, Grey Plover *Pluvialis squatarola* and Whimbrel *Numenius phaeopus*. Breeding Damara Tern occur mainly at Caution Reef and breed from October through February. Densities within a 2 km² study area have exceeded 120 nesting pairs or 60 pairs/km². This is considerably higher than the modal density in Namibia of about 1 pair/km². Other birds breed farther inland at lower densities and breeding and ringing studies have continued since 1995. Large numbers of Common and Arctic Terns *Sterna hirundo/paradisaea* flock here, and large numbers of cormorants, which use the artificial guano platform at the southern end of this IBA, sometimes roost on the beach.

Other threatened/endemic wildlife

In recent years Pygmy Sperm Whale *Kogia breviceps*, Southern Bottlenosed Whale *Hyperoodon planifrons*, the rare Pygmy Right Whale *Caperea marginata* (5 records), and the Minke Whale *Balaenoptera acutorostrata* have all occurred or been stranded on these beaches, while the Dusky *Lagenorhynchus obscurus*, Common Bottlenosed *Tursiops truncatus* and Heaviside's Dolphin *Cephalorhynchus heavisidii* are frequent visitors.

Conservation issues

This important breeding area of dune slacks and beach is unprotected. Tracks of 4WD vehicles are numerous in an otherwise unvegetated plain. Breeding Damara Terns are unprotected on their Caution Reef breeding site, and losses are attributable to 4WD vehicles driving over eggs, and Kelp

	Breeding (pairs)	Total numbers
Globally near-threatened		
† African Black Oystercatcher		5–8
Damara Tern	120	250 (max)
1% or more of population		
Turnstone		5 211 (max)
Kelp Gull		1 688 (max)
0.5% or more of population		
Cape Cormorant		2 916 (max)
Curlew Sandpiper		3 905 (max)
Swift Tern		323 (max)
Common Tern		5 400 (max)
Other important populations		
† Grey Plover		438 (max)

* – Species does not meet IBA threshold
 F – Number of females (for polygamous species)
 group – Number of groups (for co-operative breeders)
 RR & BRA – Restricted-range and biome-restricted assemblage
 av – Yearly average (max count) max – Absolute maximum
 Br – Confirmed breeding Br? – Suspected breeding
 V – Vagrant OV – Occasional visitor

Gulls *Larus dominicanus* being attracted to fishermen and their bait, increasing predation on eggs. Predation rates are higher at this colony than any other studied colony where disturbance is lower.

Fishermen regularly use the same beaches as the shorebirds, but space competition is not severe. What is more important is the possibility of major developments, including casinos and hotels, proposed for the Caution Reef plains. A building on the site, or close to it, is likely to drive birds away, even though the terns tolerate a certain degree of visitor traffic. Dogs and visitors to the two resorts also disturb feeding birds in some sections of this productive beach, but the impact is relatively minor. Pollution is relatively rare away from the Walvis Bay harbour, but tankers anchored in the bay opposite Pelican Point clean their bilges, and scum from this uncontrolled source may be problematic.

Further reading

Braby (1995); Summers *et al.* (1987); Simmons *et al.* (1998); Whitelaw *et al.* (1978).

N014 Walvis Bay

Unprotected
Global IBA (A1, A4i, iii), Ramsar site

22°59'S; 14°31'E
c. 4 000 ha

Site description

Once famous for its whales, hence the name, Walvis Bay is a large modern town and Namibia's only port. It is one of Namibia's four Ramsar sites and is located in the Kuiseb River Delta, approximately half way down the Namib Desert coast. The wetlands south and west of the town comprise the natural areas of Walvis Bay Lagoon, and include inter-tidal

mudflats and the eastern half of a 10-km-long north-south sand spit called Pelican Point; this spit provides protection for the bay from Atlantic swells. A lagoon lies at the southern end of the open water. A salt works was built at the southern end of this lagoon; it reduces the tidal sweep and possibly adds to increased siltation. Included in this IBA are the artificially flooded evaporation ponds of the salt works, as well as the occasionally flooded areas to the south of the salt works. The

only terrestrial plants occur in the extensive riverine vegetation of the delta and the ephemeral river. Walvis Bay is only some 55 km north of Namibia's second most important wetland, Sandwich Harbour. The Kuiseb River no longer flows into its own delta, having been dammed off in 1962 to prevent flooding of the town. The bay is a tourist attraction because of the proximity of a hundred thousand birds, mainly flamingos, to public areas. Rainfall is sporadic and averages about 15 mm p.a. while precipitation in the form of coastal fog is common.

Birds

In terms of numbers of birds, this is the most important coastal wetland in the Sub-region, and is probably one of the three most important coastal wetlands in Africa. This area regularly supports over 100 000 birds in summer and 50 000 in winter. Peak counts per species indicate annual use by up to 150 000 wetland birds. Most birds (c. 90% by number) which use the wetland in summer are non-breeding intra-African and Palearctic migrants. The area is vitally important for Palearctic waders and flamingos, which make up the majority of the numbers. Between 80–90% of the Sub-region's flamingos winter here, utilising especially the evaporation ponds of the salt works, or at Sandwich Harbour (IBA N015). As many as 13 species occur in numbers exceeding the 1% of the biogeographical population IBA criterion.

Several species number in their thousands, including Greater *Phoenicopterus ruber* and Lesser Flamingo *Phoeniconaias minor*, Curlew Sandpiper *Calidris ferruginea*, Little Stint *C. minuta* and Common/Arctic Tern *Sterna hirsundo/paradisaea*, and significant numbers of the global populations of the Chestnutbanded Plover *Charadrius pallidus* and Blacknecked Grebe *Podiceps nigricollis* occur. Other common species include African Black Oystercatcher *Haematopus moquini*, breeding Damara Tern *Sterna balaenarum*, Grey Plover *Pluvialis squatarola*, Whitefronted Plover *Charadrius marginatus*, Turnstone *Arenaria interpres*, Sanderling *Calidris alba*, Avocet *Recurvirostra avosetta*, Kelp Gull *Larus dominicanus*, Hartlaub's Gull *L. hartlaubii*, breeding Caspian Tern *Hydroprogne caspia*, Swift Tern *Sterna bergii*, Sandwich Tern *S. sandvicensis* and most of southern Africa's Black Tern *Chlidonias niger*. It also holds large proportions of the southern African populations of Knot *Calidris canutus*, Bartailed Godwit *Limosa lapponica*, Curlew *Numenius arquata* and Whimbrel *N. phaeopus*. Smaller numbers of White Pelican *Pelecanus onocrotalus*, Cape Teal *Anas capensis* and Ringed Plover *Charadrius hiaticula* occur. It is possibly the only place in southern Africa where one or more species of phalarope *Phalaropus* spp. are regular visitors (up to 12 birds at a time) to the salt works and offshore. This very high species richness and abundance is probably due to nutrients from the highly productive Lüderitz upwelling cell being brought north by the cold Benguela Current and being blown inshore by year-round winds. The sandy and rocky beaches here also support extremely high linear densities of wading birds (see IBA N013). Dune Lark *Certhilauda erythrochlamys*, entirely endemic to the inter-dune sea of the central Namib, occur in this area.

	Breeding (pairs)	Total numbers
Globally near-threatened		
‡ Bank Cormorant		5–8
Lesser Flamingo	14 200 (av)–33 060 (max)	
African Black Oystercatcher	110 (av)–204 (max)	
Damara Tern	60 (av)–265 (max)	
1% or more of population		
Blacknecked Grebe	2 050 (av)–4 230 (max)	
Greater Flamingo	11 350 (av)–31 800 (max)	
Avocet	818 (av)–2 340 (max)	
Grey Plover	816 (av)–3 360 (max)	
Chestnutbanded Plover	1 810 (av)–6 040 (max)	
Whitefronted Sandplover	1 010 (av)–1 610 (max)	
Turnstone	2 110 (av)–4 420 (max)	
Sanderling	2 110(av)–7 360 (max)	
Curlew Sandpiper	11 180 (av)–22 700 (max)	
Kelp Gull	1 710 (av)–5 170 (max)	
Caspian Tern	70 (av)–230 (max)	
Swift Tern	350 (av)–1 660 (max)	
Common Tern	5 410 (av)–23 610 (max)	
Other important populations		
‡ White Pelican		88 (av)–590 (max)

‡ – Species does not meet IBA threshold

F – Number of females (for polygamous species)

group – Number of groups (for co-operative breeders)

RR & BRA – Restricted-range and biome-restricted assemblage

av – Yearly average (max count) max – Absolute maximum

Br – Confirmed breeding Br? – Suspected breeding

V – Vagrant

OV – Occasional visitor

Other threatened/endemic wildlife

Whales, including the Southern Right *Balaena glacialis* and Humpback Whales *Megaptera novaeangliae*, which once brought their calves into the sheltered waters and were exterminated by early whalers, are still sometimes seen at sea. In recent years Pygmy Sperm Whale *Kogia breviceps*, Southern Bottlenosed Whale *Hyperoodon planifrons*, the rare Pygmy Right Whale *Caperea marginata* (5 records) and Minke Whale *Balaenoptera acutorostrata* have all occurred, while the Dusky *Lagenorhynchus obscurus*, Common Bottlenosed *Tursiops truncatus* and the poorly known Benguela endemic Heaviside's Dolphin *Cephalorhynchus heavisidii* are frequent visitors.

Conservation issues

Once an enclave of South Africa, Walvis Bay was ceded to Namibia in March 1994. However, the legislation in the Walvis Bay and Offshore Islands Act of 1994 made no provision for the gazetted Cape Nature Reserve to be re-promulgated, and other than its Ramsar status, it is not formally protected. However, moves by the recently formed Walvis Bay Environmental Action Committee, the municipality and the Ministry of Environment & Tourism are making rapid progress towards improving the situation.

Although the salt works at Walvis Bay destroyed large areas of naturally flooded salt pan, it does provide large areas of permanently flooded shallow water with a range of salinities not naturally occurring in this environment. The artificial section of the wetland regularly supports more than half the birds

in the wetland. Natural threats to the system include transport of wind-driven sand from the Kuiseb Delta into the lagoon, and the large silt load present in the ocean in and around the mouth of the lagoon, which may lead to the eventual siltation of part of the system. The growth of the Pelican Point sand spit at 22 m per year decreases the tidal sweep during spring tides that once helped scour the bay of wind-transported sand.

Fish oils, fish processing wastes and ship-borne pollution from the harbour have affected an already hyper-rich system, but most marine die-offs are associated with natural build ups of sulphur dioxide precipitated by the high nutrient load of the waters. Oil spills from the natural gas fields off Lüderitz have the potential to be blown inland to Walvis Bay, but oil spill contingency plans are in place.

Light aircraft, prohibited from flying low over the lagoon and mudflats, consistently violate the height restrictions and disturb feeding birds, particularly flamingos, on a regular basis. Implementing strictly enforced regulations, including the suspension of flying licences may help curb this problem.

Further reading

Berry (1976a); Boyer (1988); Curry (1997); Hockey *et al.* (1992); Jacobson *et al.* (1995); Noli-Peard & Williams (1991); Simmons (1991, 1992, 1996a, 1997a); Ward (1997); Whitelaw *et al.* (1978); Williams (1987, 1988).

N015 Sandwich Harbour

Fully protected

Global IBA (A1, A4i, iii), Ramsar site

23°20'S; 14°30'E

c. 8 500 ha

Site description

Sandwich Harbour is a natural lagoon which lies on the Namib Desert coast approximately 55 km south of Walvis Bay. One of Namibia's four Ramsar sites, and Namibia's only marine reserve, Sandwich was once a natural harbour for whalers and fish processors who could gain access to freshwater here. Owing to dynamic geomorphological change, its sand bars and lagoons shift constantly with winter storms and longshore currents.

Two main sections of this wetland are recognised: the northern fresh water wetland, much reduced in size since the early 1970s when it covered several square kilometres, and the southern mudflats, a 20 km² area of sand and mudflats inundated daily by the tides. The northern wetland is now a thin sliver of mainly *Phragmites australis*, fed by a massive freshwater aquifer beneath the high dunes of the Namib sand-sea. This potable water, possibly up to 7 000 years in age, slowly seeps through the wetland and there supports lush but dwindling stands of emergent and marginal vegetation. The brackish pools are partially fringed by *Typha capensis*, *Sarcocornia natalensis* and *Phragmites australis*. Further from the water, coarse grasses *Sporobolus virginicus*, *Odysea paucinervis* and *Cladoraphis cyperoides* intermingle, and together with the sedges *Scirpus dioicus* and *Arthrocnemum natalensis*, cover large areas. The endemic !Nara *Acanthosicyos horrida* is found just inland, within the dune sea, where freshwater is available. The species' distributions are determined by the salinity gradient between the freshwater seepage and the marine system. The wetland is protected from the Atlantic Ocean swells by a barrier beach which has moved from 1 km to within 150 m of the dunes, forming a small lagoon in the last 30 years. The southern lagoon, which leads into mudflats, is a relative shallow water-body some 5 km long by 3 km wide. It is protected from the ocean by a western sandspit that once reached the northern wetland but now joins the mainland some 3 km south of it. The mouth of the southern lagoon is where this western sandspit is breached, forming 3–4 sandbar islands.

Sandwich Harbour is one of the most active geomorphic areas along the entire Namib coast. In the late 1800s there was no barrier beach and therefore no protected wetland and an otherwise open harbour. The system continues to rapidly evolve and contrary to popular belief, it is far from dead.

Birds

This is one of the most important wetland areas in southern Africa, regularly supporting over 50 000 birds in summer and over 20 000 in winter. Traditionally, the northern wetlands hold the highest species diversity (up to 51 species of wetland bird), while the southern mudflats hold by far the largest number of birds, dominated by terns, sandpipers, flamingos and cormorants. Shorebirds occur here at densities exceeding 7 000 birds/km², amongst the highest recorded in the world. The largest number of birds counted at Sandwich Harbour was 238 000 birds during January 1998; one of the first complete counts ever undertaken at this wetland.

The area is vitally important for Palearctic waders and flamingos, which comprise the majority of the numbers. The area supports massive numbers of several species, including Cape Cormorant *Phalacrocorax capensis*, Greater *Phoenicopterus ruber* and Lesser Flamingo *Phoeniconaias minor*, Common Tern *Sterna hirundo*, up to 40% of the world population of Chestnutbanded Plover *Charadrius pallidus*, and tens of thousands of Curlew Sandpiper *Calidris ferruginea* and Little Stint *C. minuta*. Other numerous species include African Black Oystercatcher *Haematopus moquini*, Whitefronted Plover *Charadrius marginatus*, Turnstone *Arenaria interpres*, Sanderling *Calidris alba*, Avocet *Recurvirostra avosetta*, Kelp Gull *Larus dominicanus*, Hartlaub's Gull *L. hartlaubii*, Caspian Tern *Hydroprogne caspia*, Swift Tern *Sterna bergii*, Sandwich Tern *S. sandvicensis* and breeding Damara Tern *S. balae-narum*. Sandwich Harbour holds other important species, including occasional Bank Cormorant *Phalacrocorax neglectus* and African Marsh Harrier *Circus ranivorus*. This IBA also holds large proportions of the southern African populations of Ringed Plover *Charadrius hiaticula*, Grey Plover *Pluvialis squatarola*, Knot *Calidris canutus*, Bartailed Godwit *Limosa lapponica*, Curlew *Numenius arquata* and Whimbrel *N. phaeopus*. Isolated breeding populations of Great Crested Grebe *Podiceps cristatus*, Black-crowned Night Heron *Nycticorax nycticorax* and Purple Gallinule *Porphyrio porphyrio* occur here, but like most freshwater species their numbers have decreased dramatically with the reduction of the northern wetland. Rarities are regularly picked up and include European Oystercatcher *Haematopus ostralegus*, which occur

every year in low numbers, Greater Sandplover *Charadrius leschenaultii* and Broadbilled Sandpiper *Limicola falcinellus*. Lanner *Falco biarmicus* and Peregrine Falcon *F. peregrinus* occasionally visit the area when massive tern flocks occur.

Other threatened/endemic wildlife

Bottlenosed Dolphin *Tursiops truncatus* are seen in the lagoons with pods of 10–20 animals not uncommon, while a non-breeding colony of c. 10 000 Cape Fur Seals *Arctocephalus pusillus* occupies the beach west of the mudflats. Brown Hyaena *Hyaena brunnea* and Gemsbok *Oryx gazella* are frequent visitors to the wetland, while the lagoon and marine environment hold 36 species of fish.

Conservation issues

There have been no permanent human inhabitants at Sandwich Harbour since 1969, although remnants of a whaling station exist at the foot of the dunes and several wooden buildings belonging to earlier guano collectors and fishermen still stand. The entire area is a marine reserve and it falls within the boundaries of the Namib-Nakluft Park (IBA N011), managed by the Ministry of Environment and Tourism. Owing to its discrete and dynamic nature it is considered a separate IBA from the Namib-Nakluft system. Should current geomorphic processes eradicate the northern wetland, most of the freshwater vegetation would be lost and species richness would probably decrease. Any plans for the area should take cognizance of the fact that the southern end of the harbour supports the greatest abundance of birds, and this will remain, irrespective of the fate of the northern wetland. It is one of the best studied and most fascinating wetlands in Namibia with bird counts spanning a period of 27 years and further research planned on the invertebrate fauna that presumably accounts for the high densities of waders found here.

The one conservation problem is the constant illegal low-flying undertaken by tour companies, which 'buzz' the flamingos and cormorants 5–6 times daily in order to show visitors the sites of Sandwich Harbour, including flushed flamingos. Height restrictions are now set at 1 000 m a.s.l. and more regu-

	Breeding (pairs)	Total numbers
Globally near-threatened		
† Bank Cormorant		OV
Lesser Flamingo		2 000 (av)–13 100 (max)
African Black Oystercatcher		20 (av)–90 (max)
Damara Tern	20	50 (av)–300 (max)
1% or more of population		
Cape Cormorant		4 230 (av)–25 300 (max)
Greater Flamingo		2 480 (av)–11 900 (max)
Avocet		120 (av)–940 (max)
Chestnutbanded Plover	Br	170 (av)–5 590 (max)
Whitefronted Plover	10	440 (av)–2 540 (max)
Turnstone		402 (av)–2 260 (max)
Sanderling		1 630 (av)–14 160 (max)
Little Stint		3 590 (av)–30 480 (max)
Curlew Sandpiper		3 580 (av)–43 680 (max)
Kelp Gull		280 (av)–3 200 (max)
Caspian Tern		30 (av)–168 (max)
Swift Tern		80 (av)–820 (max)
Sandwich Tern		200 (av)–3 660 (max)
Common Tern		4 610 (av)–42 000 (max)

† – Species does not meet IBA threshold
 F – Number of females (for polygamous species)
 group – Number of groups (for co-operative breeders)
 RR & BRA – Restricted-range and biome-restricted assemblage
 av – Yearly average (max count) max – Absolute maximum
 Br – Confirmed breeding Br? – Suspected breeding
 V – Vagrant OV – Occasional visitor

larly enforced. Line fishing for commercial ends within the Namib-Nakluft Park has now been stopped. The area's history is well known and numerous artefacts, grave sites, shipwrecks and large shell middens litter this fascinating site.

Further reading

Berry & Berry (1975); Gebhardt (1973); Glassom & Branch (1997); Hellwig (1968); Kensley (1978); Kensley & Penrith (1977); Kinahan (1991); Lenssen *et al.* (1991); Noli-Peard & Williams (1991); Prozesky (1963); Simmons (1991, 1996b); Ward & Seely (1990); Whitelaw *et al.* (1978); Wilkinson *et al.* (1989).

N016 Hardap Nature Reserve

Fully protected
Sub-regional IBA (C4i)

24°30'S; 17°50'E
c. 25 000 ha

Site description

This reserve is centred on Namibia's largest dam at Hardap on the Fish River, just to the west of Mariental. The reserve is divided into two sections by the dam, covering 1 848 ha in the north and 23 420 ha in the southern and western sections. The surrounding area comprises a rugged, rocky landscape with scattered basalt ridges. An extensive plateau occurs in the west, tapering into a valley in the east. The topography of the

reserve consists of wide plains interspersed by small round hills and stony ridges, especially near the upper reaches of the dam. The summer months are hot, with temperatures reaching 40°C; winter is cool with temperatures falling below zero. The area is semi-arid, with an average rainfall of 192 mm p.a. and an average evaporation of 3 397 mm p.a. The reserve's vegetation has been classified as dwarf shrub savanna with scattered trees such as *Acacia karroo* and *Tamarix usneoides* occurring mainly along the river courses. The open veld is

characterised by *Acacia erioloba*, *A. newbrowonii*, *Boscia albitrunca*, *B. foetida* and *Parkinsonia africana*. *Rhigozum trichotomum* and *Cataphractes alexandri* dominate the shrub layer while the most important grasses are of the genera *Stipagrostis*, *Eragrostis* and *Aristida*.

Birds

Owing to the diverse set of habitat types some 260 bird species occur in the reserve. Wetland birds occur in reasonably large numbers. This site is the only site in Namibia that regularly holds large numbers of White Pelican *Pelecanus onocrotalus*, which breed on one or two rocky islands near the west shores. In the past it has been recorded to hold up to two thousand White Pelican. The dam also supports Darter *Anhinga melanogaster*, Little Egret *Egretta garzetta*, African Spoonbill *Platalea alba* and occasionally Whitebacked Duck *Thalassornis leucotis*. The surrounding woodland is home to Marabou Stork *Leptoptilos crumeniferus*. The surrounding grasslands support Kori Bustard *Ardeotis kori* and Double-banded Courser *Smutsornis africanus*.

Other threatened/endemic wildlife

Threatened mammals occurring in the Park include Black Rhinoceros *Diceros bicornis* and Cheetah *Acinonyx jubatus*. Hartmann's Mountain Zebra *Equus zebra hartmanni* has been reintroduced to the area. Reptiles include the Cape Wolf Snake *Lycophilidion capense*.

Conservation issues

The area was established as a recreation resort in 1964. The Nature Reserve surrounding the dam was established in 1968 by merging several farms. The management plan makes provision for a recreation area on 5% of the reserve, the remain-

	Breeding (pairs)	Total numbers
Globally threatened		
† Lesser Kestrel		OV
0.5% or more of population		
White Pelican	Br	717 (av)–1 396 (max)
† – Species does not meet IBA threshold F – Number of females (for polygamous species) group – Number of groups (for co-operative breeders) RR & BRA – Restricted-range and biome-restricted assemblage av – Yearly average (max count) max – Absolute maximum Br – Confirmed breeding Br? – Suspected breeding V – Vagrant OV – Occasional visitor		

der is managed as a conservation area. After Namibian Independence (1990), ownership of the reserve was transferred to the Ministry of Environment and Tourism. Below the dam wall is the Fresh Water Fish Institute of the Ministry of Fisheries and Marine Resources. Here, research into various aspects of fish production, breeding and conservation problems are conducted. The reserve is situated in a high-intensity, smallstock farming area, which from time to time creates tension with the neighbouring farms over small carnivore species. Several species of game have been reintroduced to the reserve. Intense use of fertilisers in the irrigated 'Hardap Scheme' lucerne growing areas, immediately south of the dam wall, has choked the natural river with a thick growth of *Phragmites australis*. Various methods to clear the blockage have failed, adding to the possibility that when the dam overflows, the river itself will overflow, flooding Mariental.

Further reading

Olivier & Olivier (1993).

N017 Mercury Island

**Partially protected
Global IBA (A1, A4i, ii, iii)**

**25°43'S; 14°50'E
c. 3 ha**

Site description

Located 800 m offshore, the precipitous Mercury Island lies within Spencer Bay, about 110 km north of Lüderitz. Geologically it is comprised of meta-arkoses with a dyke of Karoo dolerite that has been preferentially eroded. The island is within a zone of intense oceanic upwelling that is responsible for the elevated nutrient levels and high fish biomass around these near-shore islands. Somewhat elongate, this steep-sided island reaches 40 m a.s.l., is 500 m long and 100 m wide. It is the smallest of the three guano islands at 3 ha. Known as the island that shakes, the interior of the island is hollow, and large swells, common in this region, thunder inside the coves under the island, causing it to reverberate ominously. The island has one stone building for permanent staff. The island is unvegetated and was first exploited for guano in the 1840s when thousands of tons of 'white gold' were stripped from its flanks. It is the northernmost of the 18 near-shore islands of the Diamond Coast used by breeding seabirds.

Birds

Mercury Island is one of three very important coastal seabird-breeding islands along the Diamond Coast of southwestern Namibia; the other two are Ichaboe (IBA N018) and Possession (IBA N020). Mercury regularly supports over 15 000 seabirds, including African Penguin *Spheniscus demersus* (3 000 pairs), Cape Gannet *Morus capensis* (1 300 pairs), Bank Cormorant *Phalacrocorax neglectus* (1 000 pairs), and small numbers of Crowned Cormorant *P. coronatus*. The island's Bank Cormorant population has decreased by about 50% in the last 15 years. The seabirds cover virtually the entire surface area of the island, leaving no space for other species. Wooden extensions to the island and a simple bridge to an adjoining section of the island increases the surface area available for breeding cormorants and harvestable guano.

Other threatened/endemic wildlife

Killer Whale *Orcinus orca* occurs around the island, taking young penguins or seals when the opportunity arises. Several whales migrate through these waters, including the Minke *Balaenoptera acutorostrata*, Southern Right *Balaena glacialis* and Humpback *Megaptera novaeangliae* whales with their calves. Heaviside's Dolphin *Cephalorhynchus heavisidii*, Dusky Dolphin *Lagenorhynchus obscurus* and the Common Bottlenosed Dolphin *Tursiops truncatus* also occur in these waters.

Conservation issues

The island has one stone building for permanent staff, whose job is to prevent Cape Fur Seals *Arctocephalus pusillus* from settling on its shores. They also undertake regular counts of breeding birds and their success. All of the near-shore islands on the Namibian coast were managed by Cape Nature Conservation as nature reserves when they were under South African rule. Now under Namibian law they are not reserves but are protected by staff of the Ministry of Fisheries and Marine Resources. Three seabird species, African Penguin, Cape Gannet and Cape Cormorant, have suffered serious population declines in the last 30 years, mostly because of overfishing of surface-shoaling fish, such as Pilchards *Sardinops sagax*, their main food source. From an already reduced population of 70 000 African Penguins in the 1950s only 5 300 pairs remained 30 years later. However, since humans displaced seals from the island in 1986, penguin numbers have increased.

Penguins and cormorants are renowned for their guano, which has been harvested for hundreds of years for the fertiliser trade, resulting in disturbance during breeding, which compounds their population declines. This has affected the African Penguin most severely, as it prefers to burrow in the guano. Large-scale guano harvesting removed their cover and forced penguins to breed in the open, exposing their chicks and eggs to increased predation by gulls and seals, and excessive daytime heat and storms. Conservation measures currently ensure that these coastal seabirds are not disturbed during breeding and no guano is harvested.

Potential threats to the seabirds include the steadily increasing Cape Fur Seal *Arctocephalus pusillus* population along the Namib coast. Seals compete for space on some islands and eat

	Breeding (pairs)	Total numbers
Globally threatened		
African Penguin	1 000–3 000	4 000–10 000
Globally near-threatened		
Cape Gannet	1 300	10 000
Bank Cormorant	679	2 000
*Crowned Cormorant	2–4	4–8
African Black Oystercatcher		20–30 (max)

* – Species does not meet IBA threshold
 F – Number of females (for polygamous species)
 group – Number of groups (for co-operative breeders)
 RR & BRA – Restricted-range and biome-restricted assemblage
 av – Yearly average (max count) max – Absolute maximum
 Br – Confirmed breeding Br? – Suspected breeding
 V – Vagrant OV – Occasional visitor

young birds as they leave the islands. A programme has been initiated in which seals are discouraged from breeding where they dramatically affect sensitive seabird species. Furthermore, stocks of the Bearded Goby *Sufflogobius bibarbatus* have declined and Cape Rock Lobster *Jasus lalandi* have been severely over-exploited in the last 30 years. Bank Cormorants, which forage primarily on gobies and lobster, are particularly numerous on this island because the rocky nature of the island and the adjacent shoreline is favoured by their prey species. The Bank Cormorant has declined since 1956 on this island, possibly because of a reduction of food stocks. Appropriate management, permitting goby and lobster stock recovery, may lead to a concurrent improvement in population levels of the Bank Cormorant. Offshore diamond mining in which sections of the seabed are vacuumed up and then redeposited from small vessels may disturb prime lobster habitat.

Further reading

Cooper *et al.* (1980); Crawford *et al.* (1982a, 1989); Hockey (1982); Pallet (1995); Rand (1963); Swart (1987, 1988); Williams (1993).

N018 Ichaboe Island

Partially protected
 Global IBA (A1, A4i, ii, iii)

26°17'S; 14°56'E
 c. 6.5 ha

Site description

This small (6.5 ha) coastal island lies 1.4 km from Namibia's Diamond Coast, c. 50 km north of Lüderitz. Geologically, the island comprises melanogneiss and schists intruded by granites. The island is circular, mostly flat and unvegetated, and since rocky outcrops reach only 7 m a.s.l. sea spray covers much of the island during storms. It is now completely surrounded by a sea wall to prevent seals from hauling out and disturbing the birds. Repeated guano scraping since the 1840s, when guano deposits were over 20 m thick, have left the rocky island floor entirely exposed. Sandy stretches exist on the eastern side of the island. It lies in the heart of the one of the

strongest upwelling systems in the world, caused by the consistently strong long-shore winds. The upwellings bring nutrients to the surface where they enhance phyto and zooplankton blooms that are the basis for the rich abundance of fish on which the birds thrive. Rainfall is minimal (<10 mm p.a.) but coastal fog and storms often envelop the island.

Birds

Ichaboe Island is one of the most important and densely packed coastal seabird breeding islands in the world. It regularly supports over 50 000 seabirds of at least eight species including large numbers of African Penguin *Spheniscus de-*

mersus (3 400 pairs). Cape Gannet *Morus capensis* (40 000 birds), Cape Cormorant *Phalacrocorax capensis* (8 000 pairs), Bank Cormorant *P. neglectus* (2 625 pairs) and Crowned Cormorant *P. coronatus* (143 pairs). Smaller numbers of Kelp Gull *Larus dominicanus* and African Black Oystercatcher *Haematopus moquini* are also found breeding. This island is the most important location for Bank Cormorant in the world, holding a massive 65% of this globally near-threatened species' population. The global population has declined from 9 000 pairs to less than 5 000 pairs in the last 20 years, of which Namibia has c. 4 000 pairs. Ichaboe also holds about 4% of the Crowned Cormorant world breeding population. The island may also harbour thousands of roosting terns, particularly Common *Sterna hirundo* and Black Tern *Chlidonias niger*.

Other threatened/endemic wildlife

Killer Whale *Orcinus orca* are sometimes sighted around the island and may take young penguins or seals when the opportunity arises. Whales sighted here include the Southern Right Whale *Balaena glacialis*, Humpback Whale *Megaptera novaeangliae* and the Minke Whale *Balaenoptera acutorostrata*. The Dusky *Lagenorhynchus obscurus*, Common Bottlenosed *Tursiops truncatus* and the endemic Heaviside's Dolphin *Cephalorhynchus heavisidii* are also visitors to the island's waters.

Conservation issues

All the near-shore islands of Namibia's Diamond Coast were managed by Cape Nature Conservation as nature reserves when they were under South African rule. Now under Namibian law, they no longer carry the same status, but fall under the jurisdiction of the Ministry of Fisheries and Marine Resources. Three seabird species, African Penguin, Cape Gannet and Cape Cormorant, have suffered serious population declines in the last 30 years, mostly because of overfishing of surface-shoaling fish, such as Pilchards *Sardinops sagax*, their main food source. These seabird species are also renowned for their guano, which has been harvested for many years for the fertiliser trade, resulting in disturbance to breeding seabirds, compounding their populations declines. This has affected the African Penguin most severely, as it prefers to burrow in the guano. The guano on Ichaboe Island was 22 m deep when exploitation began in the 1840s; it was completely cleared of guano in three years. Large-scale guano harvesting removed their cover and forced penguins to breed in the open, exposing their chicks and eggs to increased predation by gulls and seals, excessive heat during the day, and storm conditions. Conservation measures ensure that sensitive coastal seabirds

	Breeding (pairs)	Total numbers
Globally threatened		
African Penguin	2 000–3 400	5 000–10 000
Globally near-threatened		
Cape Gannet	11 000	25 000–40 000
Crowned Cormorant	143	190
Bank Cormorant	2 625	10 000–12 000 (max)
† African Black Oystercatcher	Br?	5–8
1% or more of population		
Cape Cormorant	8 000	19 960 (av)–36 544 (max)

† – Species does not meet IBA threshold
 F – Number of females (for polygamous species)
 group – Number of groups (for co-operative breeders)
 RR & BRA – Restricted-range and biome-restricted assemblage
 av – Yearly average (max count) max – Absolute maximum
 Br – Confirmed breeding Br? – Suspected breeding
 V – Vagrant OV – Occasional visitor

are not disturbed during their critical breeding season. This does not preclude harvesting of guano, which is presently carried out less than once every two years. Only decisive conservation action on Ichaboe Island, involving limited guano collection at certain times of the year, and active prevention of seals landing to breed have begun to restore the penguin population.

Further conservation problems for coastal seabirds include a Cape Fur Seal *Arctocephalus pusilla* population which has been steadily increasing in number along the Namib coast after being severely depleted by hunting in the 1800s. Seals occasionally disrupt and displace sensitive breeding seabirds on islands, competing for space and occupying areas originally used for breeding by the birds. This has led to the decline in several of these species' populations, including the African Penguin which has decreased from 8 000 to 3 400 individuals since 1956. Seals are actively discouraged from breeding in areas where they dramatically affect sensitive seabird species. Bank Cormorant, which forage primarily on Bearded Goby *Sufflogobius bibarbatatus* and Rock Lobster *Jasus lalandi*, have recently suffered a global decline of 34%. The decline has been attributed to a reduction in food abundance and displacement by seals. European Rabbits were introduced onto the island to supplement the diet of mariners, but they are not a threat.

Further reading

Crawford *et al.* (1982a, in press); Pallet (1995); Rand (1963); Swart (1987, 1988).

N019 Lüderitz Bay Islands

Partially protected
Global IBA (A1, A4i, iii)

26°37'S; 15°07'E
c. 80 ha

Site description

The Lüderitz Bay Island complex consists of three coastal islands, all falling within one kilometre of the shore. The rocky shoreline, including Lüderitz fishing harbour, is included within the IBA. Halifax Island (3 ha) is located at the south end of Guano Bay near Diaz Point, a promontory at the western entrance of Lüderitz Bay, and one of the first landfalls of Portuguese explorers in the 1400s. The whole area lies within the intense upwelling cell off the Lüderitz coastline, creating a node of high marine productivity resulting in large numbers of seabirds congregating here. The other two islands, Penguin (36 ha) and Seal Island (44 ha), are found to the east of Halifax, within Lüderitz Bay. The islands hold some abandoned guano-scrappers buildings. They support no vegetation other than subtidal kelp and other seaweeds on their shores.

Birds

The island complex regularly supports over 10 000 seabirds. Halifax Island is an important coastal seabird breeding island; it supports over 2 000 breeding seabirds including important numbers of breeding African Penguin *Spheniscus demersus* (c. 400 pairs), Swift Terns *Sterna bergii* (800 pairs) and Crowned Cormorant *Phalacrocorax coronatus* (50 pairs). Penguin and Seal islands are utilised mostly for roosting, but Crowned (80 pairs), Bank *P. neglectus* (60 pairs), Cape *P. capensis* (2 000 pairs) and Whitebreasted Cormorants *P. carbo* (20 pairs) all breed on Penguin Island which also holds large numbers of African Black Oystercatcher *Haematopus moquini*, which probably breed, and roosting Damara Tern *Sterna balaenarum*. Seal Island is important for Crowned Cormorants as it holds some 3% of the world population. It also holds many pairs of Kelp Gulls *Larus dominicanus*,

which occasionally predate cormorant eggs when the latter are disturbed.

On the adjacent mainland, the harbour supports dense nesting populations of Hartlaub's Gull *L. hartlaubii* and Swift Tern. In 1994, at least 2 470 pairs of Swift Terns (40% of the southern African population) nested successfully there and on the rocky promontory called Shark Island.

The shoreline is completely rocky and the Lüderitz peninsula, excluding the islands, holds about 14 000 shorebirds. At 30 birds/km it is locally dense (because rocky shores hold more invertebrate fauna for foraging birds than sandy ones) but supports a lower linear density than shores farther north in central Namibia.

Other threatened/endemic wildlife

Killer Whale *Orcinus orca*, many Heaviside's Dolphin *Cephalorhynchus heavisidii* and the rarer Humpback Whale *Megaptera novaeangliae*, Minke Whale *Balaenoptera acutorostrata* and Southern Right Whale *Balaena glacialis* all occur. Dusky *Lagenorhynchus obscurus* and Common Bottlenosed Dolphins *Tursiops truncatus* also occur.

Conservation issues

All of the near-shore islands on the Namibian coast were managed by Cape Nature Conservation as nature reserves when they were under South African rule. Now, under Namibian law, they no longer carry the same status, but fall under the jurisdiction of the Ministry of Fisheries and Marine Resources who manage them. Previously, all the islands held more breeding birds than at present; their proximity to the mainland, and Namibia's only other fishing port, resulted in intense exploitation by humans, probably even before the precipitous decline of the African Penguin in the 19th and 20th centuries. Three seabird species, African Penguin, Cape Gannet and Cape Cormorant, have suffered serious population declines in the last 30 years, mostly because of overfishing of surface-shoaling fish, such as Pilchards *Sardinops sagax*, their main food source. These birds are also renowned for their guano, which has been harvested for over 100 years for fertiliser, resulting in disturbance during breeding, which compounds their population declines. This has affected the African Penguin most severely, as it prefers to burrow into the guano. Large-scale guano harvesting removed their cover and forced penguins to breed in the open, exposing their chicks and eggs to increased predation by gulls and seals, excessive heat during the day and other elements. Conservation measures, including reduced guano-scraping, currently ensure that these birds are not disturbed during the main breeding season, but some disturbance always occurs as the birds breed all year round. Egg-collecting persisted well into the 1970s on some of these islands, and may still occur at low levels. Further conservation problems for coastal seabirds include a growing Cape Fur Seal *Arctocephalus pusilla* population, which has been steadily increasing in number along the Namibian coast after a period of severe exploitation during the 1800s. Seals often disrupt and displace breeding seabirds on islands. Seals are physically discouraged from hauling out on the three manned islands

	Breeding (pairs)	Total numbers
Globally threatened		
African Penguin	330–471	800–1 500
Globally near-threatened		
Crowned Cormorant	50–160	160–350
Bank Cormorant	60	200
African Black Oystercatcher	5–10	200
1% or more of population		
Kelp Gull	500–800	1 200–2 000
Hartlaub's Gull	200–400	1 500
Swift Tern	800–2 470 (max)	6 000 (max)
^v – Species does not meet IBA threshold F – Number of females (for polygamous species) group – Number of groups (for co-operative breeders) RR & BRA – Restricted-range and biome-restricted assemblage av – Yearly average (max count) max – Absolute maximum Br – Confirmed breeding Br? – Suspected breeding V – Vagrant OV – Occasional visitor		

further south. Bank Cormorant, which forage primarily on Bearded Goby *Sufflogobius bibarbus* and Rock Lobster *Jasusalandi*, have recently suffered a global decline of 34%. The decline has been attributed to a reduction in food abundance and displacement by seals. Appropriate management, permitting stock recovery of their primary prey species, may lead to an improvement in population levels of the Bank Cormorant.

Onshore, harbour pollution appears minimal but disturbance to breeding gulls and terns in the harbour itself by

humans and dogs and cats has been severe. Attempts to control it have met with some success, but disturbance will increase as the harbour is renovated.

Further reading

Berry *et al.* (1974); Cooper *et al.* (1990); Crawford *et al.* (1989, in press); Hockey (1982); Noli-Peard & Williams (1991); Pallet (1995); Swart (1988).

N020 Possession Island

Partially protected
Global IBA (A1, A4i, iii)

27°01'S; 15°12'E
c. 80 ha

Site description

Possession Island is located 1.6 km from the Diamond Coast of southwestern Namibia, just south of Elizabeth Bay, c. 40 km south of Lüderitz. This rectangular island, at 90 ha, is the largest of Namibia's guano islands. It extends 4 km from north to south and is at most, 1 km wide. Low rainfall (<10 mm p.a.) and frequent storms inhibit vegetation growth, and isolated bushes are scattered around otherwise barren and somewhat sandy ground. Old diamond diggings have broken much of the sandy surface. The island still holds a main jetty and the remains of a small village. Like the other guano islands it was stripped of its guano cap in the 1840s and has never regained it. It is permanently manned to keep seals from settling on the island.

Birds

As Possession Island is the largest of the Namibian coastal islands, it has the potential to hold the most seabirds. This honour, however, goes to Ichaboe (IBA N018) which is 14 times smaller than Possession. Despite the relatively low

seabird densities, Possession Island is a vitally important coastal seabird breeding island, supporting over 20 000 seabirds in total. Important species include decreasing numbers of African Penguin *Spheniscus demersus* (900 pairs), Cape Gannet *Morus capensis* (800 pairs), Cape Cormorant *Phalacrocorax capensis* (3 000 pairs), Crowned Cormorant *P. coronatus* (200 pairs) and Bank Cormorant *P. neglectus* (10 pairs). Some of these breeding seabirds have been in decline since the island was first surveyed in 1956. Penguin numbers have decreased by 92% and Cape Gannet numbers by 68% in the 40 year period. While some colonies have disappeared altogether, others remain at much reduced densities. Single pairs are unusual, scattered haphazardly over barren portions of the island. Large areas, which were once occupied by breeding birds, now stand unused. Recent observations suggest that it may be the only island-breeding site of the normally mainland-breeding Damara Tern *Sterna balaenarum*, but this has not been verified. Small colonies of Damara Terns that once bred between barchan dunes on the adjacent mainland have largely disappeared since the early 1970s. Swift Terns *Sterna bergii* are said to have nested on the island but now no longer do. African Black Oystercatcher *Haematopus moquini* are common on this island and it holds over 60 breeding pairs.

Other threatened/endemic wildlife

Killer Whale *Orcinus orca* are occasionally seen around the island, hunting seals and seabirds. Of great significance was the birth of a Southern Right Whale *Balaena glacialis* in Elizabeth Bay in 1996, the first breeding record on the Namibian coast for over 100 years.

Conservation issues

Like the other 18 islands off Namibia's desolate Diamond Coast, the 1994 Walvis Bay and Offshore Islands Act brought them back from South African to Namibian jurisdiction. They now fall under the auspices of the Ministry of Fisheries and Marine Resources, who employ a full-time marine ornithologist and have permanent staff on the island. The main purpose is to prevent seals from invading the island and displacing the seabirds, with a view to re-exploiting the guano deposits that may then accumulate. Onshore disturbance is higher than on other islands as a large diamond mine was established in Elizabeth Bay in 1991. European Rabbits were released on the island by early settlers, but it unknown whether they still occur. The most important seabird species on this island are

	Breeding (pairs)	Total numbers
Globally threatened		
African Penguin	300-900	700-2 700
Globally near-threatened		
Cape Gannet	800-3 000	2 000-10 000
Bank Cormorant	10	20-40
Crowned Cormorant	20-280	50-500
African Black Oystercatcher	66	200-300
† Damara Tern	Br?	5-8
1% or more of population		
Cape Cormorant	2 000-4 000	5 704 (max)
Kelp Gull		2 864 (max)

† - Species does not meet IBA threshold
 F - Number of females (for polygamous species)
 group - Number of groups (for co-operative breeders)
 RR & BRA - Restricted-range and biome-restricted assemblage
 av - Yearly average (max count) max - Absolute maximum
 Br - Confirmed breeding Br? - Suspected breeding
 V - Vagrant OV - Occasional visitor

the African Penguin, Cape Gannet and Cape Cormorant, all of which have suffered serious population declines in the last 100 years, mostly because of overfishing of their main food source. This island has suffered particularly from guano-scraping as it is relatively featureless and guano was easy to remove. The lack of guano has reduced penguin-nesting habitat to a few peripheral shoreline areas. Penguin populations plummeted from 35 000 birds in 1956 to less than 3 000 birds in 1997. Little guano is currently harvested owing to the severely reduced numbers of birds on the island. Research conducted by the Ministry of Fisheries and Marine Resources research includes assessing breeding success of colonial and solitary

penguins, and the effect of the numerous parasites on brood size and growth rates. Whether guano harvesting will prove viable remains to be seen. Unauthorised landing by fishermen still occurs on the island but disturbance is minimised by Fisheries personnel.

Further reading

Cooper *et al.* (1980); Cordes *et al.* (in press); Crawford *et al.* (1982a, 1989); Hockey (1982); Noli-Pearl & Williams (1991); Pallet (1995); Rand (1963); Swart (1987, 1988); Williams (1993).

N021 Sperrgebiet

Fully protected
Global IBA (A1, A2, A3, A4i)

26°00'S–28°20'S; 14°52'E
c. 2 600 000 ha

Site description

The Sperrgebiet, or forbidden territory, lies in the southwestern corner of Namibia. Famous for its diamonds, the area is bordered by the Orange River in the south and the Atlantic Ocean to the west. The northern boundary was established at the 26°S line of latitude, whereas the eastern boundary parallels the coast c. 100 km inland. The IBA includes the Namibian side of the Orange River Mouth (adjacent to IBA SA030). Largely uninhabited, the only towns in the Sperrgebiet are Oranjemund on the southern coast and Lüderitz on the northern coast. The Sperrgebiet is an extremely arid zone, encompassing the northern extremity of the winter-rainfall portion of the Namib Desert. The only permanent water in the area is the perennial Orange River. The northern coastal plain is rocky and holds various sandy bays; the southern shores, intensively mined for diamonds, are reconstituted sandy beaches. The major part of the remaining area comprises sand and gravel plains with low isolated hills. In the centre and north of the Park, dune sand and sand sheets predominate, the most prominent area being Obib dune field which rises to 500 m a.s.l. Several rocky ranges, low mountains and inselbergs are found scattered throughout the Park, the most prominent being Schakalsberg in the south, and Boegeberg (502 m a.s.l.), Aurus (1 082 m a.s.l.), Klinghardtberg (750–950 m a.s.l.) and Tsaus in the centre and north. Falling within the southern sector of the Namib Desert, the climate of the Sperrgebiet is dominated by three main factors: strong southerly winds in summer and short duration berg winds from inland in winter; meagre rainfall, generally less than 100 mm p.a., which falls predominantly in winter, but towards the north changes to summer rainfall and precipitation from coastal fog extending inland to provide life-giving moisture. Inland temperatures can be extreme, occasionally reaching over 50°C, although the extreme heat is moderated by coastal winds and fog and the mean daily temperatures range between 15°C and 25°C at different localities.

Various vegetation types are found, including coastal zone vegetation, which consists of hummocks in sandy areas, which stabilise dunes and form barriers to sand movement. Close to the coast, *Salsola nollothensis* and *Cladoraphis cyperoides* dominate; farther inland *Othonna furcata* becomes increasingly common. Lichens, such as *Xanthoria turbinata*, are found on the numerous rocky outcrops and on dead *Salsola* plants. The central sand plains lie between 300 and 600 m a.s.l.

and are covered by dune fields and coarse sands that are driven inland by southerly prevailing winds, which are a dominant feature of this region. The Obib red dunes in the southeast hold large !Nara *Acanthosicyos horridus* hummocks and typical dune grasses. The more elevated eastern sand plains consist predominantly of gravel plains with one permanent dune system northeast of the Klinghardtberg. Dominant plants here consist of several *Euphorbia* and *Zygophyllum* spp. Scattered stands of *Acacia erioloba* trees are found in the ephemeral washes and on open plains towards Tsaus. The scattered rocky outcrops and high inselbergs that are found throughout the Sperrgebiet receive higher precipitation and more fog moisture and have a more diverse flora than the surrounding areas. Lichens, aloes, *Acacia* and lithops are more frequent there. The Aurusberg supports the highest diversity and density of plants in the Sperrgebiet. A highly adapted flora grows at the Aurus summit, holding several ferns, two *Gladiolus* and an Orchid species. The linear Orange River in the south holds dense riverine woodland including stands of *Rhus*, *Tamarix* and *Salix mucronata*. The scrubby open woodland in the floodplain is dominated by *Euclea pseudebenus*, *Ziziphus mucronata* and *Acacia karoo*.

Birds

This extremely arid area holds a depauperate avifauna of only some 110 bird species, many of these are restricted to the Namib-Karoo system. However, the inclusion of the Orange River mouth boosts the species total to 251 birds. The recently recognised Barlow's Lark *Certhilauda barlowi* is virtually restricted to the Sperrgebiet, which holds over 80% of its tiny 18 000 km² range. The Orange River and its associated cliffs hold populations of Black Stork *Ciconia nigra* and Peregrine Falcon *Falco peregrinus*, while recently re-discovered White backed Night Heron *Gorsachius leuconotus* and Cape Eagle Owl *Bubo capensis* occur further upstream in suitable habitat. African Fish Eagle *Haliaeetus vocifer* has a stronghold and Namaqua Warbler *Phragmacia substriata* and Cape Francolin *Francolinus capensis* reach the northern limit of their distributions here. The Orange River mouth is particularly species rich (64 wetland species) and in the past has been the sixth most important wetland (for total abundance: 26 000) in southern Africa. Water abstraction in the upper catchment, particularly in South Africa and Lesotho, severely threatens this wetland. Four species occur in numbers exceeding 1% of their

biogeographical population. It is one of Namibia's four Ramsar sites.

Raptors number only 24 species but include both Black *Circus maurus* and African Marsh Harrier *C. ranivorus*. Several typical karroid species occur in the Sperrgebiet including Karoo Korhaan *Eupodotis vigorsii*, Blackeared Finchlark *Eremopterix australis*, Karoo Chat *Cercomela schlegelii*, Sicklewinged Chat *C. sinuata*, Cinnamonbreasted Warbler *Euryptila subcinnamomea* and Layard's Titbabbler *Parisoma layardi*. Other arid-zone species which are found within the area include Ludwig's Bustard *Neotis ludwigii*, Dune Lark *Certhilauda erythrochlamys*, Gray's Lark *Ammomanes grayii*, Stark's Lark *Eremalauda starki*, Tractrac Chat *Cercomela tractrac* and Black-headed Canary *Serinus alario*. The shorelines in the intensively mined Diamond Area No. 1 (100 km north of Oranjemund) are depauperate in birds, holding only 14 shorebirds/km of 16 species compared with 45 birds/km of 29 species immediately north. Shores around Lüderitz by contrast support 89 birds/km because of the rocky substrate and include large numbers of Hartlaub's Gull *Larus hartlaubii*, Kelp Gull *L. dominicanus*, African Black Oystercatcher *Haematopus moquini*, Cape Cormorant *Phalacrocorax capensis* and a few Bank Cormorant *P. neglectus*. Both Greater *Phoenicopterus ruber* and Lesser Flamingo *Phoeniconaias minor* occur.

Other threatened/endemic wildlife

The Sperrgebiet is characterised by high levels of endemism in various taxa. At least 45 plant species are endemic to the Sperrgebiet and thus Namibia, but many more are endemic to the Sperrgebiet and Richtersveld of South Africa. The coastal zone holds the spectacular endemic *Sarcocaulon patersonii*. Aurusberg holds several endemic plants that are exclusive to this peak. In the Orange River Valley the inselbergs, Skilpadberg and Swartkop, hold several plants endemic to the lower Orange River, including *Aloe ramosissima* and *A. garipeensis*. Endemic and near-endemic amphibians include, Desert Rain Frog *Brevipectus macrops*, Namaqua Rain Frog *B. namaquensis*, Namaqualand Frog *Strongylopus springbokensis* and the recently discovered, and as yet undescribed, Paradise Toad *Bufo* sp. Endemic and near-endemic reptiles include Nama Padloper *Homopus* sp., Namaqua Dwarf Adder *Bitis schneideri*, Dwarf Mountain Adder *B. xeropaga* and two legless and burrowing skinks. The Sperrgebiet comprises about 40% of the global range of the Namaqua Dune Molerat *Bathyergus janetta*. Heaviside's Dolphin *Cephalorhynchus heavisidii*, endemic to the southwest coast of Africa and probably one of the world's rarest dolphins, is fairly common off the Sperrgebiet coast. Aardwolf *Proteles cristatus*, Brown Hyena *Hyaena brunnea*, Spotted Hyena *Crocuta crocuta*, Cape Fox *Vulpes chama*, Bateared Fox *Otocyon megalotis*, Wild Cat *Felis lybica*, Cheetah *Acinonyx jubatus* and Cape Clawless Otter *Aonyx capensis* occur and are considered vulnerable in Namibia.

	Breeding (pairs)	Total numbers
Globally near-threatened		
^V Bank Cormorant		5-8
Lesser Flamingo		310 (av)-886 (max)
African Black Oystercatcher	20-50	78 (av)-296 (max)
Damara Tern	10-40	35 (av)-65 (max)
<hr/>		
RR & BRA	Status	
Cape Francolin	Common	
Ludwig's Bustard	Fairly Common	
Karoo Korhaan	Common	
Cape Longbilled Lark	Common	
Dune Lark	Uncommon	
Barlow's Lark	Common	
Gray's Lark	Uncommon	
Stark's Lark	Fairly Common	
Blackeared Finchlark	Uncommon	
Tractrac Chat	Uncommon	
Karoo Chat	Common	
Sicklewinged Chat	Fairly Common	
Namaqua Warbler	Common	
Cinnamonbreasted Warbler	Uncommon	
Layard's Titbabbler	Common	
Blackheaded Canary	Fairly Common	
<hr/>		
	Breeding (pairs)	Total numbers
1% or more of population		
Blacknecked Grebe		250-300
Cape Cormorant		1 228 (av)-6 000 (max)
Kelp Gull	Br	354 (av)-1 433 (max)
Swift Tern		869 (av)-4 941 (max)
<hr/>		
^V - Species does not meet IBA threshold F - Number of females (for polygamous species) group - Number of groups (for co-operative breeders) RR & BRA - Restricted-range and biome-restricted assemblage av - Yearly average (max count) max - Absolute maximum Br - Confirmed breeding Br? - Suspected breeding V - Vagrant OV - Occasional visitor		

Conservation issues

The Sperrgebiet is protected by virtue of the security surrounding the diamonds mined there. The area is earmarked to become a protected area under auspices of the Ministry of Environment & Tourism. It is adjacent to the large Namib-Naukluft Park, which lies to the north, and it is also narrowly linked to the recently proclaimed Huns-Ai-Ais Game Reserve in the east at Sendelingsdrift. To the southeast, across the Orange River is the Richtersveld National Park in South Africa. This Park shares the lower Orange River as a common boundary for several kilometres. The scenic value of this area has the potential to make an important contribution to the local and national economy. The only permanent water supply in the area is the Orange River, but flow rates have dwindled and will do so in future as the Lesotho Highlands Scheme takes more from the headwaters in Lesotho for water supply to South Africa's Gauteng District. Agricultural potential along

the lower Orange River is minimal, and difficult to realise because of the great distance from suitable markets and the anticipated reduction of available water in the river. Nevertheless, organophosphates constantly filter into the river from lucerne farming on the river's banks and may be detrimental to the associated flora and fauna.

The area is largely used for diamond prospecting and mining by NAMDEB; the remainder of the area falls under the jurisdiction of the Ministry of Mines and Energy, which intends maintaining the security of the entire Sperrgebiet by restricting access to the area and thereby limiting human impacts in the region. All mining activities should be undertaken in conjunction with Environmental Impact Assessment procedures. Mining activities should be restricted because mined areas require rehabilitation, and the massive quantities of waste generated by mining should be appropriately managed. The Ministry of Environment and Tourism has proposed that the area be converted into a Park, to create a continuous strip of protected land between the Cunene and Orange rivers, all under their jurisdiction. The Ministry of Mines and Energy has recently opened up 46 concessions along a 3-km-wide strip of the Orange River.

The vegetation of the Sperrgebiet is for the most part pristine. The main terrestrial impacts on this area occur for 100 km

along the coast and about 3 km inland from the town of Oranjemund. The intensity of this mining appears to have affected both shorebird numbers using the beaches and the number of breeding Damara Terns on the coastal plains. Older mining concessions occur around Lüderitz, and along the eastern margin of the area where emergency grazing has been permitted since the 1950s.

The Sperrgebiet has the distinction of supporting more alien mammals than any other area of Namibia. Feral Donkeys, European Rabbits and House Mice are among the aliens here, but ranges are restricted by the severe environment outside the winter-rainfall area. Offshore stocks of the Cape Rock Lobster *Jasus lalandii* have been severely over-exploited in the last 30 years and may be affected by the suction techniques of marine diamond mining currently being employed. Bank Cormorants, which forage on gobies and lobster, have recently suffered a dramatic decline which may be partially due to a reduction of the lobster stocks.

Further reading

Cooper *et al.* (1980); Hockey (1982); Maggs *et al.* (1998); Pallet (1995); Robertson *et al.* (1998); Ryan *et al.* (1996, 1998); Simmons *et al.* (1998); Williams (1986, 1993).

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