



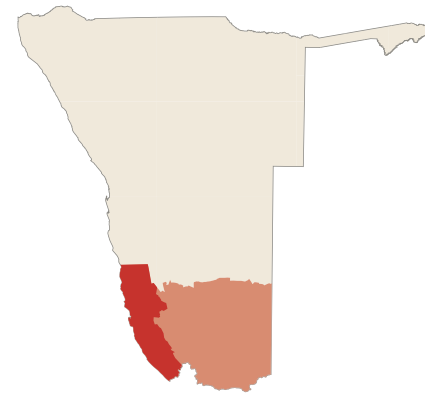
# The coast of the Karas Region

*Namibia's Coast*



## Introduction

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Namibia's coastline falls within four political regions: Kunene, Erongo, Hardap and Karas. This booklet describes the coastal area in the Karas Region which includes the southern area of the Namib Naukluft Park and the Sperrgebiet National Park.

People have lived on parts of the Karas coastline for a very long time, with archaeological remains near the Orange River mouth dating from about 800,000 years ago. While conditions along the Orange have probably been conducive to human habitation for much of the time because of the availability of fresh water, early inhabitants were also attracted to rich supplies of food from the sea. These early inhabitants are likely to have been nomadic along the very arid coastline moving from one water source or good hunting area to another.

The limited supply of water for both people and livestock made much of the coast inhospitable, leaving the environment largely unspoilt. After the discovery of diamonds near Lüderitz

in 1908 a huge area was declared off-limits to protect diamond mining interests. This designation excluded all non-mining access and ensured that much of Karas' coastal area remained pristine.

Coastlines are the narrow interface between the Earth's three great realms – the land, the atmosphere and the oceans. This is the zone where a diversity of life is often concentrated, with some species from the sea, others from the land, and those that occur only in the thin inter-tidal strip itself. Processes operating in one domain affect the other. For example, the cool ocean moderates temperatures on land, while the land provides nutrients to the oceans. Conditions along coasts are also influenced by tidal changes and particularly by weather, such as wind and the waves and currents driven by atmospheric circulation.

The Karas coast is characterised by extreme aridity, frequent fog and almost constant southerly winds. Offshore, the cold Benguela Current and its associated upwelling cells are rich in nutrients. Most of the coastline consists of rocky stretches interspersed with sandy beaches and bays, and with salt pans and gravel plains inshore.

The Karas coast includes a number of areas which are internationally recognised for the diversity of life they support. Falling within the transition area between winter and summer rainfall, the Sperrgebiet National Park incorporates 80% of the Succulent Karoo Biome, an area recognised by botanists as one of only 34 biodiversity hotspots on earth. It is an area of tremendous plant diversity, of which many are succulents that have restricted ranges or are endemic species (species which occur nowhere else). The Orange River mouth is recognised as an internationally important wetland, and the islands hold



**Figure 1.** The coastal zone of Karas Region. The arrows show the direction of flow of the Benguela Current.

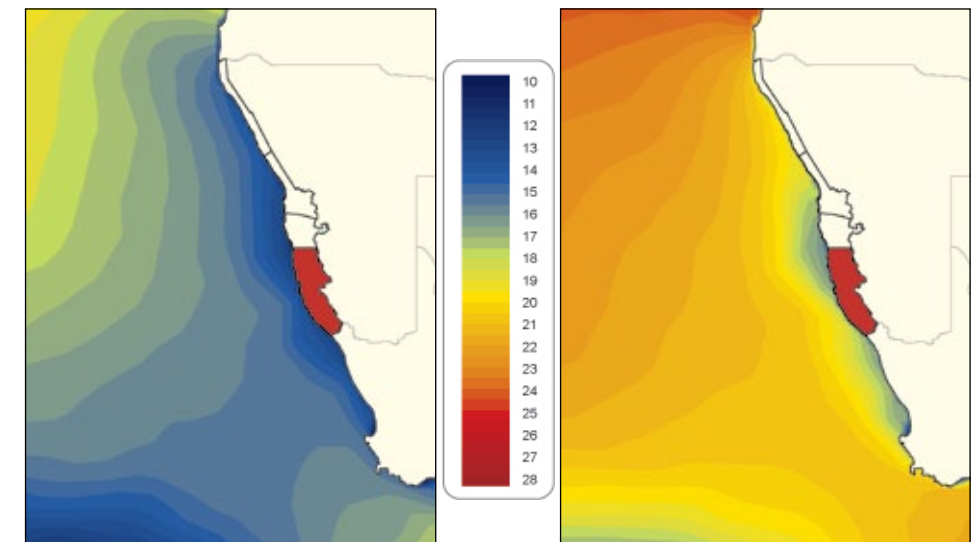
globally significant seabird populations. The northern section of the Karas coastal region falls within the Namib Naukluft Park.

The Sperrgebiet National Park was proclaimed in 2008 and covers about 21,600 square kilometres. Before this, the area had remained off-limits as the 'forbidden zone' since the original colonial decree on the 22nd of September 1908 to protect diamond mining interests. During the last 100 years, extensive mining has taken place, bringing huge financial returns to the country. The exclusion of people and other activities left the environment unscarred in places that were not mined. Over the last 20 years, mining has increasingly moved off-shore due to the gradual depletion of onshore diamonds.

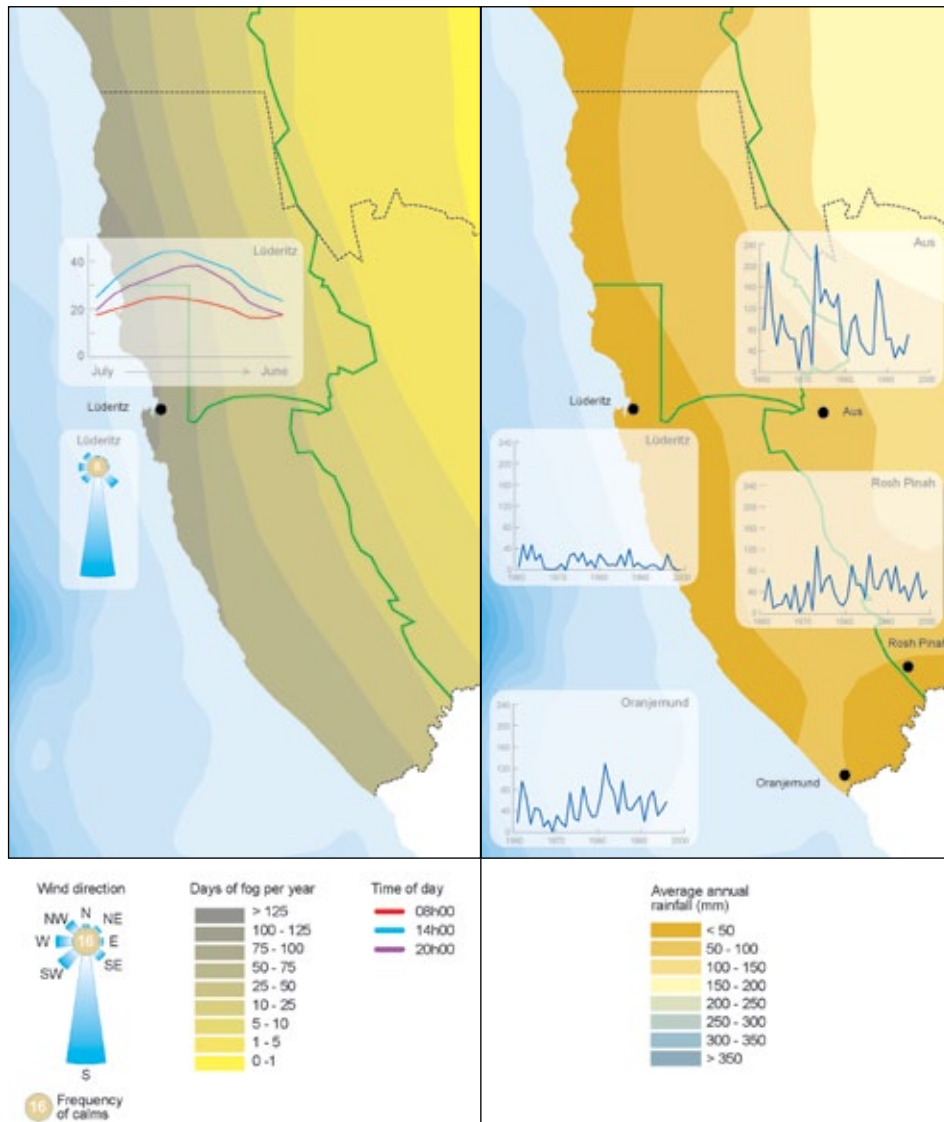
The offshore environment was given little protection prior to 2009 when Namibia's first Marine Protected Area (MPA) was proclaimed. This encompasses an area stretching 400 kilometres from Meob Bay in the Hardap Region to Chameis Bay, including all islands, rocky islets and marine areas to a distance of 30 kilometres west of the shore. This MPA will help to preserve the biological resources of the southern Benguela. Although the islands were not formally protected prior to this, access to them has always been restricted.

In addition to mining, other economic activities in this coastal region include fishing and tourism. There are two towns in the area: Lüderitz and Oranjemund, and no people live permanently outside these two towns. Lüderitz was founded in 1883 as a trading post and today its economy is largely dependent on the fishing industry. It is Namibia's second most important fishing port and centre of the crayfish industry. Access to Oranjemund has been restricted since its establishment in 1936 because this – in turn – is the centre of the diamond industry.

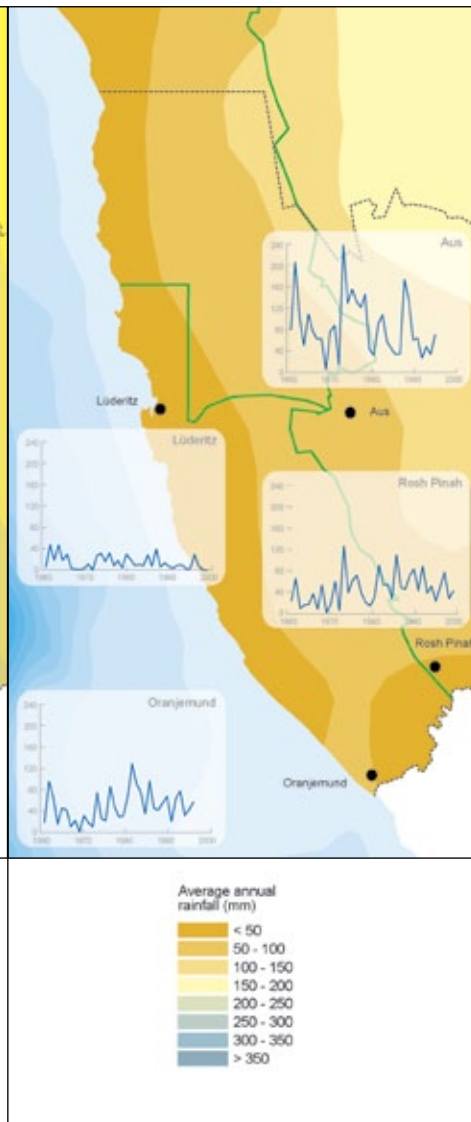
## The Climate



**Figure 2.** Average temperatures (°Celsius) of the sea's surface over the past 20 years in August (left) and February (right).



**Figure 3.** The map is shaded to show the average number of days on which fog occurs, while the graph gives average wind speeds at different times during the year. The wind rose indicates wind direction and frequency. At Lüderitz almost two-thirds of all wind is southerly (i.e. from the SE, S and SW), and calms are recorded only 8% of the time. Lüderitz and the Kunene River mouth are the windiest areas along the Namibian coast and also amongst the windiest places on earth.



**Figure 4.** Average annual rainfall and the total recorded each season at four places in the vicinity of the Karas coast. Note how greatly the totals vary from year to year, and how much lower the totals at the coast are compared to inland.

The climate of the coast of the Karas Region is strongly influenced by the Benguela Current which carries cold water from the southern ocean all the way up to beyond the Kunene river mouth in northern Namibia. Low sea surface temperatures – ranging from monthly averages of 13 to 18° Celsius – keep the air above the sea cool and dense (Figure 2). Winds along the coast are predominantly from the south, having been generated by the South Atlantic high pressure cell far to the south-west of Namibia. The cool, relatively dry air usually cannot rise enough over the coast to form rain clouds, and so moisture normally only condenses into fog and low clouds. At Lüderitz fog occurs on around 120 days each year (Figure 3), and is most prevalent during mornings and evenings. The Karas coast receives an average of about 7 to 9 hours of sunshine per day.

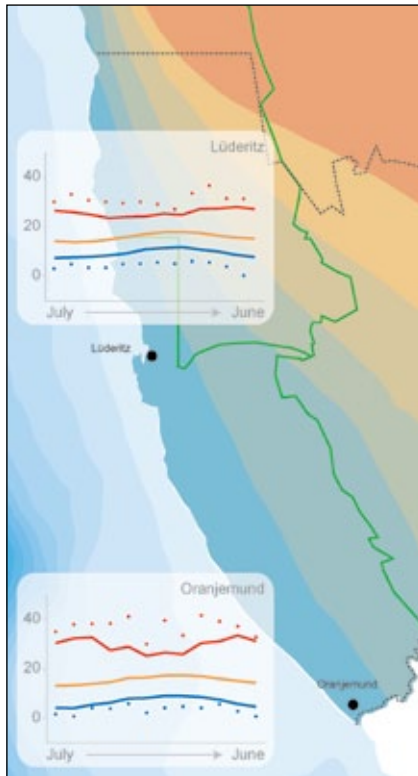
The strong prevailing southerly winds (Figure 3) and the Coriolis Force cause surface waters to be deflected away from the shore. Cold water from the deeper layers then moves upwards to replace the surface water. These circular upward movements are known as upwellings and bring nutrient-rich water from the depths of the ocean up to the sunlit surface. The northern half of the Karas coast falls within the Lüderitz upwelling cell. Upwelling cells are the key to the high productivity of Namibia's coastal waters.

Cool dry air from the South Atlantic pressure cell prevails over the Karas coast for much of the year. However, in winter, the Karas coast is subject to the effects of cold fronts moving up from the Cape in South Africa. Consequently the Karas coast falls within the winter rainfall belt, and it is the precipitation in winter which sustains the vegetation of the Succulent Karoo Biome found in the Sperrgebiet National Park (see page 8). Although widely referred to as the 'winter rainfall' area, the southern coast also receives rain in the summer. Annual average falls are consequently higher here than along the rest of the Namibian coast.

The very southern part of the coast in the region receives an average of around 50 millimetres each year and this declines to less than 20 millimetres at Lüderitz and further north. While precipitation generally increases to the east, rainfall in the entire Karas Region is highly variable (Figure 4).



A bank of fog over the Orange River near Oranjemund.



Temperatures along the coast are lower and vary less than those inland (Figure 5). Interestingly, the highest maximum temperatures are measured in winter when berg or east winds blow. The winds are driven by the Botswana high pressure cell which lies over the interior of southern Africa in winter. The dry air heats up as it drops down from the higher interior across the lower coastal plain, and sometimes blows great quantities of sand into the Atlantic.

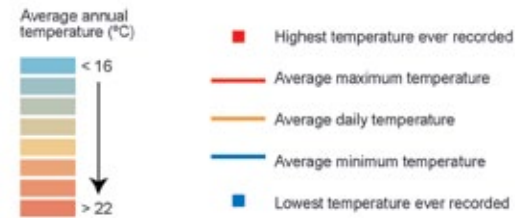


Figure 5. Average daily temperatures range between 13°Celsius in the coolest months (July and August) and 18°Celsius in the warmest month (February).

## Landscapes and shapes of the Karas Coast

The geomorphology of the coastal Karas region has been shaped by the interplay between the persistent and strong winds from the south, the Orange River flowing from the east, strong swells and the northerly directed Benguela Current. These driving forces combine to form a natural conveyor belt: the Orange River transports sediment to the coast from where it is moved northwards along the coast by the Benguela. The sediments are subsequently forced back onshore by the waves, and the wind then carries them into the Namib Sand Sea. Valleys lying parallel to the wind direction channel the wind and thereby increase its intensity so that the sand transported by the wind can erode hard bedrock to form wind-abraded valleys called yardangs.

Within this overall landscape of moving sediments, pans have formed in sheltered bays located behind headlands. Rocky parts of the coastline are eroded by the wave energy coming from the strong swells, forming cliffs and sea arches, including the highest in southern Africa, the 54 metre high Bogenfels arch.

For 100 kilometres north of Oranjemund up to Chameis Bay the coastline is dominated by a straight, sandy shoreline. North of here the coast is rocky with sea cliffs and rock arches interspersed with sandy bays, which are often called j-bays to reflect their shape. Diamonds are often trapped within these bays making them a prime target for mining. There are several islands and rocky islets north of Chameis Bay which are used by seals and seabirds for breeding.

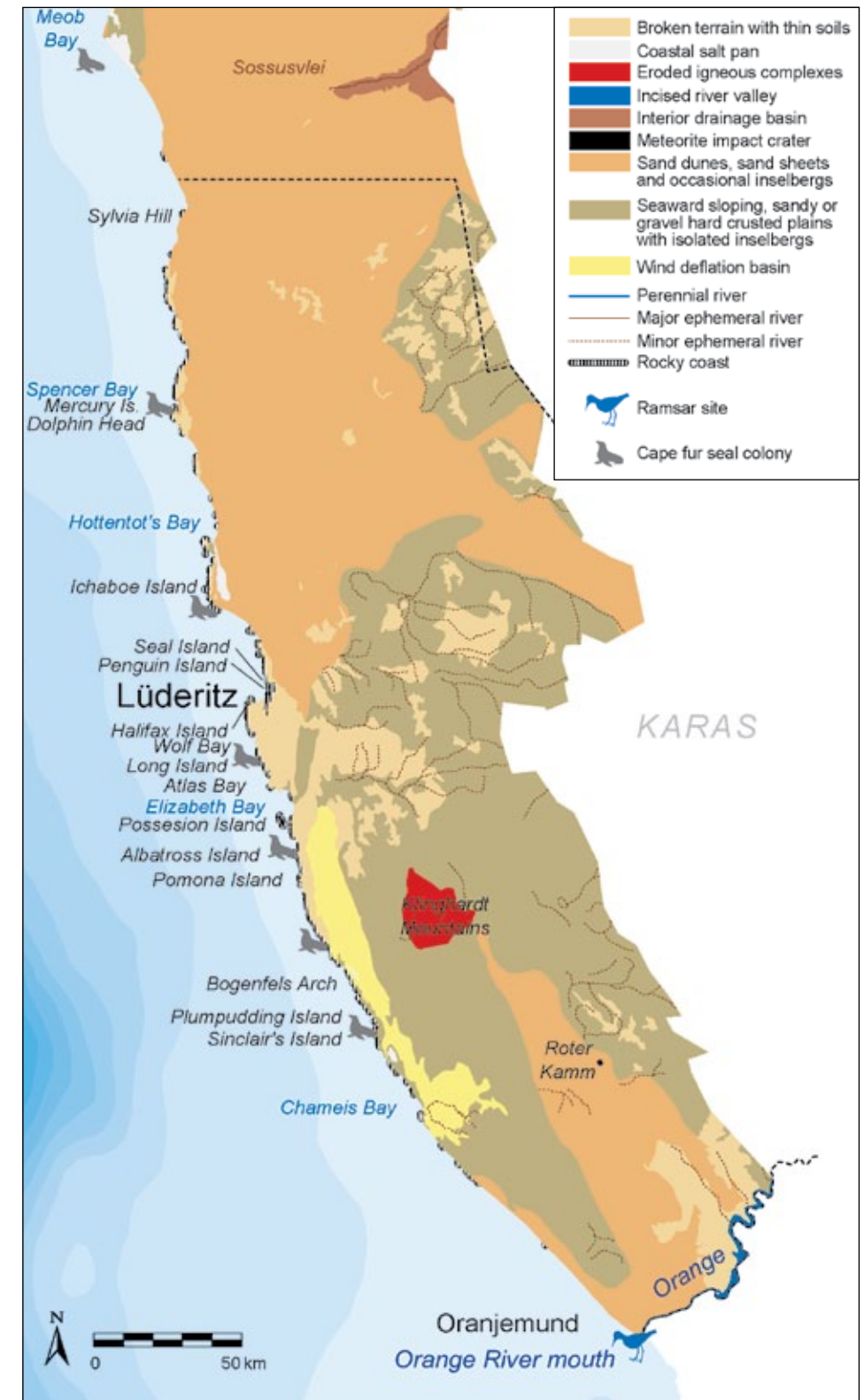


Figure 6. Important habitats, geomorphological features and sites of special interest along the Karas coast.

The Klinghardt Mountains are a roughly circular complex of extinct volcanoes which erupted some 46 million years ago. The volcanoes have been eroded rather little since their emergence, indicating that the area has probably been arid for much of that time.

The 2.5 kilometre diameter, near perfectly circular Roter Kamm is an ancient meteorite crater. Nothing remains today of the original meteorite which is believed to have been about 100 metres in diameter. The inside of the crater is now largely filled with wind blown sand, but it is possible to see evidence for the impact on the rims and rocks ejected out of the crater upon impact can be found in the surrounding plains.

Unlike the coastal regions to the north of the Namib Sand Sea, there are no ephemeral rivers that flow to the coast. The only large ephemeral river is the Koichab, which flows underground to the Koichab Pan. Water is pumped through boreholes drilled into the pan, and then piped about 100 kilometres to supply the town of Lüderitz. Judging from radiocarbon dating much of this water accumulated some 5,000-7,000 years ago. Although the Koichab River provides some recharge of the aquifer, rates of inflow are lower than current rates of use.

## Life on the coast

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The Karas coast has great value for environmental conservation, especially for plants. Many species found along the Karas coast are unusual, and many plants are rare or endangered. A large number of species are also endemic to the area. Figure 6 shows the major habitats which are described below in three categories: terrestrial, riverine and marine.

### Terrestrial habitats

The Karas coast falls largely within the Succulent Karoo and Namib Desert biomes. The Succulent Karoo biome is recognised as a globally important biodiversity hotspot, and is the only one in an arid region. As a transition area between winter and summer rainfall, the Sperrgebiet has several times more plant species than the rest of the coast to the north. In fact, 1,050 species of flowering plants and ferns have been recorded in the Sperrgebiet. This is nearly a quarter of Namibia's entire plant diversity, although the Sperrgebiet covers just 3% of the land area. A high proportion of these plants are succulents. As a consequence of this diversity and the concentration of species having restricted ranges, the Sperrgebiet has been identified as an Important Plant Area, which is defined as an area having an '...*exceptional botanical richness and/or supporting an outstanding assemblage of rare, threatened and/or endemic plant species and/or vegetation of high botanical value.*'

The Sperrgebiet has 180 plant species that are fully endemic to Namibia, while nearly 200 species are near-endemics because their distribution extends south into South Africa. Red Data species in the Sperrgebiet include perennial shrubs such as *Marlothiella gummifera*, a Namibian endemic known from only a handful of locations, spiny succulents such as *Hoodia alstonii* and *Hoodia officinalis*, clump-forming succulents such as *Tridentea pachyrrhiza*, and species such as *Aloe erinacea* which have a range of less than 100 square kilometres.

More locally, landscape features such as the Klinghardt Mountains and isolated inselbergs support small, restricted hotspots of endemism and diversity for plants as well as other groups, such as scorpions.

The gravel plains in the fog zone support lichen fields which are easily damaged by vehicles and other surface disturbances such as mining. These composite organisms, consisting of both fungus and algae, obtain water from coastal fog and grow extremely slowly. About 90 species occur in the Sperrgebiet, many of which are endemic. They provide ecological niches for other flora and fauna and are an important food source for beetles and a range of animals from gerbils to bigger mammals. Lichens are important pioneer species that colonise bare desert, thus stabilising the soil and reducing wind and water erosion.



Brown hyaenas living on the Namibian coast forage amongst seal colonies, scavenging and killing seal pups, but they also eat other mammals, birds, reptiles and fish. Other mammals in the coastal area include oryx, springbok and jackal.

### Riverine habitat

The perennial Orange River marks Namibia's border with South Africa. Its mouth covers 18 square kilometres and is considered to be an estuary because it experiences some tidal and therefore marine influence. Flows to the sea are usually cut off by a sand bar and a brackish lagoon forms behind the bar. The largest feeding area for wading birds is available during periods when the river is low as a result of lack of rain in the catchment area and water being dammed upstream. Over 20,000 birds of 56 species have been recorded, including 14 Namibian or South African Red Data species. There are 15 species of freshwater fish in the Orange River system, of which one is endemic to the lower stretches. The river mouth wetland has been given international recognition as a Ramsar Site.

### Marine environment

Namibia's marine environment supports one of the greatest concentrations of oceanic life in the world. This includes vast populations of commercially valuable fish which are one of Namibia's most important renewable natural resources. This wealth of life is due to extremely high rates of primary production that result from upwelling offshore (see page 5). The most intense upwelling and nutrient supply occurs where the inner continental shelf is narrowest and the wind strongest. The northern Karas coast and many of its islands fall within this very productive so-called Lüderitz upwelling cell, which extends northwards from Lüderitz (Figure 1).

Great numbers of tiny plants known as phytoplankton use the nutrients to grow and multiply, and they, in turn, provide food for small animals called zooplankton. Further bouts of production occur as the zooplankton provide vast supplies of food for other, larger consumers up the food chain, such as fish, whales and dolphins, seabirds, seals and, of course, humans by way of commercial fisheries.

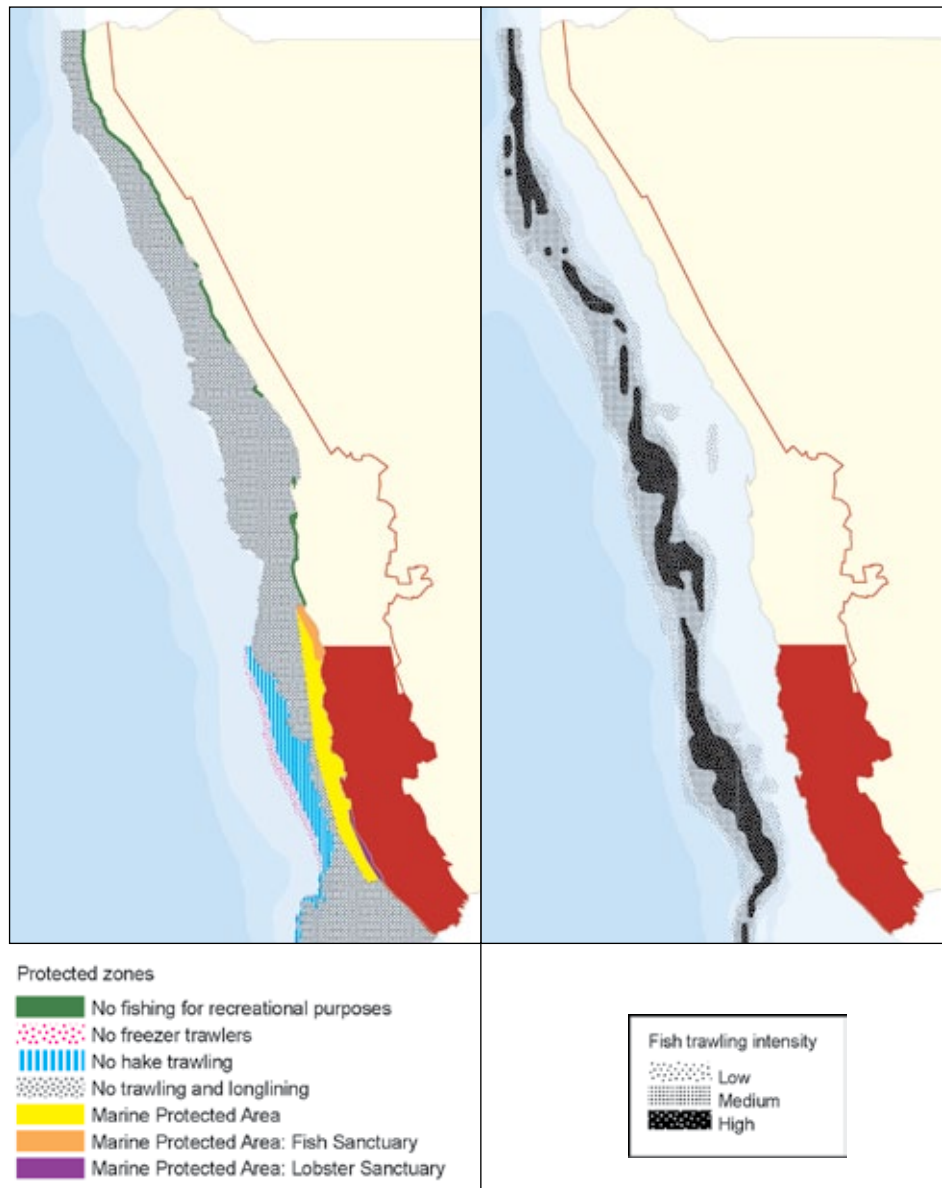


Figure 7: Fishing areas and protected zones off the Namibian coast.

Much of the production and wealth of life is far offshore where fishing boats ply the waters to catch hundreds of tonnes of fish each year (Figure 7). However, the inshore marine environment, which includes the inter-tidal and sub-tidal zones, is crucial to fish breeding and shellfish populations.

The rocky shores and sandy beaches support relatively few animal species. The coast of Karas, however, has more species of shore invertebrates than the coast further north, on both rocky and sandy substrates. For example, rocky intertidal habitats north of Lüderitz typically support about 100 invertebrate species, whilst those south of Lüderitz have 150 or even more species. There are fewer species on sandy beaches.

Further out into the ocean, communities on the rocky seabed are also low in diversity but high in biomass. Dominant species are mussels, whelks, urchins, sea cucumbers and sea anemones. The west coast rock lobster is the main predator, feeding extensively on mussels.

Out of eleven species in the world, eight species of baleen whales occur along Namibia's coast. While some are resident, most are seasonal migrants that spend summer in the Antarctic and winter in West African waters. Twenty-three species of dolphins and toothed whales have also been recorded along the coast. The birth of a southern right whale in Elizabeth Bay in 1996 was the first breeding record for this species on the Namibian coast for over 100 years. Since then between one and three calves have been born each year on the coast between Conception Bay and the Orange River but the population is still extremely small. Three of Namibia's five main seal breeding colonies also occur in this area - at Atlas Bay, Wolf Bay and Long Island.

The islands provide key foraging, breeding and resting places for seabirds and seals where they are safe from terrestrial predators, such as hyaenas and jackals. Up to 145,000 sea birds have been recorded on the islands, including 60,000 Cape cormorants, 48,000 Cape gannets and 25,200 African penguins. Eleven seabird species breed on the islands. For seven of them the islands hold the majority of their global breeding populations: African penguin, Cape gannet, bank cormorant, crowned cormorant, Cape cormorant, African black oystercatcher and Hartlaub's gull. Ichaboe Island, Mercury Island, Possession Island and the Lüderitz Bay islands are particularly important roosting and breeding sites for cormorants, penguins and gannets and have been designated as Important Bird Areas, which are similar in status to Important Plant Areas (see page 8). Other species that breed on the southern islands are white-breasted cormorant, kelp gull, swift tern and Caspian tern. There is also one mainland colony of African penguins at Sylvia Hill.

Nutrients that leach into the sea from the concentrated guano enrich waters around the islands. The sea floor thus provides a rich habitat and substrate for high densities of bottom dwelling animals and plants, such as anemones, mussels, sponges and seaweeds. The large kelp beds provide food, protection and shelter to vulnerable juvenile life stages of many marine animals, including those of the commercially valuable west-coast rock lobster.

## People and the economy

Archaeological sites scattered along the coast confirm that the Karas coast has a long history of human occupation, with the earliest firm evidence being from about 800,000 years ago. People were then most likely nomadic, moving from one water source or good hunting area to another. A number of sites along the coast itself, including Elizabeth Bay, provide indications that people were living along stretches of the coast between 10,000 and 2,000 years ago. The remains of livestock at sites on the coast such as Chameis Bay, indicate that nomadic pastoralists lived here hundreds of years ago.

More recently, the coast served as a contact point with the rest of world when early explorers made their first contact with coastal inhabitants. However, many seafarers met

their untimely end when their ships were wrecked. Most notably the oldest shipwreck so far found on the African continent, the Bom Jesus, was discovered in April 2008 just north of Oranjemund. The ship was lost around 1533. The remains of 22 tons of copper ingots found with the ship also indicate that the vessel was probably on its outward journey to the east, carrying copper to use for barter. Of 21 Portuguese ships lost on their way around Africa to the east between 1525 and 1600 only one – the Bom Jesus – was recorded as being lost near the Namibian coast.

### **Guano**

During the guano rush which began in the 1840s, layers of guano - which were then 10 metres or more in thickness - were scraped from the islands, bagged and shipped for use as fertiliser. Between 1841 and 1991, 869,332 tonnes of guano was produced, scraped and bagged. Much of this was taken from the bigger islands, principally Ichaboe, Possession, Mercury and Long Islands. However, the guano provided ideal nesting habitat for African penguins and its removal was disastrous for this species, which is the only penguin to occur on the African continent. Some guano harvesting continues today on certain islands where it is limited to particular months to minimise disturbance to birds.

### **Diamonds**

The guano rush was followed by the discovery of much greater riches along the Karas coast: diamonds. Since their discovery in 1908, the economy of the Karas coast has been dominated by diamond mining, principally by Consolidated Diamond Mines (CDM) and its successor, Namdeb. Until 2008, Namdeb was the single most important player in the Namibian economy having paid N\$1.765 billion dollars in tax in 2008.

While relatively few diamonds are found per unit of ore mined, the quality of diamonds found along the coast is exceptionally high with over 95% being of gem quality. This rich supply of gem diamonds is a consequence of a remarkable combination of circumstances. Originating from kimberlites in the interior of southern Africa, the diamonds have been transported down the Orange River to the sea over at least the last 45 million years. Since only high quality diamonds are hard and durable, it is these that have survived the long journey downstream, while those with defects were destroyed and removed from the supply carried down the Orange.

Those diamonds that made it all the way into the sea first settled on the very wide continental shelf off the mouth of the Orange River. The combined forces of the Benguela Current and the strong southerly wind then moved the gems northwards and back towards the shoreline. The j-bays described earlier (see page 6) provided excellent trap sites for diamonds from where they were carried onshore by the south-westerly winds that funnel up the coastal valleys. Yet other diamonds were deposited on bedrock which was relatively far inland when sea levels were much higher than now.

After about 90 years of mining operations, the stock of onshore diamonds on which mining concentrated has been largely depleted. This was compensated by the move into mining the marine environment during the 1980s.

Diamond mining along the coast has caused habitat degradation along large sections of the coast. Most of this is due to onshore mining along a 100 kilometre long strip between Oranjemund and Chameis Bay. Fortunately, the sandy beaches which covered most of

this stretch largely recover when mining operations cease. Further north, diamonds are mined by sucking up gravel off the rocky shores. This causes considerable short-term disruption to the rich fauna and flora that live in the sub-tidal zone. However, studies have shown that these recover relatively well when mining stops.



Ichaboe Island from the air. As a consequence of their economic and strategic importance, Ichaboe Island was annexed by Britain in 1861, the other islands in 1866 and Walvis Bay in 1878. Walvis Bay and the islands were included in South Africa when it became the Union of South Africa in 1910. They remained part of South Africa until the 21st March 1994 when they were finally included within Namibia.



Lüderitz was founded in 1883 as a trading post. Although there is a well protected bay, this is underlain by rock which makes it unsuitable for large modern ships. Fish processing and the servicing of fishing fleets are the main economic activities in the town, which is home to about 13,000 people.

### **Fish resources**

The high biological productivity of the Benguela system has supported a vibrant fishing industry off Namibia for the last 60 years. The industry is the largest employer on the coast, particularly in the two major ports of Lüderitz and Walvis Bay. There are eight processing plants in Walvis Bay and two in Lüderitz. Some 97% of all fisheries products are exported, 70% of which currently go to Spain.

While the fishing industry has contributed much to the Namibian and coastal economy, it has also endured a succession of declines of fish stocks. The first and most dramatic of these occurred in the 1970s and early 1980s when sardine stocks collapsed. This was followed by the collapse of anchovy and rock lobster stocks, while harvests of hake are now less than half of what they were in the 1970s. Orange roughy stocks have also dropped substantially, while those of deep-sea red crabs collapsed rapidly and dramatically in the early 1990s. In short, substantial proportions of Namibia's marine resources have been lost.



It is generally believed that the declines were due to over-fishing – often by foreign vessels fishing in Namibian waters – but environmental factors have also been important. For example, sardine and other marine resources were hard hit by major Benguela-Niño events in 1984/1985 and 1994/1995. These warm water events led to a loss of oxygen in seawater, while the warm water itself caused some species to abandon their normal spawning grounds and therefore not to breed.

### Tourism

Tourism to Namibia is second only to mining in its contribution to the country's economy, and is thus currently more valuable than agriculture and fishing. A variety of attractions draw tourists to the Karas coast: Lüderitz and the nearby ghost town of Kolmanskop and Diaz Point. Inland, and to the north is the Namib Naukluft Park with its spectacular scenery, wildlife and feral desert horses, while guided tours along concession routes can be taken to Hottentots Bay, Spencer Bay and Sylvia Hill along the coast. A host of special and new attractions will be available when the Sperrgebiet National Park eventually opens to tourists.

Figure 8. Conservation areas and tourism facilities in and around the Karas coast.



### Seals

Along the Karas coast most harvesting occurs at Atlas Bay and Wolf Bay. The seal harvest is a contentious and emotive issue with animal rights groups protesting the killing, particularly the clubbing of pups. On the other hand, fishermen regard seals as competitors and a threat to their livelihoods. Many countries have now banned the import of products from Cape fur seals.

### Mariculture

Mariculture is dominated by oyster farming in Lüderitz, although farming with rock lobster, abalone and mussels is also being developed at the town. Seaweed is harvested to produce agar, a gelatinous substance used in foods; currently about one quarter of the production is cultured while the remainder is harvested from wild stocks.



## Challenges for the future

The overarching challenge facing the Karas coast lies in how to achieve a balance between environmental conservation and adding further value to the coast.

But what economic development is possible or desirable without large-scale losses of environmental assets? Agriculture is not viable due to the obvious constraints of water and poor soil fertility. Although the Orange River is a perennial river it is already heavily utilised and its ecological functioning has been disrupted by the damming of water in its upstream catchment.

Mariculture has significant potential, and has been identified as a priority for development by the Ministry of Fisheries & Marine Resources. Most mariculture needs the sheltered waters of bays and ponds such as those at Lüderitz. Further developments might be possible in ponds that remain from diamond mining in the Sperrgebiet. However, all maricultural developments are costly and require stringent controls to prevent the accidental introduction of alien species and detrimental effects of chemicals used to enhance production.

The Kudu gas field could become a major development in the region. The gas field is far offshore, some 170 kilometres north-west of Oranjemund in 170 metres of water depth. Technical challenges such as its remote location make development of the gas field expensive, but the increasing shortage of electricity in southern Africa has already made development of this resource for electricity production more viable.

While mining can provide substantial economic benefits, significant environmental degradation may lead to loss of opportunities for tourism and other potential uses of the natural environment. The impacts of mining are often especially harmful in the fragile arid environments found along the coast, and mining in national parks needs very careful management if it is to be allowed.

Other than pollution, the main threat to the Karas coast is diamond mining close to the shore. For example, kelp may be cut or dislodged and sediments are shifted when sections of the seabed are sucked up and then deposited after being sorted for diamonds. One study found that mining significantly reduced the species diversity and abundance of both inter-tidal and sub-tidal communities, but both diversity and abundance recovered within two years.

One obvious opportunity for the Karas coast lies in the further development of tourism. Much of the newly proclaimed Sperrgebiet National Park is pristine (Figure 9) and offers a variety of activities, sights and routes to tourists. These include relics of the heydays of diamond mining, the Roter Kamm meteorite crater, the Klinghardt Mountains and the very rich assemblages of succulents and other plants of the Succulent Karoo Biome. A variety of new, unusual ventures could be developed, such as giving tourists the opportunity to dig for their own diamonds, and to explore the many interesting archaeological, geological and fossil sites in the area. The richest assemblage of fossils from the Miocene age in Africa occurs at sites near the Orange River. Effective controls will be needed to prevent collectors illegally removing rare and endemic plant species, however.

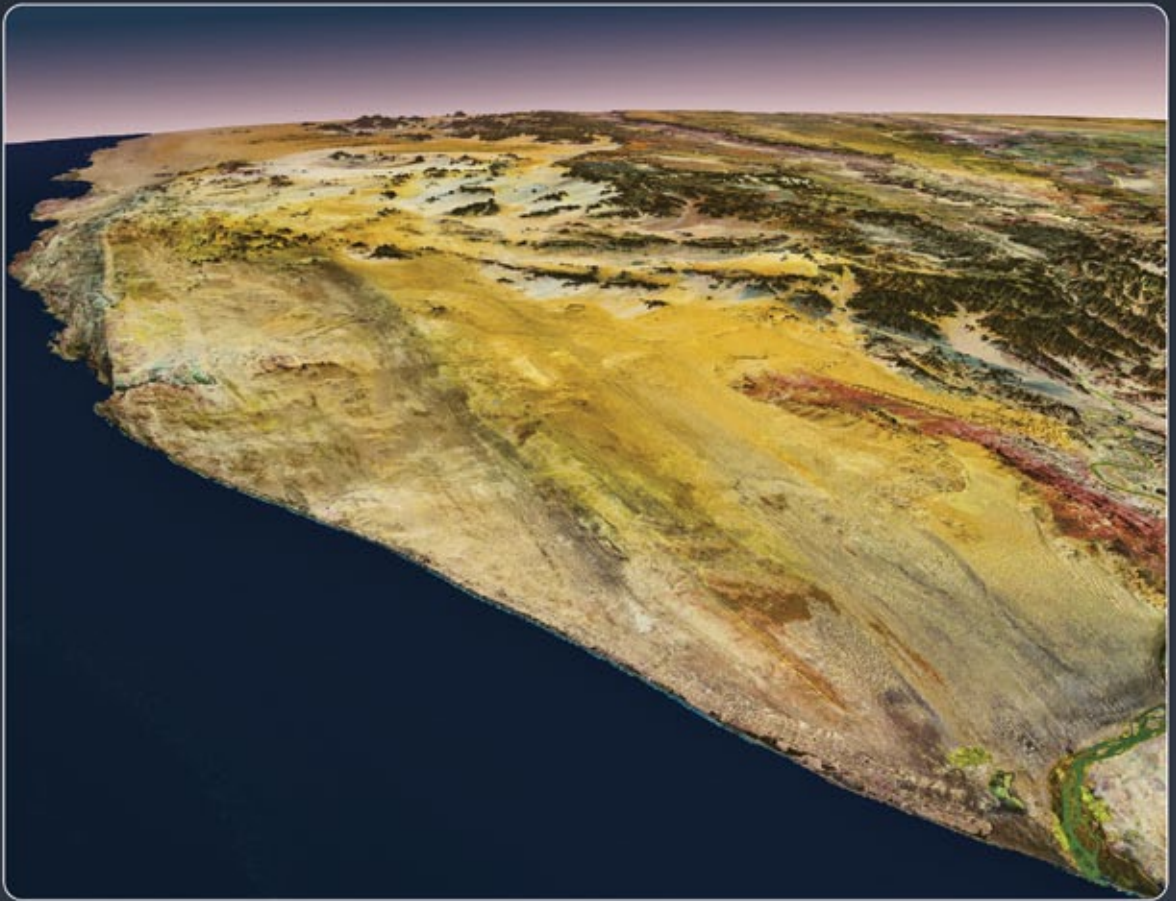
New opportunities for tourism could be developed in the Marine Protected Area (MPA). Protection offered by the MPA should lead to increased populations of dolphins and whales. Examples are the Heaviside's dolphins, the breeding southern right whales, and humpback whales which migrate along the coast between their summer feeding grounds

in the Antarctic up the west coast of southern Africa to their breeding grounds in the tropics north of Angola. The viewing of these and other species could be a significant source of income and jobs if a whale-watching tourism industry was to develop, similar to whale-watching enterprises in South Africa.

Further value and options for tourism should also develop if the proposed transboundary Richtersveld–Sperrgebiet Park is established. In short, the Karas coastal region has a unique mixture of features and attractions which could be developed to make this stretch of the Namibian coast a premier destination for tourists.



**Figure 9.** Most of the Karas region's coastal zone is pristine, and even much of the diamond mining area is environmentally healthy and attractive for tourism.



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