



WALVIS BAY

BIODIVERSITY REPORT | 2008



ENHANCING URBAN NATURE THROUGH A GLOBAL NETWORK OF LOCAL GOVERNMENTS



The Local Action for Biodiversity (LAB) Project is a 3 year project which was initiated by the City of Cape Town, supported by the eThekweni Municipality (Durban), and developed in conjunction with ICLEI – Local Governments for Sustainability and partners. ICLEI is an international association of local governments and national and regional local government organisations that have made a commitment to sustainable development. LAB is a project within ICLEI's biodiversity programme, which aims to assist local governments in their efforts to conserve and sustainably manage biodiversity.

Local Action for Biodiversity involves a selected number of cities worldwide and focuses on exploring the best ways for local governments to engage in urban biodiversity conservation, enhancement, utilisation and management. The Project aims to facilitate understanding, communication and support among decision-makers, citizens and other stakeholders regarding urban biodiversity issues and the need for local action. It emphasises integration of biodiversity considerations into planning and decision-making processes. Some of the specific goals of the Project include demonstrating best practice urban biodiversity management; provision of documentation and development of biodiversity management and implementation tools; sourcing funding from national and international agencies for biodiversity-related development projects; and increasing global awareness of the importance of biodiversity at the local level.

The Local Action for Biodiversity Project is hosted within the ICLEI Africa Secretariat at the City of Cape Town, South Africa and partners with ICLEI, IUCN, Countdown 2010, the South African National Biodiversity Institute (SANBI), and RomaNatura. For more information, please visit www.iclei.org/lab.

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FOREWORD

Walvis Bay is blessed with a rich biodiversity which thrives in the scenic Namib Desert dunes and associated gravel plains, the Walvis Bay Lagoon, the ephemeral Kuiseb River Delta and other ecosystems. Biodiversity forms the basis of our tourism sector. Therefore its preservation is critical to the sustainable growth of the sector and the entire economy of Walvis Bay.

Namibia's Vision 2030 aims to transform Namibia from a developing lower-middle income country to a developed high-income country by year 2030. This report and the subsequent Walvis Bay Local Biodiversity Strategy and Action Plan is a milestone of strategic planning on the way to 2030, so that the achievement of the essential targets for Vision 2030 as well as the Millennium Development Goals in Namibia works with, and not against, our natural resource base especially biodiversity.

Since Walvis Bay's reintegration in 1994 the city has taken great strides towards the sustainable management of its biodiversity. Formal environmental management by the Municipality of Walvis Bay started with the implementation of the Walvis Bay Local Agenda 21 Project. The project's aim was to achieve a workable balance between protecting the environment and promoting economic and social development - the real challenge of sustainable development.

It is a pleasure to see how many individuals and institutions from the public and private sectors have contributed to the drafting of this document. This highlights the importance that the residents of Walvis Bay attach to the sustainable management of our fragile biodiversity.

The Municipal Council of Walvis Bay thus commits itself to achieve sustainable development goals through continuous networking and learning from other local authorities and institutions worldwide. Walvis Bay will strive to be engaged in ICLEI's initiatives such as the Local Action for Biodiversity (LAB) Project. I am confident that this report will be a useful working document that will provide baseline information for the successful implementation of the Walvis Bay LAB Project and beyond.



Uilika Nambahu
Mayor of Walvis Bay



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KEY STAKEHOLDERS



The Municipality of Walvis Bay

Is a local authority and is the overall coordinator of the WB LAB Project.



The Coastal Environmental Trust of Namibia

Is an environmental NGO based in Walvis Bay and is involved in various environmental projects and mainly in the bird counts of the city. They will coordinate the Walvis Bay Lagoon component of the WB LAB Project.



The Ministry of Environment and Tourism

Is a Namibian government ministry responsible for the implementation of environmental policies, laws and regulations in the country, and they will coordinate the Dune Belt Area component on the WB LAB Project.



Municipality of Swakopmund

Is a local authority that will provide technical assistance on both the Swakop River Estuary and Dune Belt Area components of the WB LAB Project.



The Namibia Coast Conservation and Management (NACOMA) Project

Is a project co-funded by the Namibian government and the Global Environmental Facility, aiming to strengthen and mainstream biodiversity conservation. They will provide general technical assistance to the WB LAB Project.



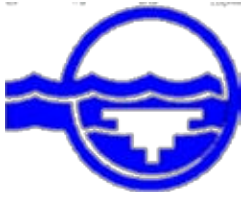
The Erongo Regional Council

The Erongo Regional Council is the regional authority and its responsibility in the WB LAB Project will be to provide the linkage with the national government for political support.



Ministry of Fisheries and Marine Resources

Is a Namibian government ministry responsible for the management of marine and freshwater resources. They will assist with the coordination of the Coastline component of the WB LAB Project.



The Walvis Bay Salt Refiners (WBSR)

Is a Namibian Registered company and wholly owned by Chlor-Alkali Holding and mainly produces high quality salt. They will assist with the coordination of the Ramsar site component of the WB LAB Project.



The Namibia Port Authority (NAMPORT)

Is a national government parastatal that manages the Namibian ports. They will coordinate the Walvis Bay Harbour component of the WB LAB Project.



Gobabeb Training and Research Centre

Is a research and training centre that works with a variety of partners to address training and research for sustainable management and use of renewable natural resources. They will provide research and educational assistance to the WB LAB Project.

The Topnaar Traditional Authority

Is the traditional authority of the indigenous Topnaar people recognised by the government in terms of the Traditional Authorities Act. They will coordinate the Kuiseb Delta component of the WB LAB Project.

Friends of the Swakop River Mouth

This is a group that is concerned with the well being of the Swakop River Estuary ecosystem. They will coordinate the Swakop River Estuary component of the WB LAB Project.

Quality Manager Forum

Is the fishing industry forum of Quality Managers & Controllers that aims to improve the quality of production. They will assist with the Walvis Bay Harbour component of the WB LAB Project.

ABBREVIATIONS & ACCRONYMS

BCLME	Benguela Current Large Marine Ecosystem	PPP	Public Private Partnership
BOD	Biological Oxygen Demand	SADC	Southern African Development Community
CAAP	Coastal Area Action Plan	SANBI	South African National Biodiversity Institute
CAAPSC	Coastal Area Action Plan Steering Committee	WB	Walvis Bay
CETN	Coastal Environmental Trust of Namibia	WBBR	Walvis Bay Biodiversity Report
CPAP	Cleaner Production Action Plan	WBBP	Walvis Bay Biodiversity Plan
CSEA	Coastline Strategic Environmental Assessment	WBL	Walvis Bay Lagoon
DANIDA	Danish International Development Agency	WB LAB	Walvis Bay Local Action for Biodiversity
DBMPR	Dune Belt Management Plan and Regulations	WB LA21	Walvis Bay Local Agenda 21
DMA	Directorate of Maritime Affairs	WBM	Municipality of Walvis Bay
DTBA	Damara Tern Breeding Area	WBNR	Walvis Bay Nature Reserve
EAP	Environmental Action Plan	WBSR	Walvis Bay Salt Refiners
EIA	Environmental Impact Assessment	WBEAG	Walvis Bay Environmental Action Group
EMS	Environmental Management System	WBEMP	Walvis Bay Lagoon Integrated Environmental Management Plan
EMP	Environmental Management Plan	WBIEP	Walvis Bay Integrated Environmental Policy
FSR	Friends of the Swakop River	WBRS	Walvis Bay Ramsar Site
ICLEI	International Council for Local Environmental Initiatives	WRMA	Water Resources Management Act
IUCN	International Union for the Conservation of Nature	WWE	Department of Water, Waste and Environmental Management
LAB	Local Action for Biodiversity		
MRA	Marine Resources Act		
MARPOL	International Convention for the Prevention of Pollution from Ships		
MAWF-DWAF	Ministry of Agriculture, Water and Forestry – Department of Water and Forestry.		
MET	Ministry of Environment and Tourism		
MFMR	Ministry of Fisheries and Marine Resources		
MoHSS	Ministry of Health and Social Services		
MOP	Management and Operational Plan		
MTAN	Marine Tourism Association of Namibia		
N/A	Not applicable		
NACOMA	Namibia Coast Conservation and Management Project		
NAD	Namibian dollars		
NGO	Non Governmental Organisation		
NDP	National Development Plan		
Namport	Namibian Ports Authority		



1. EXECUTIVE SUMMARY



The Walvis Bay Biodiversity Report covers the entire Walvis Bay area which is divided into four main areas namely: the Walvis Bay Ramsar Site, the Kuiseb Delta, the Dune Belt Area and the Walvis Bay Coastline. The Walvis Bay wetland was proclaimed as a Ramsar Site in 1995 and is regarded as one of the most important coastal wetlands in Southern Africa for its birdlife. The Kuiseb Delta holds significant ecological and cultural values and makes up an important part of the area used by the indigenous Topnaar community.

The Dune Belt Area hosts a high diversity of desert adapted flora and fauna and is the main habitat of the endemic Damara Terns. This area is immensely popular as a recreation area as a result of its natural beauty and having the only high coastal dunes in Namibia that are easily accessible to the public. The 30km Walvis Bay Coastline is designated as an Important Bird Area (IBA). This area has up to 770 birds per kilometre of shore which is the highest linear count of birds anywhere in Southern Africa.

The Swakop River Estuary is one of only two of its kind along the Namib central coast and is on the major migratory flyway of hundreds of

thousands of migratory birds. This wetland has a fragile and complex environment for a wide variety of plants, birds, reptiles, fish and a number of other animals.

Management initiatives for all the four main areas are in place and some were attempted or are in the developing phase. In 1996 the Walvis Bay Environmental Action Group (WBEAG) now Coastal Environmental Trust of Namibia (CETN) had a workshop and drafted the 'Walvis Bay Lagoon Integrated Environmental Management Plan' (WBEMP), which in May 2004 culminated in the Coastal Area Action Plan (CAAP) as an output of the Walvis Bay Local Agenda 21 (WB LA21) Project.

The Cape Provincial Administration proclaimed the dune areas east of Walvis Bay, the Kuiseb Delta and the Kuiseb River, south to the boundary of the Namib-Naukluft Park as the Walvis Bay Nature Reserve (WBNR) in 1991, but following the reintegration of the Walvis Bay enclave into Namibia in 1994, its protection was discontinued. In 1998 the Municipality of Walvis Bay moved to reinstate its proclamation. A WBNR management and operational plan (MOP) for the area was formulated in July 1998 but has

not been implemented, as the process initiated to reinstate the reserve has not yet been finalised.

Similarly, as an output of the WBLA21 Project, a Dune Belt Management Plan & Regulations (DBMPR) were drafted and approved by the WBM but could not be implemented due to the lack of a relevant legislation and landownership. The WBM commissioned a consultant in 2004 to conduct and compile a Coastline Strategic Environmental Assessment (CSEA) in order to guide Council's decision making on sustainable coastline development and management. "Friends of the Swakop River (FSR)", a Non-Governmental Organisation (NGO), initiated an environmental project which is still in its infancy state.

Chapter 2 briefly describes the general facts of Namibia, as a country, the city of Walvis Bay's history, location, and its unique environment as well as the general social and economic activities. The national, local and civic responsibilities as well as the legal status with regard to biodiversity management are covered in **Chapter 3**.

The city's definition of biodiversity, and the vision, mission and objectives of biodiversity management are



elaborated on in **Chapter 4** and further deals with the core of the issues of the WBBR.

The core of the WBBR is elaborated on the basis of the four main biodiversity areas and their respective zones. There are four zones within the WBR main area, namely the Lagoon, Pelican Point (including the Paaltjies Coast), Walvis Bay Harbour and the Salt Works; two zones within the Kuiseb Delta main area namely the Kuiseb River and Delta, and the Desert and Dune Areas around the Kuiseb River; two zones within the Dune Belt main area, namely Dune fields and Gravel plains, and the WB Coastline with two zones namely the Coastline and the Swakop River Estuary as the last main area. Each zone or area is discussed in terms of its location and extent; biodiversity description, socio-economic issues; biodiversity threats and management.

The Lagoon is characterised by two main habitats: extensive shallow, sandy shores that are regularly covered and exposed by tidal action and the sub-tidal deeper (up to 5m) waters of the southern harbour area. The Walvis Bay Lagoon is considered one of the richest and most important wetlands in southern Africa, with approximately 20 bird

species regularly occurring in numbers greater than 1% of their world population. At the same time the Walvis Bay Lagoon is also one of very few coastal wetlands in southern Africa, which makes the importance of the area even greater. Because of its ornithological significance it was designated as a Ramsar Site in 1995.

At the moment the biodiversity in the Lagoon is being threatened by natural and man-made siltation, pollution, disturbance through developments and recreational activities, but the CAAP and the Walvis Bay Nature Reserve Management and Operational Plans make provision for and guide the management of all the threats identified for this zone.

The Pelican Point peninsula separates the dynamic waves of the Benguela current to the west from the sheltered harbour waters, thus providing protection to the harbour. This area's beach supports sandy shore animals such as sand hoppers and white mussels as well as many terrestrial insects, especially flies that are attracted by the debris on the shore.

Other mammals include jackals and a non-breeding colony of Cape fur seals, normally numbering some 5 000, but sometimes expanding to

a significantly larger number. The bird count in our summer months at Pelican Point average out at 15,000 birds. White mussels and other organisms occur in the sand of the surf zone. Jackals patrol the area. The biodiversity in this zone is threatened by the sand trapped by the peninsula and remobilised by wind into the harbour and lagoon. Visitors also disturb the seals and birds, and contribute to littering. Besides litter from visitors, oil and debris from offshore vessels also pollute the point. Namport is responsible for cleaning up the oil.

It is thus evident that the protection of seals and seabirds; preservation of natural sand spit dynamics; restricted access conservation; motorised vehicles prohibition; controlling shore angling permits; provision of information about key features and the vulnerability of the area; support to and further development of eco-tourism opportunities; preservation of roosting shorebirds by means of information; provision of more opportunities for supporting mixed recreation; angling from coastline, mainly between November and April; disturbances because of recreational and tourism activities from land and from sea; litter and debris from visitors, etc. – all require proper planning and management.

1. EXECUTIVE SUMMARY

The Walvis Bay harbour is located north and east of the Outer Lagoon zone, bounded on the west and north by the limits of Namport jurisdiction, and on the east by the shore and factories of Walvis Bay. The harbour wall offers rare surfaces for the attachment of indigenous sessile marine animals such as mussels, barnacles, tube worms, sea squirts and lace-animals. However, pollution from fish factory effluent within the harbour is thought to have reduced marine invertebrate biodiversity significantly. The harbour has a soft substrate/mud sediment bottom with depths up to 15 metres. Encompassed within this area in the north-eastern corner is an artificial guano platform for nesting birds from which the guano is harvested annually.

Namport is ISO 14000 compliant and the city's sources of pollution to the bay as well as appropriate management actions are well documented in the CAAP as part of the WB LA21 Project. All stakeholders i.e. the Namport authorities, all the associated harbour businesses and fish processing plants have a legal and moral responsibility not to endanger the city's biodiversity and more specifically the Walvis

Bay Lagoon. The Walvis Bay salt field operation is situated centrally on the west coast of Namibia, nine (9) kilometres south from the port of Walvis Bay. Birds like to feed in the shallow pans because of the steady artificial influx of particles and nutrient-rich water, which in turn fuel the benthic and pelagic food-chain.

The salt pans support up to half of the total number of birds in the lagoon area. The salt works have profoundly changed the ecology of the lagoon area because of the extensive land reclamation and the physical barriers to the tidal dynamics. The access road to the salt works is a major feature that cuts off the southern edge of the lagoon and reduces tidal action south of this point, despite culverts. Walvis Bay Salt Refiners is busy with the implementation of an Environmental Management System (EMS) following the ISO 14000 standards. The salt refinery also serves on the Coastal Area Action Plan Steering Committee (CAAPSC) as per the CAAP guidance.

The Kuiseb River and Kuiseb Delta are situated south of the salt works and east of Paaltjies and cover the south-east corner of the Walvis Bay district. The Kuiseb Delta and River supports a low number of plant species adapted to very dry conditions. This zone has a number of cultural and socio-economic features, the most prominent of

which is the presence of the small, indigenous Topnaar community. A diversity of lichens is found on some of the trees and on the stones of the gravel plains. The biodiversity is threatened by the invasive alien vegetation, which is now replacing some indigenous vegetation. Another disturbing trend is the soil degradation and desertification caused by deforestation, overgrazing and over abstraction of ground water. There is presently no management or active protection of these valuable heritage sites. The draft WBNR management and operational plans aim at addressing the above mentioned threats.

The Dune belt area is characterized by a unique biodiversity and its conservation is important in view of Namibia's heritage and sustained tourism potential along the coast. One of the special attractions of the Namib Desert is the very unusual fauna and flora of the dune ecosystem with its wonderful adaptations to this sandy environment. There are 47 species of mammals listed in the dune area and delta of the Swakop and Kuiseb Rivers, mostly bats, rodents and carnivores. The common vegetation in the dune belt especially along the road between Walvis Bay and Swakopmund is the cushion-like plant, *Trianthema hereroensis*. A section of the gravel plains area has been fenced off by the MET because it is one of the most important Damara Tern breeding areas along the coast.

The Municipality of Walvis Bay, in collaboration with other stakeholders developed a "Management and

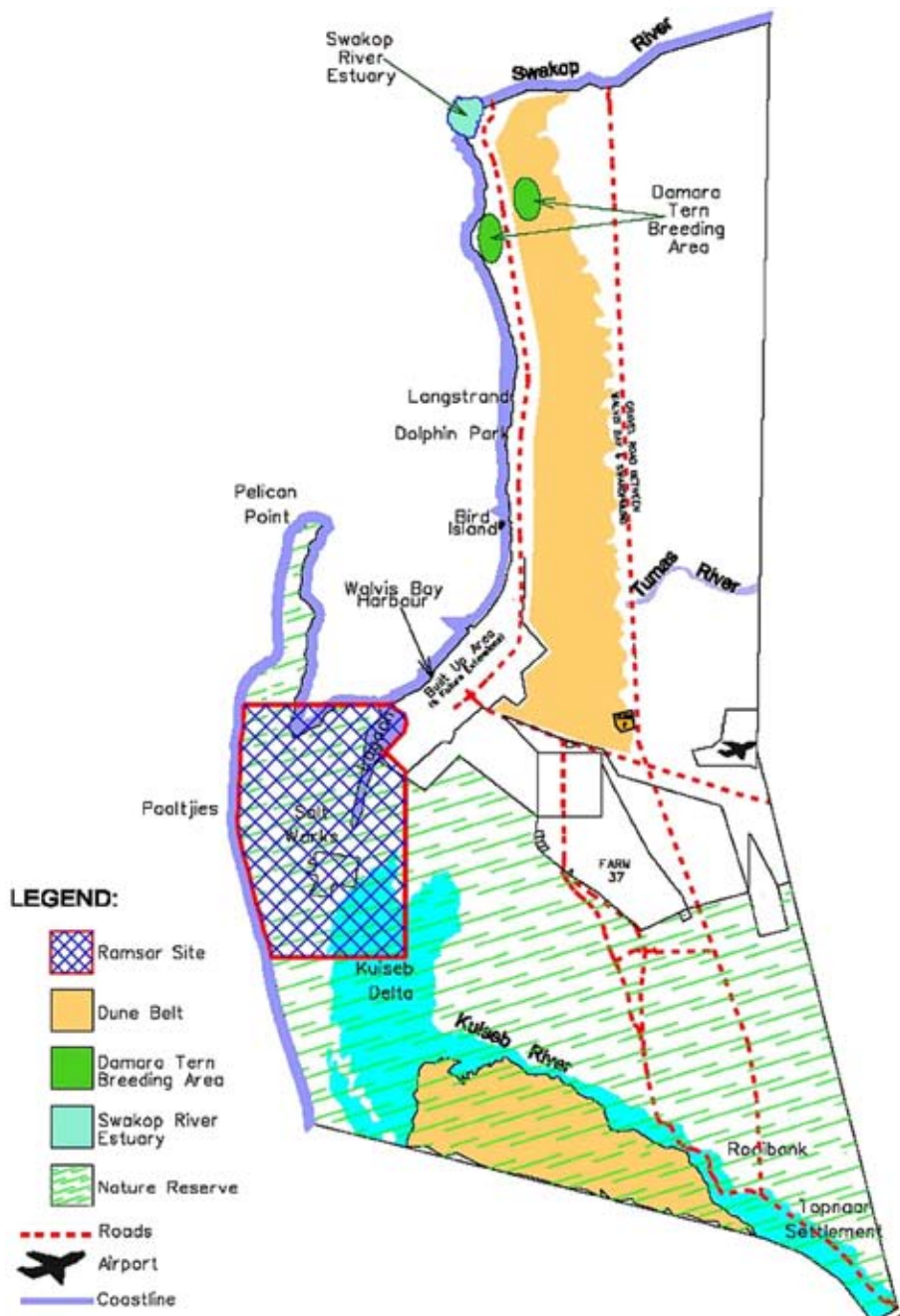


Monitoring Plan for the Dune Belt between Swakopmund and Walvis Bay” in December 2002 as one of the outputs of the WB LA21 Project.

Chapter 5 concludes the WBBR reviewing, administration in terms of governance, public participation and environmental awareness. This is concluded with a brief introduction of a number of relevant policies, plans and programmes that will add value in the drafting of the WB Local Biodiversity Strategy and Action Plan for the Municipality of Walvis Bay.

The landscapes of the Walvis Bay biodiversity areas are a result of river, marine, wind, and man-induced processes. For the purpose of the WBBR the city’s biodiversity is divided into four main different areas namely (note map in the “Executive Summary” section): (1) The Walvis Bay Ramsar Site; (2) The Kuiseb Delta; (3) The Dune Belt Area and (4) The Walvis Bay Coastline. The WBBR is a very important document for use in the LAB process and to prepare the way for further steps in the process.

It will also provide valuable baseline information for general biodiversity management into the future, helping to set priorities for action and monitor the state of the WB biodiversity and its management. The WBBR thus incorporates all the relevant management policies, programmes and plans for the four areas such as Integrated Environmental Policy (IEP), Seashore Regulation/Bylaw,



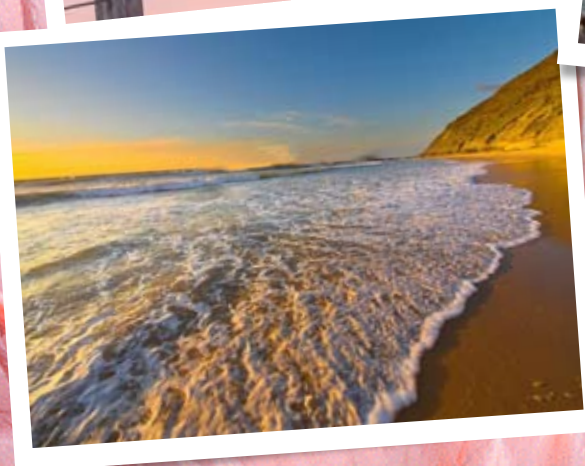
Coastline Strategic Environmental Assessment (CSEA), Coastal Area Action Plan (CAAP), Dune Belt Management Plan and Regulation, Walvis Bay Nature Reserve Management Plan, Walvis Bay Environmental Fund (WBEF), Data Sharing Policy, Internal Environmental Impact Assessment Guideline,

Draft Habitat Restoration Guidelines for the Dune Belt and Draft Integrated Coastal Zone Management Plan.



2. DESCRIPTION OF WALVIS BAY

This Chapter provides a general brief introduction to Namibia and the city of Walvis Bay.



History

Walvis Bay, meaning “Whale Bay” in Afrikaans, has had a chequered history. In fact, the Topnaars were the first settlers within Walvis Bay since the early Stone Age. The Topnaars belong to the Nama group of people. For centuries the Topnaars have lived off the oasis created by the Kuiseb River and Delta.

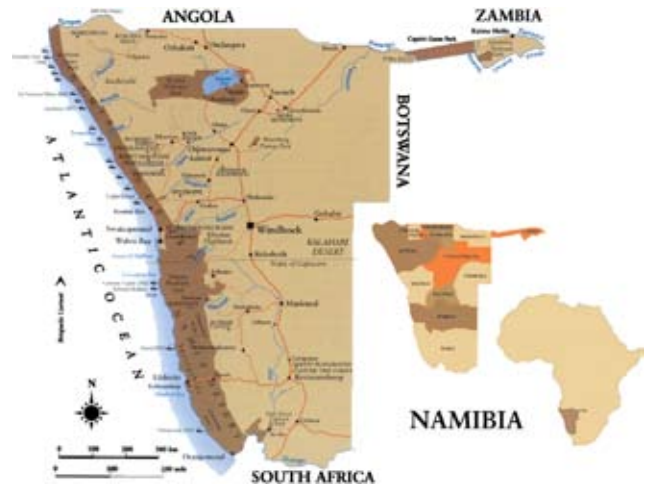
Without doubt, the Topnaars are among the oldest inhabitants of Namibia. They trace their origins back before 1652, when Jan van Riebeeck established a European settlement on the Southern African soil. Records from 1677 recount a

barter trade system between Topnaars and European sailors, which suggest that the Topnaars were among the first traders in Namibia. Beef, lamb, milk, !Nara plants and fresh water were exchanged for groceries, clothes and weapons.

The bulk of their subsistence activities is the recovery of !Nara seeds and some goat herding. The ground water abstraction and the lowering of the water table indirectly affect these activities. The Topnaar community is also expanding into tourism development in the Namib Naukluft Park, which will spill over to the Walvis Bay area.

Although Walvis Bay had already been discovered by Portuguese explorer Bartolomeu Diaz as early as 1487, it was only founded in 1793 by the Cape Dutch. Two years later it was annexed by the British. In 1910, Walvis Bay became - like the entire Cape Colony of the present day South Africa - part of the South African Union. Walvis Bay, the only deep sea harbour on the Namibian coast, remained under South African rule after Namibia's

independence and only in 1994 did the former South African president F.W. de Klerk agree to return the former enclave to Namibia.



Location and the Environment

The desert meets the sea at Walvis Bay. The municipal area is approximately 1,124km² in size and is situated on the south western coast of Africa and flanked by 60km of the cold, nutrient rich South Atlantic Ocean's coastline. It lies between the Swakop River in the north and the Namib Desert's sand dunes and gravel plains to the east with its boundary extending to the Namib Naukluft Park.

To the south is the 12,600 hectare Walvis Bay wetland which was listed as a Ramsar Site in 1995, and the adjoining delta of the ephemeral Kuiseb River in the south (refer to the picture on the next page).



!Nara (Acanthosicyos horridas) is endemic to the Namib Desert and grows in sandy places wherever its long tap roots can reach down to water. The !Nara is the most important plant to the indigenous Topnaar people as a source of food and income. It is believed that the plant has medicinal qualities.



2. DESCRIPTION OF WALVIS BAY



An aerial view of Walvis Bay and the Walvis Bay Salt Refiner's evaporation ponds (red colour).



Walvis Bay is situated in the most arid part of the hyper-arid Namib Desert having high coastal sand dunes and a coastal climate that is strongly moderated by the cold-water upwelling of the Benguela system. The area is characterised by mild summers and cool winters and fog is a regular feature throughout the year.

Long-term mean annual rainfall is less than 20 mm, while totals may range from 0 to over 100 mm per year. Wind is the single most important physical agent in the area affecting wave action, transport of sediments onto the shoreline and then further inland, and the shape and movement of surrounding sand dunes. The winds are characterised by high velocity, high frequency south to south-westerly winds in summer and high velocity, low frequency east to north-westerly winds in winter.

Social and Economic Activities

Today, Walvis Bay has about 60,000 citizens and is a buzzing business, industrial and tourism centre. Most people are employed at the modern harbour terminal, in the booming fishing industry and the processing of sea salt.

The salt fields to the south of Walvis Bay cover an area of 4,500 hectares

and annually produce 650,000 metric tonnes of high quality salt.

Walvis Bay is linked to Namibia's rail, air and road network, making the port ideally situated to service most of its landlocked SADC neighbours. The deep-sea harbour in Walvis Bay caters for fishing and cargo vessels and provides facilities for smaller boats and yachts. Walvis Bay has a high standard airport that is being upgraded for direct international flights. Various cruise liners make Walvis Bay one of their regular port of call. This location is an ideal connection for north-south Namibian travellers and links directly to the pristine expanse of the Namib-Naukluft/Sossusvlei tourist attractions to the south.

Also worth seeing in Walvis Bay, is the local museum in the Civic Centre and the Rhenish mission church established in 1880. The city has numerous good restaurants, cafes and bars



Walvis Bay Civic Centre (Municipal Head Office)

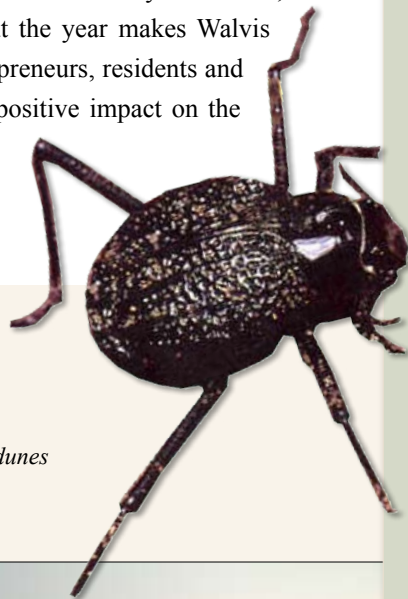
as well as comfortable hotels and guest houses on offer. Walvis Bay also offers a variety of sports and recreation facilities for those who enjoy an active outdoor lifestyle including golf, tennis, bowls, surfing, swimming, angling and sailing.

A special attraction of Walvis Bay is the huge natural lagoon with its overwhelming abundance of water birds. They are joined by 200,000 migratory birds annually. The famous "Dune 7" at the outskirts of town is the highest sand dune in the area and once you have climbed to the top, you can enjoy a stunning view. During summer, when temperatures in the interior of Namibia become extreme, Walvis Bay is a cool sunny haven for those seeking refuge against the inland heat, as the weather remains moderate.

The Namib is considered to be the oldest desert in the world, and has the world's largest desert dunes. The ancient central Namib Desert, the uniquely desolate coastline and an idyllic climate, which prevails almost throughout the year makes Walvis Bay an attractive option for entrepreneurs, residents and tourists alike and thus having a positive impact on the local economy.

LEFT: The Toktokkie, one of the many species of Tenebrionid beetles found in the Namib Desert.

At some parts of the Namib Desert dunes appear to drop-off into the ocean.



i Fast Facts About the Country and City

Location:	The City of Walvis Bay (1,124 km ² in size) is situated between the Namib Desert and Atlantic Ocean, on the west coast of the Republic of Namibia. The country is bordered by South Africa, Angola and Botswana, Zambia and Zimbabwe.
Latitude:	22.95°S
Longitude:	14.50°E
Population:	Walvis Bay 60,000 (2007 municipal figures), Namibia 1, 83 million (2001 national census)
Climate:	Walvis Bay - Arid with temperate weather, average 10 to 25 degrees Centigrade, rest of the country - arid, and sub-tropic.
Official language:	English
Other major languages:	Afrikaans, Oshiwambo, German, Otjherero, Khoekhoegowab, Damara-Nama, Lozi, Kwangali, Tswana, Portuguese, Spanish
Time:	Winter is GMT + 1 Hour (1st Sunday in April to 1st Sunday in September), while summer is GMT + 2 Hours (September to April)
Currency:	Namibia Dollar (N\$) = RSA Rand
Principal Exports:	Diamonds, Minerals, Fish, Livestock & its by-products
Principal Imports:	Food & Beverages, Vehicles, Machinery
Main Export Destinations:	UK, South Africa, Spain, France, Switzerland
Main Import Origins:	South Africa, Germany, USA, France
Literacy:	81,4%
Natural Resources:	Diamonds, Uranium, Livestock, Fish, Wildlife, Marine Resources

3. RESPONSIBILITIES & LEGAL STATUS



This chapter deals with the national, local and civic responsibilities for the management of the city's environment as outlined in the WB IEP.

National Government

In the Constitution of the Republic of Namibia, Namibia commits itself to sustainable development through environmental protection and wise resource management.

Article 95 (1), Promotion of the Welfare of the People, puts forward this intention as follows:

The State shall actively promote and maintain the welfare of the people by adopting... policies aimed at:
(1) Maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit

of all Namibians, both present and future...

In accordance with the Constitution, the national government has formulated policies and legislation directed at managing the environment namely:

Namibia's Green and 12 Point Plans

In 1992, by means of Namibia's Green Plan, Namibia created a common national vision around its environmental issues priorities and future actions, drawing together government, NGO, private sector and community in an unconventional coalition to work towards a common future – a coalition that started to break down the highly sectoral ways as in the past. The Green Plan led in turn to Namibia's 12 Point

Plan for Integrated and Sustainable Environmental Management, which is a strategic implementation document.

Namibia's Vision 2030

The government of the Republic of Namibia has, since independence established a planning system based on medium-term plans, for promoting sustainable socio-economic development in Namibia. Based on policy oriented research on key national strategic issues, and on a process of discussion and dialogue (involving the private sector, civil society, and the donor community) on the long term goals and future of the country, Vision 2030 provides long term alternative policy scenarios on the future course of development in Namibia at different points in time up until target year 2030.

The overall aim of Vision 2030 is to transform Namibia from a developing, lower-middle income to a developed, high income country by the year 2030.

National Development Plan (NDP) I, II & III

The National Development Plan for Namibia consists of long and medium term development perspectives. NDPs are part of a medium-term development perspective (of Vision 2030) for Namibia. The realization of the country's vision calls for more commitment to hard work and conscious effort of all Namibians. NDP's medium term objectives are to:

- Revive and sustain economic growth;
- Create more employment;
- Reduce inequalities in income distribution;
- Reduce poverty;
- Reduce regional development inequalities;
- Promote gender equality and equity;
- Promote economic empowerment; and
- To combat the further spread of HIV/AIDS.

Those objectives do not, in any way, mean that the other equally important objectives are discarded. To the contrary, the government and the people of Namibia remain committed to the other objectives of national importance such as: education and training; health and social services; housing; provision



The Namibian commercial fishing industry is a shining example of sustainable resource management.

of water resources; agriculture; manufacturing; and fisheries.

National Environmental Health Policy

The policy controls food hygiene, occupational health, community health and infectious and communicable diseases, vector control, building construction control and environmental pollution.

Marine Resources Act 27 of 2000

Marine fisheries in Namibia are governed by the Marine Resources Act (MRA) and the regulations made under it (MRA Regulations). The MRA provides for the conservation of the marine ecosystem and the responsible utilization, conservation, protection, and promotion of marine resources on a sustainable basis. The Act regulates the harvesting of marine resources and other matters relating to the management and conservation of marine resources.

Forest Act 12 of 2001

The Forest Act regulates the management and use of forests

and forest produce; establishes a Forestry Council, and provides for the protection of the environment and the control and management of forest fires. The Act also establishes a general prohibition on cutting, destroying or removing vegetation on any land which is not part of surveyed erven of a local authority area without a licence.

Water Act 54 of 1956

The Water Act provides that it is a criminal offence to –

“Pollute fresh water or the sea in a way that makes the water less fit for any purpose for which it is or could be used by people, including use for the propagation of fish or other aquatic life, or use for recreational or other legitimate purpose.”

The Act requires that water used for industrial purposes be purified before it is returned to a public stream or the sea, so as to conform with requirements established by the Minister of Agriculture, Water and Rural Development, but can be exempted from doing so, subject to certain conditions.

3. RESPONSIBILITIES & LEGAL STATUS

Water Resource Management Act 24 of 2004

The purpose of this Act is to ensure that water resources are protected, used, developed, conserved, managed and controlled in a sustainable manner for the benefit of all.

The Bill prevents and regulates the discharge of pollutants into the air, water and land. The Bill furthermore regulates noise, dust and odour pollution and establishes a framework for integrated pollution prevention and control.

- The Convention on Wetlands of International Importance (Ramsar Convention) - 23 December 1995.
- International Convention on Prevention of Pollution from ships (MARPOL Protocol) -
- The Convention on Biological Diversity – 18 March 1997
- The United Nations Convention to Combat Desertification – 21 October 1994
- The United Nations Framework Convention on Climate Change- 12 June 1992



The WBBR is both oriented by and follows multilateral agreements, national and local legislation, policies, programmes and plans.

Environmental Management Act 2007

The Act gives effect to Article 95 and 91 (c) of the Namibian constitution in that it establishes general principles for the management of environmental and natural resources. The Act further gives effect to Namibia's Environmental Assessment Policy and it also promotes the co-ordinated and integrated management of the environment.

Integrated Pollution and Waste Management Bill

The Bill aims to promote sustainable development and provides for the establishment of the pollution Control and Waste Management Agency that will endeavour to effectively control and prevent pollution in Namibia.

Parks and Wildlife Management Bill

The new legislation may enter into written agreements with any local, regional or traditional authority, conservancy or legal person which provides for the co-operative management of human activities, wildlife and/or wildlife habitats within a protected area.

Ratified Conventions

In addition to national policies and legislation, Namibia has signed many international treaties and conventions aiming at protecting the global environment. The following (and the ratification date) are particularly important for the management of the Walvis Bay Biodiversity:

Local Government Responsibilities

The Municipality of Walvis Bay and its Council were established under the provisions of the Local Authorities Act No. 23 of 1992 delegating power from the national level to local authorities to administer municipal areas. This includes the responsibility to manage natural resources. Municipal by-laws and policies with regard to housing, environmental health, town planning, public participation and littering, amongst others, are all important for the implementation of the WB LAB Project.

Hence the WBM initiated participation in the LAB Project and

the drafting of this WBBR in order to translate its responsibilities into action in such a way that it can effectively manage the precious and unique environment of Walvis Bay.

“Walvis Bay – Your Oasis of Opportunities” is the vision of the Municipality of Walvis Bay. The WBM recognizes that to develop and maintain this Oasis it has a major responsibility to manage both its natural and human-made urban environments.

The Mission Statement of the WBM thus reads:

“To continuously broaden the scope and improve the quality of municipal services rendered to all our customers with due regard for the environment.”

Recognizing its responsibility to safeguard Walvis Bay’s natural resources and biodiversity, one of the WBM’s core values is:

“We adhere to the principles of the conservation of the environment.”

One of the municipality’s eight focus areas follows on this core value:

“To continuously enhance and sustain our resource base, with a view to self-sufficiency.”

Assuring the prosperity of Walvis Bay’s people and reducing what are high levels of poverty depends strongly on good management of the environmental assets of the city and its surrounding biodiversity.

Civic Responsibilities

Walvis Bay is home to many interest groups and institutions such as churches, sports and social clubs, schools, old age homes, voluntary organizations and industry associations, amongst many others.

The WBM is strongly committed to working among the different municipal departments and in partnership with all the relevant stakeholders. Another WBM core value expresses this as follows:

“We promote teamwork and stakeholder involvement.”

The WBM will thus take a leading role in formulating, promoting and enforcing environmental Public Private Partnerships (PPP). But residents and their institutions, and visitors, will play an equally active role in supporting and ensuring the implementation of the WB LAB Project in real partnership with WBM. Accordingly, all inhabitants of and visitors to Walvis Bay are to be collectively held responsible for the management of the unique environment of the city and its surroundings as an interaction between nature, society and economy.

Moreover, a key feature of the WB LAB Project is to discover new and practical ways for all stakeholders to work together to manage the local environment in a sustainable fashion.

Sustainable development seeks a balance between social, economic and natural needs so that the current generation can meet its needs without undermining the ability of future generations to meet their needs. This worthy intention has translated into practical actions through encouraging partnerships with the MET, CETN, Friends of the Swakop River, the Municipality of Swakopmund, NACOMA and others for it to achieve real meaning.



4. ECOLOGY

Following Chapter 3: “Responsibilities and Legal Status” it was thought wise to adapt the national definition of biodiversity and the draft WBNR (Walvis Bay Nature Reserve) vision, mission, objectives and incorporating the LAB project goals.



Definition

The Walvis Bay Municipality has adopted the Namibian National Biodiversity Task Force (NNBTF) definition of biodiversity which reads as follows: “Biological diversity means the variability among living organisms from all sources including inter alia, terrestrial ecosystems and aquatic ecosystems and the ecological complexes of which they are part and this includes diversity within, between species and ecosystems”.

Vision

The successful implementation of an internationally acceptable biodiversity management programme for the Walvis Bay area by the year 2010.

Mission

To successfully conserve the natural and cultural environments of the Walvis Bay area through coordinated, co-operative management partnerships.

Objectives

- To promote the conservation of the Walvis Bay area, its biological communities, landscapes and cultural heritage;
- To engender a conservation ethic in the local and broader community through awareness and environmental education;
- To implement relevant ecological and biological monitoring and research programmes in the Walvis Bay area;
- To promote community

empowerment and ownership of conservation programmes and projects by means of co-ordinated, co-operative public participation and partnerships between all relevant stakeholders;

- To promote ecologically responsible eco-tourism; To ensure that utilization of the environment is done in a sustainable way;
- To promote community development; and
- To promote communication, transparency and credibility regarding conservation matters in the Walvis Bay area.

The city's biodiversity will be managed collaboratively by stakeholders in such a fashion that it achieves its potential as a true asset for all Walvis Bay residents.

Different Biodiversity Areas and Zoning

This section introduces the different biodiversity areas and zones of the town, which constitutes the main part of the WBBR. It describes and provides valuable baseline information for general biodiversity management into the future, helping to set priorities for action and monitor the state of the city's biodiversity and its management.

The Walvis Bay area is characterised by a complex and dynamic environment. The landscapes of the

Walvis Bay biodiversity areas are a result of river, marine, wind, and man-induced processes and feature some of the most interesting geological, soils, hydrological and biological features as well as different land uses. It is further characterised by a rare ecological interaction between a coastal wetland and the desert, under the influence of a very unusual climate dominated by the presence of cold sea currents.

Only 1% of Namibia's shoreline offers a sheltered, shallow area connected to the sea such as is found at Walvis Bay. Here a collection of species can usually be found that either do not occur or occur less plentifully on the open shore. Walvis Bay thus provides a rich habitat for marine fauna and flora and also accommodates the largest harbour along Namibia's coast.

It is for these reasons that the city's biodiversity is divided into four main areas: (1) The Walvis

Bay Ramsar Site; (2) The Kuiseb Delta; (3) The Dune Belt Area and (4) The Walvis Bay Coastline. Each of these main areas is further divided into functional zones. The report is thus structured in such a way as to reflect on the respective biodiversity zones. The status of each individual biodiversity zone and its characteristics are described in more detail by addressing the location and extent of the area or zone; the biodiversity description; the socio-economic issues, and the biodiversity threats and management tools.

This report is an important document for use in the LAB process and to prepare the way for further steps in the process. The report will also help all stakeholders to place biodiversity on a stronger footing in the respective institutions and secure greater support for its planning and implementation.



The Gobabeb Research and Training Centre is situated in the Kuiseb River delta area.

4. ECOLOGY

The Walvis Bay Ramsar Site

For the purpose of the WBBR the Walvis Bay Ramsar Site is divided into four biodiversity zones namely: (1) The Walvis Bay Lagoon, and (2) The Pelican Point (including Paaltjies), (3) The Walvis Bay Harbour, and (4) The Salt Works.

Zone 1: The Walvis Bay Lagoon

Location and extent of the zone

The Walvis Bay lagoon lies in the south-east corner of the large natural coastal embayment of Walvis Bay which is formed by the prominent barrier/sand spit Pelican Point. The lagoon is approximately seven km long and up to 2,5m deep at high tide with a maximum tidal range of about 1.8 m. The south-southwest to north-northeast orientation of the Walvis Bay Lagoon closely parallels that of the dominant wind direction.

It is likely that wind processes superimposed on tidal effects have played the dominant role in shaping the original development of the lagoon. Radiocarbon dating of the white mussel, *Donax serra*, in the prominent beach ridge about 4km west of the lagoon indicates an age of at least 3,000 years indicating that the ridge is therefore at least 3,000 years old.

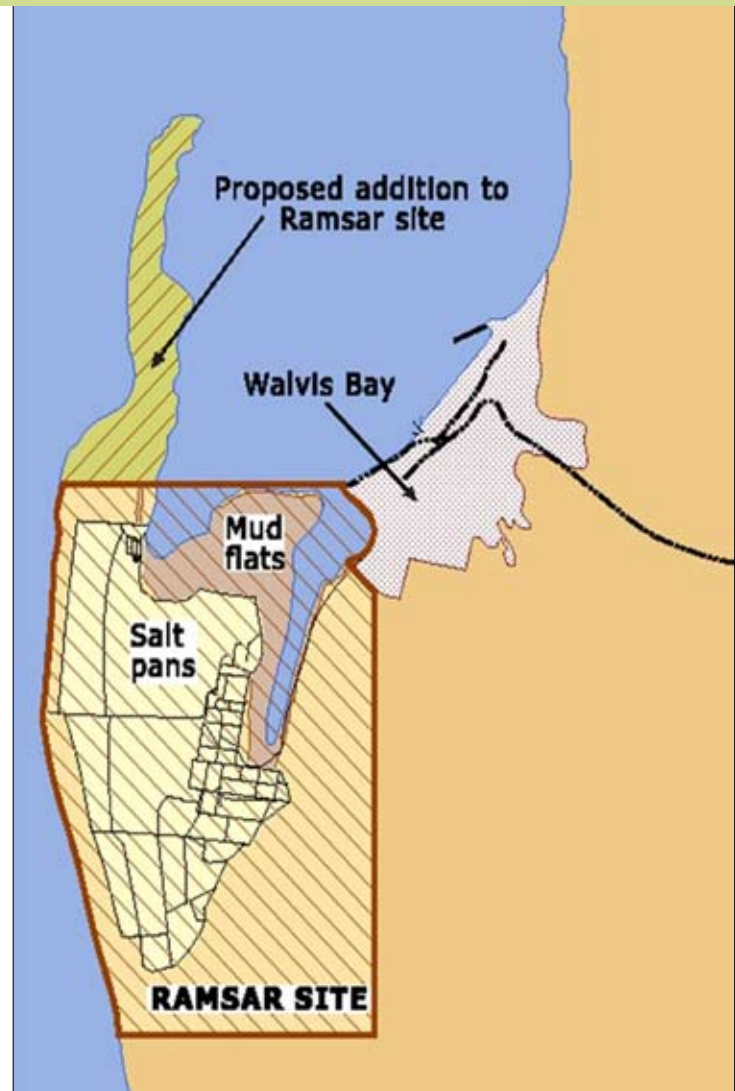
The zone encompasses the coastal area extending from the north-west point

of the lagoon west, along the northern boundary of the salt works concession, and northward along the beach ridge of the Pelican Point peninsula to the southern boundary of Pelican Point. An arbitrary north-eastern boundary has been taken as the straight line connecting the tip of Pelican Point and the southern boundary of the Walvis Bay harbour area at the Yacht Club. This zone is characterised by two main habitats: extensive shallow, sandy shores that are regularly covered and exposed by tidal action and the sub-tidal deeper (up to 5m)

waters of the southern harbour area. Of note is the very narrow section of the peninsula at Donkey Bay where a breach could potentially take place, severing the northern part of the Pelican Point peninsula from the mainland. It is assumed that a breach will be closed within a short time because of the strong sedimentation at that point.

Biodiversity description

The Walvis Bay Lagoon is considered one of the richest and most important wetlands in southern Africa, with approximately 20 bird species



regularly occurring in numbers greater than 1% of their world population. At the same time the Walvis Bay Lagoon is one of very few coastal wetlands in southern Africa, which makes the importance of the area even greater.

Because of its ornithological significance it was designated as a Ramsar site in 1995. The main reason for the richness of - in particular - the bird life is the location of the lagoon at the centre of a nutrient-rich marine upwelling system, driven by the cold Benguela current, which sustains long-shore drift. The nutrient-rich deep-water fertilizes a very high

primary production of phytoplankton, which then fuels the very productive food chain of zooplankton, marine invertebrates, fish and marine mammals. The Walvis Bay Lagoon together with the tidal areas is a key wetland in ecological terms because of its immense importance for coastal biodiversity, in particular birds and cetaceans. Because of its shallowness and its dynamic nature its temperature and salinity differ in different parts of the lagoon and at different times. Bay water is found at the mouth but within the lagoon heating and evaporation produce extremes of up to 30°C and 46 parts per thousand salinity in the southern tip. The salinity level is lower at the mouth of the lagoon than at the southern end as it is unable to flush itself due to siltation.

Similarly, coarse and medium sand fractions are found near the mouth, while finer sediments with substantial levels of clay and organic mud are found in the central and southern reaches. Progressive siltation has increased the inter-tidal flats and decreased sub-tidal areas, affecting the population composition in the various parts of the lagoon. The high production of phytoplankton in the Walvis Bay Lagoon is based upon nutrients generated as well as imported into the lagoon. Zooplankton in the lagoon find a plentiful food supply from the phytoplankton, detritus and bacteria in the water and are encouraged by high nutrient levels, warm temperatures and calm water. The soft-bottom fauna (*benthic*

fauna) is abundant and provides food for the bird and fish populations. Inflow of seawater imports plankton, krill and young stages of fish and invertebrates. A few salt and sand tolerant plant species are scattered on the inland side of the peninsula.

The larger invertebrate fauna is typical of the Southern African west coast with a high density but low diversity. No rare or endangered species have been identified, although the status of a new species of bivalve found in the lagoon is unknown. Distribution within the lagoon is determined by habitat variation and variations in oxygen levels within the lagoon. Crowned crabs are abundant at the mouth. High densities of bivalves and tubeworms are supported at the mouth and northern reaches of the lagoon.

The middle sub-tidal reaches support the greatest species diversity and density of invertebrates. The southern third of the lagoon is nearly devoid of bottom-dwelling invertebrates, presumably because of anoxia. The inter-tidal flats support a limited fauna of invertebrates, dominated by small polychaete worms.

Coastal fish species are said to have been caught in great numbers in the lagoon in the past. Presently large schools of small mullet and springer and some skates and rays are found. Bottle-nosed Dolphins (*Tursiops truncatus*) and whales frequently enter the lagoon but can be stranded by the outgoing tide.



4. ECOLOGY



More than 50 species of birds, including the Greater and Lesser Flamingo, sea gulls, the Chestnut-banded Plover, Damara terns, pelicans and cormorants depend on the Walvis Bay Lagoon as feeding grounds.

Black-backed Jackals (*Canis mesomelas*) patrol the beaches of the lagoon and Brown Hyaenas (*Parahyaena brunnea*) were probably regular visitors until recently.

The birds of the Walvis Bay Lagoon come from three areas. Palearctic migrants breed in the northern hemisphere from May to August, then migrate south and spend most of September to April in southern Africa. Young birds may remain in Africa for their first year. The Walvis Bay Ramsar Site supports up to 250 000 birds at peak times during the summer season. Intra-African migrants, including Greater and Lesser Flamingos, breed elsewhere in Africa but feed in the Walvis Bay wetlands, and may be seen throughout the year and particularly during the winter months.

However, many Intra-African migrants, although not the flamingos, breed at Walvis Bay when rains fail elsewhere. Resident wetland birds breed along the Namib coast and are present all year long. Pelicans and the very localized Damara Terns are the best known examples of resident birds.

Socio-economic factors

Wetlands account for a wide variety of habitat types including rivers, shallow coastal waters and coral reefs. The Ramsar Convention provides a very broad framework of wetland habitat types including marine/coastal wetlands, inland wetlands and human-made wetlands. Wetlands are highly fertile and productive natural systems, which support many forms of life. They are important to man because of their economic value, ecological importance, aesthetic appeal, rich animal life and recreational possibilities.

Birds are the primary concern and interest in the Walvis Bay Lagoon and the surrounding areas. The bird fauna has great conservation value, locally and internationally, as well as economic value as it draws tourists and bird watchers, and evocative value as it helps to define the identity of Walvis Bay. The Lagoon is one of the best flamingo viewing localities in the world, yet to date it is under-used and under-valued as a tourist attraction.

People use the Walvis Bay Lagoon, directly and indirectly, for a number

of purposes. Archaeological evidence indicates that people have used the lagoon as a source of shellfish and other marine products for a long period. When Walvis Bay was permanently settled in the nineteenth century, the lagoon area was largely ignored. In the past two decades, however, the area has become a focus for residential and tourism development. Permanent residences, holiday accommodation and hotels have been built or are planned.

Tourism in Walvis Bay has focused on the lagoon and other nearby wetlands because of the abundant and conspicuous bird life. This development has been supported by organised tour operators with some publicity and infrastructural support from the WBM. A walkway along the lagoon and an information centre, established by Round Table, are widely used by residents and tourists alike.

Recreational use of the lagoon has also increased during the past 20 years. Wind surfing, kayaking, swimming and use of a variety of small boats takes place in the lagoon, sometimes extending to the Outer Lagoon area as well. Motorised craft are presently accorded limited access to the lagoon, but only for fishing competitions. Because of trouble in controlling the traffic of motorised craft it is proposed to enforce a

Did you know?

- ▲ The Namibian coastline is about 1.500 km long classified as hyper arid desert.
- ▲ Around 1,6 million birds belonging to 73 species regularly occur along the Namibian Coast.
- ▲ The coastline from Swakopmund to Walvis Bay has up to 770 birds per km of beach.
- ▲ 25 species of cetaceans & 493 species of fish occur off Namibian waters.
- ▲ Around 552,000 tons of fish was harvested in 2005.
- ▲ 3 coastal wetlands are under the International Ramsar Convention.
- ▲ Over 600 000 tourists in 2007 and 1 million expected in 2008.

Adapted from www.nacoma.org.na

ban on all such craft within this zone. The Inner Lagoon is the most sensitive area in all of the WBNR for both wetland and shorebirds, and all efforts should be made to preserve the avifauna in this area.

Angling, from small craft or from the beach, is a major form of recreation throughout the coastal reaches of the Walvis Bay area. Use of the beaches for sunbathing and similar pursuits is mainly limited to the summer holiday period.

With the construction of a raised road along the eastern and southern sides of the lagoon, access to Sandwich Harbour to the south, Paaltjies on the

coast to the west and the salt works has been greatly enhanced. Heavy traffic from the salt works consists of large, articulated lorries regularly hauling salt to the harbour for export. These lorries pass daily along the edge of the lagoon in front of the residential area.

This road represents the beginning of the route to Sandwich Harbour, which requires the use of off-road vehicles (ORVs), but is of such a standard that ordinary cars can reach Paaltjies for coastal angling. Construction of this road effectively truncated the southern lagoon and prevented seasonal inundation toward the south and east. About 30 years ago culverts were constructed under the road toward the east to allow water to flood this area, in an attempt to control the windblown sand and to re-establish the dynamic lagoon-dune interface at this point.

Concessions for aquaculture in the form of oyster rafts have been granted within the salt works area during the past decade. This development will be located toward the northern part of the peninsula within this zone. Except for the diesel-powered pumping system

providing water for the evaporation ponds of the salt works, its visible physical presence and the infrequent harvesting and inspection activities, the oyster culture poses no threat to the lagoon environment. Oyster production in Walvis Bay has been a financial success, and extensions of this activity are expected.

Biodiversity threats and management

As a staging and wintering area for up to a quarter of a million birds, the preservation of the area and its ecosystem is paramount. However, sedimentation of the lagoon became a cause for concern in the 1970's as there were indications that the lagoon could be silting up. The WB LA21 Project's Coastal Area Study conducted an intensive study and showed that siltation of the Lagoon is taking place, but at a very slow rate. The main source is wind blown sand and dust, with very small and infrequent contributions from the bay and floods in the Kuisseb River.

Following sedimentation, pollution from activities in the Walvis Bay harbour has the largest impact on the functioning of the Walvis Bay Lagoon.



4. ECOLOGY

Pollutants affecting the water column have been identified as petroleum products, fish processing waste, ore dust, cargo packaging waste, heavy metal waste, toxic waste, galley waste and dredged material. In contrast to the severe effects of water-borne pollutants, air and ground pollutants originating in the harbour have a relatively small impact on the lagoon. Similarly the organic load produced from the fish factory outfalls in the harbour leads to accumulation and decomposition of organic matter on the bottom, which, in turn, causes sulphur eruptions. These eruptions are more common in summer than in winter and may kill fish in the harbour and lagoon, turning the water a variety of colours and producing an unpleasant sulphurous smell.

In addition to the reduction in total area of the lagoon caused by surrounding development, the Walvis Bay Lagoon is directly and indirectly affected by a variety of influences originating in the surrounding area. Currents entering and flowing from the lagoon carry sediments that are deposited, mainly at the mouth of the lagoon. The water-borne sediment

load has apparently been augmented by dredging in the harbour. Wind-blown sand is the other major source of sedimentary input into the lagoon. The prevailing south-westerly winds drive sand northwards onto barchanoid dunes which flank the eastern side of the lagoon.

In summer, sands from these dunes enter the lagoon between Lover's Hill and the Meersig urban housing development. In winter, large quantities of sand and dust are blown from these dunes into the lagoon along the entire eastern shore. Attempts have been made to stabilise these dunes by the Directorate of Forestry and the WBM. With the entire Namib Sand Sea as a source immediately to the south, stabilisation of the sands north of the Kuiseb River without removal of the accumulated sand can only remain a temporary measure.

The salt works lying south and west of the lagoon have served to reduce input of wind-blown sediments originating on the coastal beaches. At the same time, these salt works may be responsible for the degradation of the dune vegetation to the south and east of the lagoon, freeing dune sand to move more rapidly northward along the eastern lagoon shore until a new

equilibrium is established. Various areas surrounding the lagoon boost animal life in the lagoon. Birds travel back and forth between the Inner Lagoon, the Outer Lagoon, the salt works and the coastal zone. Of particular note is the salt works where the evaporation ponds serve as an extension of feeding grounds for many of the birds using the lagoon itself. Marine mammals and fish that frequent the lagoon must enter via the Outer Lagoon and the harbour.

People have frequented the edge of the lagoon for centuries as evidenced by the abundance of kitchen middens and other archaeological sites in the area (see sections on the Kuiseb Delta and Kuiseb River). Today urban dwellers, tourists and recreation seekers use the lagoon in a variety of ways.

Pollution, generated mainly in the harbour area, is perhaps the single most important human impact influencing the well being and functioning of the lagoon. Second in ranking of human impacts comes disturbance to the bird fauna stemming from the traffic in the lagoon, in particular from motorboats and windsurfers. The CAAP and the Walvis Bay Nature Reserve Management and Operational Plans make provision and guide the management of all the threats (siltation, development, pollution, disturbance and recreational activities) identified for this zone.



An aerial view from the mouth of the Walvis Bay Lagoon.

Zone 2: Pelican Point

Location and extent of the zone

The seven km long peninsula (max. altitude approx. 4 m above MSL) sandy strip separating the Atlantic ocean to the west from the lagoon, the salt works, the harbour and urban development in the north and eastern, and extending to Donkey Bay southwards including Paaltjies, to the Namib-Naukluft Park (Walvis Bay municipal boundary).

Biodiversity description

The Pelican Point peninsula separates the dynamic waves of the Benguela current to the west from the sheltered harbour waters, thus providing protection to the harbour. The sea floor slopes steeply westward into the Atlantic. This wind-exposed sand spit serves as a source of sand for the beach north of Walvis Bay. The peninsula is growing in a north-easterly direction at an average rate of about 20 m per annum, while the opposite mainland coast is beginning to grow southwards towards Pelican Point. There is no vegetation on Pelican Point whereas Paaltjies is very sparsely vegetated with *Salsola* shrubs.

This area's beach supports sandy shore animals such as sand hoppers and white mussels as well as many terrestrial insects, especially flies that are attracted by the debris on the shore. Other mammals include Black-backed Jackals (*Canis mesomelas*) and a non-breeding colony of Cape fur seals (*Arctocephalus pusillus*),

normally numbering some 5,000, but sometimes expanding to a significantly larger number.

Heavyside's Dolphins and Common Dolphins frequent the surrounding waters. Numerous terns roost on the point and nests of Whitefronted (*Charadrius marginatus*) and Chestnut-banded (*Charadrius pallidus*)

plovers are found here. Other birds such as African Black Oystercatcher (*Haematopus moquini*), Eurasian Curlew (*Numenius arquata*), and both Lesser Flamingos (*Phoenicopterus minor*) and Greater Flamingos (*Phoenicopterus ruber*) may be seen here. The bird count in our summer months at Pelican Point average out at 15,000 birds. White mussels and other organisms occur in the sand of the surf zone. Jackals patrol the area and Damara Terns nest on the elevated parts. A rich bird fauna, including the rare African Black Oystercatcher, feeds and roosts in the lagoon area and along the coast.

Socio-economic factors

Apart from hosting the lighthouse and service building for Namport, the Pelican Point peninsula protects the socio-economically important harbour from the waves of the Benguela current. This zone is a tourism key point because of herds of seals and roosting shorebirds, Heavyside Dolphins and scenic



Pelican Point-Cape fur seals colony

views. In addition it is also the destination for local residents, visitors and tourists for surf and shore-angling during December-February as well as picnickers who visit the area with both regular vehicles and ORVs. Paaltjies forms a passage for tourists travelling with ORVs to Sandwich Bay. Unfortunately no exact economic benefit can be attached to the above mentioned activities.

Biodiversity threats and management

Naturally, this zone is dominated by a long, sandy beach, exposed to strong wind- and wave-action of the Benguela current. Sand is trapped by the peninsula and remobilised by wind into the harbour and lagoon. Wave action moves some 2 million m³ of sand per annum. Of note is the very narrow section of the peninsula at Donkey Bay where a breach could potentially take place, severing the northern part of the Pelican Point peninsula from the mainland.

4. ECOLOGY

It is assumed that a breach will be closed within a short time because of the strong sedimentation at that point. South of Donkey Bay, the coast is growing westwards at a rate of 5-10m/yr.

The disturbance to the seals and birds from visitors to Pelican Point from land and sea poses a threat to the ecology. Although abiding to a “Code of Conduct drawn up by CETN, MFMR and MTAN, motorboats bringing visitors close to the seals and the birds posed an almost permanent disturbance factor, even if most of the boats stay outside the critical distance relative to the seals and the birds. Also non-motorized vessels such as kayaks and canoes frequent the shores of Pelican Point.

From land the area is accessible only by ORVs, but these vehicles are able to drive all around the spit and thus constitute a significant disturbance factor, should they not keep a certain distance from the seals and birds. Protection of the seals and birds from

disturbances therefore requires that all traffic must keep a distance of 50 m from seals and roosting flocks of birds. Joint efforts, by Namport, CETN and MTAN, have been made over the past thirty years to limit access to the point by means of signposts. Although only pedestrians are allowed to traverse the area, as indicated by a sign at the end of the track, visitors frequently drive their ORVs further to the tip, thereby churning up the sand, increasing wind erosion, and damaging bird nests. ORVs often drive across the surf zone at low tide and may thereby damage the white mussel population, which furthermore has to cope with human exploitation. ORV traffic on the beach may also frighten away some coastal fish.

Wind-blown plastic (particularly plastic bait bags) and discarded fish lines pose a threat to seabirds and marine life (seals, turtles etc.) that mistake plastic for foods and ingest it causing harm and even death. Fish lines could cause entanglement of seabirds. Litter detracts from the area’s natural beauty and could negatively affect eco-tourism. Besides litter from visitors, oil and debris from offshore vessels also pollute the point. Namport is responsible for the harbour/bay oil

spill contingency plan, which makes provision for oil to be cleaned from this area at all times. In case of a minor oil spill in the area south of the peninsula, the Namport Contingency Plan recommends that the oil be left to natural cleaning unless heavy deposits pollute the recreational facilities and the ecology.

It is thus evident that the protection of seals and seabirds; preservation of natural sand spit dynamics; restricted access conservation; motorised vehicles prohibition; controlling shore angling permits; provision of information about key features and the vulnerability of the area; support to and further development of eco-tourism opportunities; preservation of roosting shorebirds by means of information; provision of more opportunities for supporting mixed recreation; angling from coastline, mainly between November and April; disturbances because of recreational and tourism activities from land and from sea; litter and debris from visitors, etc. – all require proper planning and management.

Zone 3: The Walvis Bay Harbour

Location and extent of the zone

This zone is located north and east of the Outer Lagoon zone, bounded on the west and north by the limits of Namport jurisdiction, and on the east by the shore and factories of Walvis Bay. Pelican Point falls within the territory of Namport but is treated



The Pelican Point Lighthouse can be seen in the background.



The Port of Walvis Bay is Namibia's biggest port.



here as a zone in itself because of its unique biodiversity character.

Biodiversity description

The harbour area is protected from the brunt of the south-westerly winds and currents by the Pelican Point peninsula. The tidal range is as great as 2 metres during spring tides. The harbour has a soft substrate/mud sediment bottom with depths up to 15 metres. Encompassed within this area in the north-eastern corner is an artificial guano platform for nesting birds from which the guano is harvested annually. The nutrient-rich waters of the Benguela system support rich plankton and fish populations along the coast and extend into the harbour and Lagoon. Associated with this are organic mud deposits that cause toxic sulphur eruptions, most frequently in the summer months.

The harbour wall offers rare surfaces for the attachment of indigenous sessile marine animals such as mussels, barnacles, tube worms, sea squirts and lace-animals. However,

pollution from fish factory effluent within the harbour is thought to have reduced marine invertebrate biodiversity significantly. A high variety of marine mammals recorded in Namibian waters, especially the dolphins, can be found within this zone. Resident sea birds include numerous Cape Cormorants (*Phalacrocorax capensis*) and gulls. In general the harbour has limited ecological value for the WBBR.

Socio-economic factors

The first use of Walvis Bay as a harbour dates back to the late 18th century, though today there are no remains of historical harbour elements. However the Walvis Bay Harbour is the most important import/export harbour on Namibia's extensive coast, also serving countries north and east of Namibia, and thereby contributing in putting Walvis Bay on the world map. It is thus no wonder that this harbour is of outstanding socio-economic importance for the Walvis Bay community due to substantial and diverse commercial harbour operations, resulting in a

large number of jobs.

Biodiversity threats and management

The Namport authorities and all the associated harbour businesses and fish processing plants activities are potentially damaging to the environment. The main negative effects of harbour dredging activities include the smothering of sea floor habitat by settling sediments and the release of contaminants. Release of heavy metals, emanating mainly from the synchrolift activities, can have serious cumulative negative impacts on marine ecosystems and can also affect humans. The release of hydrogen sulphide, mainly as a result of fish processing effluent, can cause varying degrees of anoxia resulting in the mortality of marine organisms. The environmental effects of specific dredging plans should always be subject to an EIA prior to the start of the dredging activities. Namport does have an oil spill contingency plan in place but this has not been structured to ensure maximum protection to the Lagoon system.

4. ECOLOGY

It is of high priority to ensure a revision of the oil spill contingency plan. Namport is ISO 14000 compliant and the city's sources of pollution to the bay as well as appropriate management actions are well documented in the CAAP as part of the WB LA21 Project. All stakeholders i.e. the Namport authorities, all the associated harbour businesses and fish processing plants have a legal and moral responsibility not to endanger the city's biodiversity and more specifically the Walvis Bay Lagoon (WBL) as part of the international conservation obligations given by the designation as a Ramsar Site.

Zone 4: The Salt Works

Location and extent of the zone

The Walvis Bay salt field operation is situated centrally on the west coast of Namibia, nine (9) kilometres south from the port of Walvis Bay with a mining grant area of approximately 160 km².

Biodiversity description

Birds like to feed in the shallow

pans because of the steady artificial influx of particles and nutrient-rich water, which in turn fuel the benthic and pelagic food-chain. The salt pans support up to half of the total number of birds in the lagoon area. The most numerous species are lesser and greater flamingos, with sometimes more than 40,000 individuals. The largest number of rare Chestnut-banded Sandplovers (*Charadrius pallidus*) is also found within the salt pans and ponds. The pans further support 40% of the African sub-species of Black-necked Grebe (*Podiceps nigricollis*).

The pans are also good habitat for rarer waterbirds such as the Red-necked Phalarope (*Phalaropus lobatus*), Common Redshank (*Tringa totanus*), Eurasian Curlew (*Numenius arquata*), Bairds Sandpiper (*Calidris bairdii*) and many others.

Plankton species include several species of the salt-tolerant unicellular green algae such as *Dunaliella* species; *Rhodobacteria* and *Halobacteria* (which produces the dark reddish colour of the brine

water) are common residents of the evaporation ponds. In addition a variety of cyano-bacteria (blue green algae) such as *Anabeana*, *Microcystis*; and the brine shrimp (*Artemia*) are also found in the salt pans. B-carotene originally from *Dunaliella* and passed on to brine shrimp, who feed on *Dunaliella*, is responsible for the pink pigment in flamingos. The red colour from the *Halobacteria* is important in the operation of the ponds as more colour in the water increases the heat absorption of sunlight, increasing the temperature of the water and also the evaporation rate. In addition the red colour from the *Halobacteria* is found in the blue green algae on which both the Lesser and Greater Flamingos feed and this is what gives the colour to the flamingos.

The maintenance of the physical structure of the salt pans currently facilitates the continued existence of benthic and planktonic animals and plants and the birds that feed on them.

Socio-economic factors

Walvis Bay Salt Refiners was established in 1964 and is one of the largest solar evaporation facilities in Africa. It is a Namibian registered Company and wholly owned by Chlor-Alkali Holdings. It operates in an area that is 4,500 hectares. Thirty million tonnes of seawater is processed per year to produce about 650,000 metric tonnes of high quality salt per annum. At the beginning of 2005 the company commissioned an



Walvis Bay Salt Refiners produces about 650,000 metric tonnes of salt per annum



automated bagging plant at a cost of N\$8.5 million. The company now employs 120 permanent employees. In addition to direct salaries and other benefits that are paid to these employees, the company also contributes indirectly in the form of tax paid by the company and employees, assistance to the local schools and other institutions, educational assistance to the children of all its employees etc. The salt works have plans to expand with more pans in a south-westerly direction in the foreseeable future, according to prospects provided by the concession. In addition, the enterprise also encompasses an oyster culture operation.

Biodiversity threats and management

The company operates within an area designated for protected status (as a nature reserve) and forms an important element in the conservation of birdlife. The salt works have profoundly changed the ecology of the lagoon area because of the extensive land reclamation and the physical barriers to the tidal dynamics. On one hand this development has meant a marked reduction in the extent of the natural lagoon ecosystem, but on the other hand the salt basins have created a whole new range of shallow-water and highly productive lakes, which attract a number of habitat-specific bird species, notably the flamingos. Equally the salt works trap wind-blown sand from the southern dune field, thereby reducing the

sedimentation rate of the lagoon.

From the point of view of nature conservation the salt works area as a 'constructed wetland' will be regarded as less valuable, because it has ousted the natural lagoon ecosystem. It does not possess the natural physical and ecological dynamics as the lagoon, and it may indeed have negative impacts on the surroundings because of leaking brine. If the walls of ponds adjacent to the lagoon were breached by accident, marine organisms caught in the affected zone of hyper-salinity would undergo osmotic shock and this could result in large-scale mortalities, particularly of sessile invertebrates.

The more concentrated the brine, the higher the shock. In mitigation, no chemicals are added during the evaporation process and water (dilute brine) used to wash the salt is reused in the production process. In addition, the vast majority of the pans are well dyked and/or separated from the lagoon by raised roads – greatly reducing the risk of concentrated brine entering the lagoon. The importance to some species of birds that it attracts is unquestionable.

Numerous *Salsola* and other shrubs immediately south-east of the salt works are dying. The cause of this is likely to be a combination of water

extraction further inland leading to an influx of saline water from the sea and salt evaporation activity adjacent to this area. The Walvis Bay Salt Refiners plan to mitigate their potential negative contribution to this phenomenon by digging a shallow canal between the salt pans and the edge of the Kuiseb Delta, collecting brine seepage to be pumped back into the adjacent evaporation pans (Stanton, pers. comm.). The northern pans near the intake are very rich in marine plankton, but this declines and changes in composition with increasing salinity.

There is no human use of the pans besides pan maintenance and removal of the end product. The water intake draws many fish into these interconnected pre-evaporation pans. These fish form captive food for the pelicans, herons terns, etc. The access road to the salt works is a major feature that cuts off the southern edge of the lagoon and reduces tidal action south of this point, despite culverts. Walvis Bay Salt Refiners are busy with the implementation of an EMS following the ISO 14000 standards. The salt refinery also serves on the Coastal Area Action Plan Steering Committee (CAAPSC) as per the CAAP guidance.

4. ECOLOGY



The Kuiseb river in flood; a rare sight in this harsh environment.

The Kuiseb Delta

For the purpose of the WBBR the Kuiseb River Delta is divided into two biodiversity zones namely: (1) The Kuiseb River and Kuiseb Delta and (2) The desert and dunes areas around the Kuiseb River.

Zone 1: The Kuiseb River and Kuiseb Delta

Location and extent of the zone

The zone comprises the Kuiseb River and Kuiseb Delta, but excluding the salt works concession area. The Kuiseb River and Kuiseb Delta are situated south of the salt works and east of Paaltjies and cover the south-east corner of the Walvis Bay district. The zone extends from Paaltjies, across Dorob, then along the northern boundary of the Namib-Naukluft Park and across the Kuiseb Delta to the lagoon.

Biodiversity description

This zone encompasses part of a dune field, sand flats, gravel plains and delta areas of the ephemeral

Kuiseb River. There is considerable movement of sand over the entire area, especially in the western section, where large dunes migrate at 1-6m per year. Wind erosion also causes extensive flaking of solidified silt plates in the Kuiseb pans. This area is a major source of sediments moving into the lagoon.

Within the Kuiseb Delta and River a low number of plant species occur which are adapted to very dry conditions. The vegetation includes *Salsola* shrubs in the west, dune grass, the dune succulent shrub, *Trianthena hereroensis*, !Nara (*Acanthosicyos horridas*), riparian vegetation of camelthorn (*Acacia erioloba*), anaboom (*Faidherbia albida*), wild ebony (*Euclea pseudebenus*) and tamarisk (*Tamarix usneoides*) trees in the Kuiseb, and reeds near Wortel. Alien invasive vegetation such as *Ricinus* species, *Datura* species, *Nicotiana* species (all poisonous) and *Prosopis* species is established along the river channel. These plants are spreading, possibly replacing some indigenous vegetation. A diversity of lichens is found on some of the

trees and on the stones of the gravel plains. Mammals include jackals, a few springbok, and domestic dogs, goats and donkeys. There are more than 220 archaeological middens in the lower Kuiseb Delta area, many of which are known to be at least 1,000 years old. This ephemeral river delta thus serves as a habitat for highly specialised flora and fauna, with an occurrence of a number of endemic species, including the Namibian endemic Dune Lark.

Socio-economic factors

This zone has a number of cultural and socio-economic features, the most prominent of which is the presence of the small, indigenous Topnaar community totalling approximately 400 people. Archaeological evidence indicates that people have used the lagoon as a source of shellfish and other marine products for a long period of time, as evidenced by the abundance of kitchen middens and other archaeological sites found in particular in the Kuiseb Delta and Kuiseb River.

The residents of this zone are found at small villages near Rooibank and upstream to Ururas. The Topnaars are important (but not exclusive) users of natural resources, including !Nara fruit, firewood (camelthorn) and fodder for their goats and donkeys (browsing, seed pods, !Nara plants). Traditional subsistence farming combined with eco-tourism would allow for the sustainable use of these natural resources. Responsibility for

the environmental conditions of the Kuiseb Delta, which in turn affect the lagoon, rests with a much larger human population encompassing the entire river catchment.

This zone also serves as a tourism key point for tour guides (including Topnaars) as a result of the several archaeological sites; the numerous 500+ year old middens; the Topnaar graves; and the river silts bearing historical elephant tracks. It is one of only two Topnaar strongholds in Namibia, making this an area of outstanding cultural-historical importance.

Biodiversity threats and management

Invasive alien vegetation, such as Ricinus, Datura and Nicotiana and Prosopis, are established along the river channel. The total number of these plants is increasing, possibly replacing some indigenous vegetation. Another disturbing trend is the increasing loss of vegetation and the subsequent degradation of soils in this region. Desertification in river valleys is believed to be due to overgrazing and over-abstraction of ground water supplies, as well as deforestation and soil compaction in upper catchments resulting from human settlements and excessive numbers of livestock. These factors are causing rapidly increasing rates of soil erosion and decreased groundwater recharge. The fragile nature of soils in the area makes them highly susceptible to the impacts of off-road vehicles. Soils

with gypsum crusting are often very old, and represent a very stable base for the growth of plants. The effects of off-road vehicles are therefore not only unsightly but also have ecological implications.

The Kuiseb River flows into the delta one or more times a decade with an average annual volume of 4.3 million m³. In the past 160 years, the river has reached the sea only 15 times. The delta used to have two river channels, a northern one running past Narraville and Kuisebmond, and a southern one that occasionally flushed through the lagoon or through the Salt Flats south of it. A flood diversion wall established in 1962 now cuts off the northern river channel, which no longer flushes out accumulated sediments and causes a reduction in the groundwater replenishment of the northern delta. This has probably contributed to the reduction of the woody vegetation in the delta, including the large !Nara fields. The Topnaars still practise traditional harvesting of the !Nara in the southern delta, despite the reduction in fruit production even in this area. The southern arm of the Kuiseb River channel is currently blocked by a large barrier dune, which could break open onto the salt flats or salt works.

Namibia's national water supplier (NamWater) is extracting large quantities of groundwater, especially from the Kuiseb aquifers. A network of pipelines, reservoirs and roads runs through the Delta.



An aerial view of the Kuiseb River dividing the gravel plains from the dunes.



The desert winds have no mercy with old Topnaar graves.

A Silver-back Jackal



4. ECOLOGY

The balance between water extraction and recharge is being monitored very closely in terms of the Water Resources Management Act 24 of 2004 by the Kuseb Basin Management Committee (KBMC). Excessive extraction from the Kuseb aquifer could allow a saline wedge to migrate landwards and reduce the quality of the groundwater. An increase in salinity may be a cause of the general decline of vegetation, thus exposing more sand to wind and accelerating erosion, leading to a likely desertification process. In order to minimise the negative effect of the flood wall across the delta, consideration should be given to establishing a sluice-gate in the dam for allowing controlled flooding of the areas west of the wall during flood periods of the Kuseb River. This may counter some of the negative effects on the vegetation in the delta and it may improve the recharging of the aquifers.

Another threat is the tour operators' vehicles that cross the delta at various places, including Rooibank, Dorob and the salt flats. In general private ORVs constitute a heavy disturbance in the delta, sand flats and dune areas. Vehicular traffic destabilises the surfaces on the gravel plains which, in turn, enhances wind erosion and disturbs soil surface properties for a long period of time. Tracks leave an unsightly impression and encourage others to follow tracks already made. As a result the sites are being irreparably damaged and artefacts permanently lost.

More recent Topnaar graves can also be found, while the river silts bear well-preserved elephant tracks that are sensitive to disturbance.

There is presently no management or active protection of these valuable heritage sites. The draft WBNR management and operational plans aim at addressing the above mentioned threats.

Zone 2: The Desert and dunes areas around Kuseb River

Location and extent of the zone

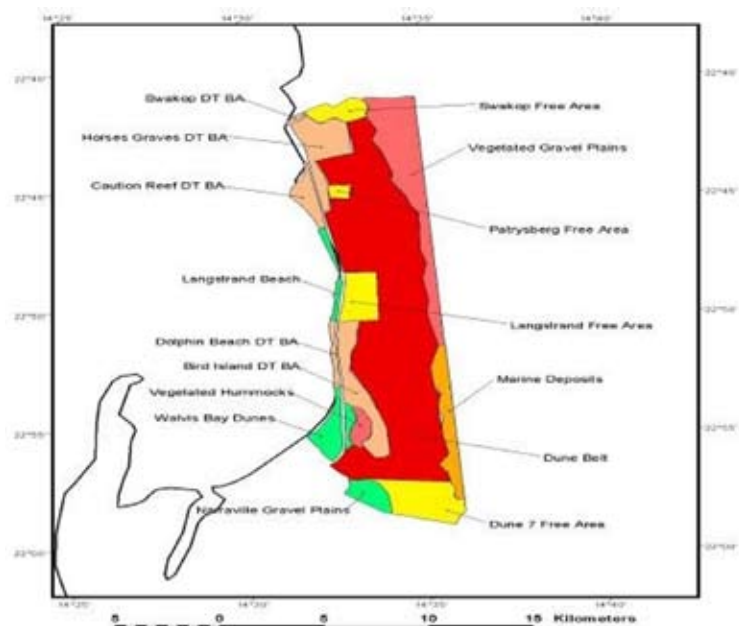
The zone includes the sand dune and gravel plain areas north, east and south of the Kuseb River and Kuseb Delta, to the eastern and north-eastern boundaries of the envisaged WBNR, and bordering the Namib-Naukluft Park.

Biodiversity description

The dunes and gravel plains between Walvis Bay and the Kuseb River, and south of the Kuseb River include a

variety of desert landscapes. Most prominent are the various types of sand dunes, which take on mainly crescent-shaped forms. This suite of dunes reflects the energy and uni-directional south-southwest wind regime of the central Namib coast. The crescentic dunes move northward at a rate of 10-20 m a year.

The sand dunes support unique and well-adapted fauna and flora communities. The Namib Desert is particularly well known for its diversity of endemic invertebrate species, most of which are substrate-specific. Tenebrionid beetles living on sandy or rocky substrates are the best known group, with a number of unique adaptations to the desert environment. At least one endemic species is restricted to the dunes in this zone (and further towards Swakop River). Other fog-basking and fog-collecting species of beetles and reptiles are not uncommon.



The gravel plains are less spectacular but constitute a natural part of the desert landscape around Walvis Bay as the windswept part of the desert. The gravel plains are rich in stones and minerals of a very high diversity. A visit to these areas leaves a lasting impression because of the variety of the colours, shapes and textures of the stones and minerals found on the gravel plains. The gravel plains form an extremely sensitive desert pavement, which is easily scarred by inappropriate human activities.

Socio-economic factors

The dunes have a high tourism potential as a large landscape with a great sense of wilderness and open space, and can thus be considered as a secondary (Lagoon being the primary) tourism site. There is a potential of much higher value when dunes and gravel plains gradually return to a more pristine state with reduced human impact and disturbance. The cultural and socio-economic values of this zone are not known and require research.

Biodiversity threats and management

The integrity of this area is threatened by two types of activities namely mining (and other forms for extraction of stones, minerals and sand) and uncontrolled traffic with ORVs. The mining and related activities are currently allowed on the basis of the issuing of lease-holds by the Ministry of Mines and Energy, with limited consultation of local authorities. The effect of the disturbance is a significant impact on the visual appearance of the desert landscape, which leaves the visitor with the impression of an industrial landscape rather than a desert landscape that is a part of a nature reserve.

The ORV traffic destabilises the surfaces on the gravel plains which, in turn, enhances wind erosion and disturbs soil surface properties for a long period of time. Tracks remain visible for a very long time span on gravel plains, as the wind does not rehabilitate tracks, as is the case on the sand dunes, where tracks -

depending on the exposure relative to the wind direction - can disappear in a short time. In the sand dunes, which change on a daily basis, tolerance to ORV activity is significantly greater. Traffic must thus be regulated and information campaigns, on good driving behaviour in the dunes and on the plains, are required.

When the areas, as proposed by the WBNR management plan, become designated as a nature reserve it is recommended that a plan is elaborated for a medium term restoration of the abandoned mining sites and borrow pits.

In addition the WBNR management plan aims at addressing issues such as the preservation of dune habitats and gravel plain habitats; the preservation of a unique landscape; establishing tourism sites of importance; the issuing of lease-holds; the restoration of mining sites and borrow pits to restore landscape aesthetics as well as restrictions for ORV traffic; and zoning designated areas for ORVs inside the proposed WBNR.



Dunes of the Namib Desert. The highest dunes in the world are found in the Namibia.

4. ECOLOGY



Namaqua Chameleon (Chamaeleo namaquensis) is found on the gravel plains of the Dune Belt Area. It copes with the extreme weather conditions by changing its colour (darker when cold and lighter when it is hot)

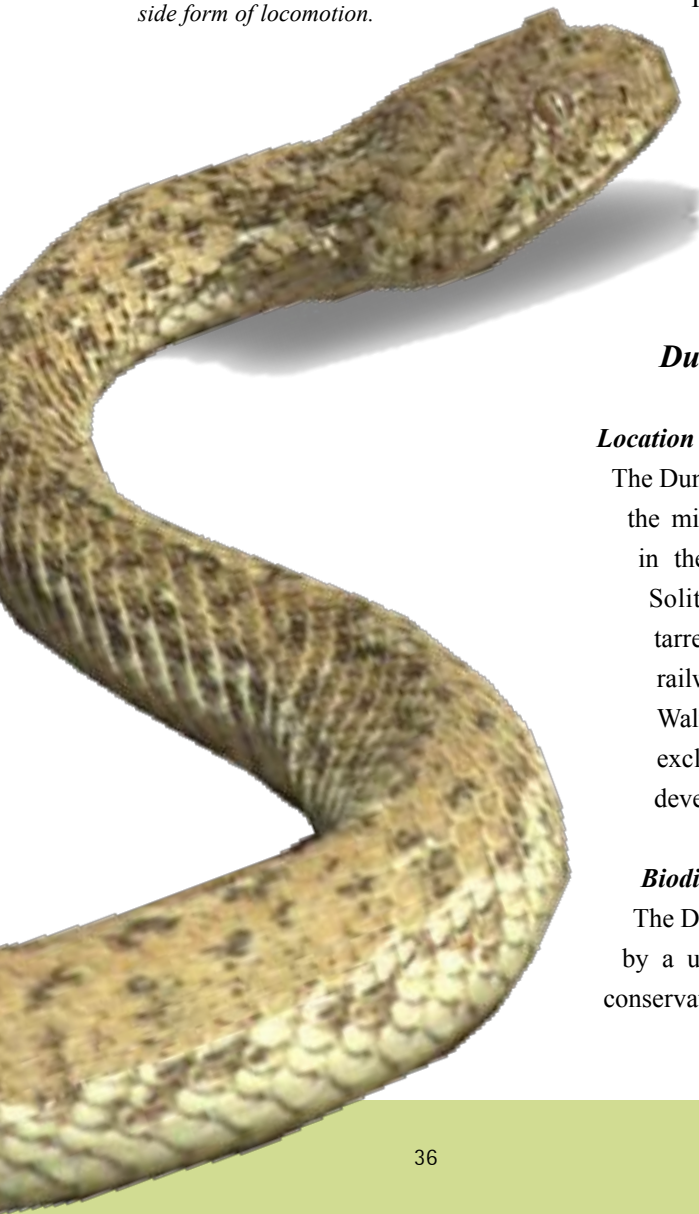


Golden mole (Eremitalpa granti namibensis) is endemic to the Namib Desert and it is virtually blind. It uses waves that move through the soil to locate its prey and predators.



The Fog-basking beetle (Onymacris unguicularis) is known for its fog basking behaviour. During fog basking it straightens out its rear legs and lowers its head. Fog condenses on its body and forms into droplets of water which glides to the mouth parts.

Sand Adder (Bitis peringuey). This sidewinder snake reduces contact with the hot sand by its peculiar side-to-side form of locomotion.



The Dune Belt Area

For the purpose of the WBBR the Dune Belt is divided into two biodiversity zones namely: (1) The Dune Fields and (2) The Gravel Plains.

Zone 1: Dune Fields

Location and extent of the zone

The Dune fields is the area between the middle of the Swakop River in the north, the C14 road to Solitaire in the south, the tarred road in the west and railway line in the east between Walvis Bay and Swakopmund, excluding any approved urban development.

Biodiversity description

The Dune fields are characterized by a unique biodiversity and its conservation is important in view

of Namibia's heritage and sustained tourism potential along the coast. The ability of this area to support a rich and unique biodiversity should not distract from the fundamental fragility of this dune ecosystem which is easily disturbed. Ecologically it is a low energy system because of the lack of water. Perennial plants grow slowly while annual ones can only grow in the years with adequate rain. As a result a long period of time is required for the vegetation of the area to recover from disturbance.

One of the special attractions of the Namib Desert is the very unusual fauna and flora of the dune ecosystem with its wonderful adaptations to this sandy environment. The common vegetation in the dune belt especially along the road between Walvis Bay and Swakopmund is the cushion-like plant, *Trianthema hereroensis*. This succulent is able to absorb fog-water through its leaves as well as soil moisture by way of its roots. *Trianthema hereroensis* is endemic

to the western half- the foggy part- of the Namib Dune sea from the Swakop River southwards. This plant supports a great amount of animal life in the dunes. The seeds are eaten by many beetles, whereas the Oryx and gerbils will forage on the green plant.

The gravel plains within the Dune Belt area are home to a number of hummocks (vegetated mounds of sand that act as sand and detritus traps) which are important shelter for various species of beetles and reptiles. The hummocks are mainly caused by *Arthroerua leubnitziae*, *Zygophyllum* species and *Salsola* species. The area supports a high diversity of Tenebrionid beetles. There are well over 200 species in the Namib, many of which may be found in the dune fields. **Tenebrionids** are abundant, conspicuous and flightless, they serve as indicators of environmental conditions because

their populations integrate several factors, namely, detritus on which they feed, vegetation cover under which they shelter, the moisture and stability of the soil, and the availability of water from fog, and occasional rain, and runoff. Fog basking by *Onymacris unguicularis* and fog trench-building by *Lepidochora* species is well known, as is the fastest running insect in the world *Onymacris plana*. Other detritivores like fish moths are also abundant feeding on detritus made up of seeds and other reproductive parts of the plant and organic material of animal origin. Two endemic rodent species occur in the dune sand namely the **Golden mole** (*Eremitalpa granti namibensis*) and Namib dune gerbil (*Gerbilurus tytonis*).

Damara Terns (*Sterna balaenarum*), (near-threatened, near-endemic seabird) also breed in the dune belt area. Various species of lizards and

snakes occur in the dune fields. The lizards and snakes in this area have largely adapted to the desert environment and some have become famous for their behaviour of licking fog moisture off themselves, sand diving, foot-lifting, and side-winding. The animals responsible for the above mentioned adaptations are the following: the **Palmatogecko** (*Palmatogecko rangei*), the Southern Slipface Lizard (*Meroles anchietae*), and the Southern **Namib Sand Adder** (*Bitis peringueyi*) respectively.

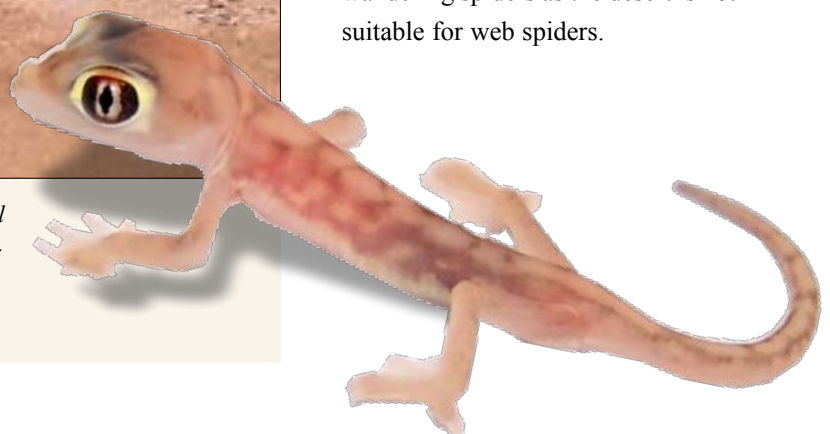
The **Namaqua Chameleon** (*Chamaeleon namaquensis*), the Namib Sand Snake (*Psammophis leightoni* subs. *namibensis*), the Wedge-snouted Skink (*Mabuya acutilabris*), the Slender Blind Legless Skink (*Typhlosaurus braini*), the Wedge Snouted Desert Lizard (*Meroles cuneirostris*), the Small-scaled Desert Lizard (*Meroles microphilodotus*) and the Small-legged Burrowing Skink (*Typhlosaurus brevipes*) found here, also occur on other coastal desert areas of the Namib Desert. Almost all the reptile species on the coast are endemic to Namibia.

13 of the 90 spiders that occur in the Namib are endemic. Most are wandering spiders as the desert is not suitable for web spiders.



TOP: Damara Tern (*Sterna balaenarum*) breeds in the gravel plains along the coast between Walvis Bay and Swakopmund. Namibia is home to 97% of the world population.

RIGHT: Palmatogecko (*Palmatogecko rangei*)



4. ECOLOGY



The Dancing White lady (Carparachne aureoflava). This aggressive spider curls its body in a tight ball and rolls down dunes to escape from predators like wasps.

The White lady or *Leucorchestris* species is well known in the area and many trap doors in the dunes under which these spiders live are destroyed by recreational activities such as ORV driving. The Spoor spider, *Seothyra* species kills its prey by heat shock during the day, it lives in unconsolidated burrows that are easily damaged, often causing its demise, and these spiders could therefore be used as an indicator of environmental disturbance.

Socio-economic factors

The Namib Desert is one of the most scenic deserts in the world and believed also to be the oldest desert. The Dune Belt's natural beauty and having the only high coastal dunes in Namibia that are easily accessible to the public make it immensely popular as a recreation area for residents and visitors. In addition, Swakopmund and Walvis Bay are popular urban centres from where tourists explore this region. Tourism is important for these two coastal towns and creates valuable job opportunities for many in the tourism support services. In recent years the dune fields have become popular for off road vehicles

such as 4x4s, quad bikes and motor bikes. It has also become a popular venue for group dinners and film shoots. A number of high budget Hollywood movies have been filmed in this area in the

last three years providing thousands of jobs to the residents of Walvis Bay and Swakopmund. All these activities make the Dune Belt area an important socio-economic asset for both the Municipality of Walvis Bay and its neighbour Swakopmund.

Biodiversity threats and management

Increased use of the area has resulted in conflicts, arising particularly during peak seasons, in major visual impacts to the aesthetic appeal of the dunes and surrounding gravel plains and also adversely effecting the fauna and flora. A number of impacts of environmental concern have been observed for years. Throughout the year, but specifically during the main holiday season (around the Christmas summer vacations in southern Africa) this area is frequented by holiday makers from Namibia and abroad, especially by South African visitors. Sand boarding, para gliding and sailing, ballooning, and off-road tour adventures are particularly popular leisure time activities practised in this area. It is especially noted that quad biking as a means of transportation,

as a hobby and outdoor adventure have significantly high negative impacts on the easthetics as well as natural environment of the dune belt area. Another problem is caused by small private aeroplanes (scenic flights). These aeroplanes do not adhere to the restriction height and continue to fly lower than 1000m, thus disturbing the animals in the area.

The area is currently managed by various institutions on an ad hoc basis mainly due to unclear institutional roles and mandates. Although under the jurisdiction of the Municipality of Walvis Bay this area is a state land and falls under the Ministry of Lands and Resettlement on behalf of the Namibian government. Note should be taken that the MET is also a key player in the management of this area. However the Municipality of Walvis Bay, the Erongo Regional Council and some individuals have applied for land ownership of the area. Institutionally it is not clear who is responsible for the management and regulation of activities in the area. The Municipality of Walvis Bay and Swakopmund, the Erongo Regional Council and the Ministry of Environment and Tourism have certain political and social responsibilities over this area.

The other management challenge is the lack of legislation. Existing draft regulation, related to the Dune Belt Management Plan, prepared by the Municipality of

Walvis Bay has not been passed to date. An interim committee has been facilitated by the NACOMA project to guide the implementation of short-term management initiatives while waiting for the implementation of a more permanent solution to the management of the area. The committee comprises various stakeholders including local and national government departments. The committee has developed a contingency plan to address immediate impacts emanating from various land use forms. Zoning of the area for specific uses is one of the key strategies employed by the committee to achieve better regulation of activities within the entire dune belt area.

The Municipality of Walvis Bay, in collaboration with all stakeholders

developed a “Management and Monitoring Plan for the Dune Belt Management between Swakopmund and Walvis Bay” in December 2002 as one of the outputs of the WB LA21 Project. Relevant “Dune Belt Regulations” followed but could not be enacted due to a number of unresolved technical issues. NACOMA recommended that the Dune Belt areas be included in the proposed Walvis Bay Nature Reserve area. If this materialises it will improve the sustainable utilisation and management of this special area.

Zone 2: Gravel Plains

Location and extent of the zone

The gravel plains are situated within the dune belt area as described above. But this section also covers the gravel plains extending from the high water mark, elongating into

relatively low lying beach areas, to the gravel plains extending inland towards the Walvis Bay – Swakopmund main road.

Biodiversity description

The *Zygophyllum stapffii*, *Arthroa leubnitziae* and *Salsola nollothensis* communities form hummocks that are very sensitive to disturbance. The root systems are shallow to make use of the fog that drips onto the soil beneath the plants, and they can withstand very saline soil conditions. Naturally occurring flora provides an indication of the present state of the environment; the slow-growing perennials and short lived annuals are extremely fragile. Most of the plants that grow in this zone, but specifically the *Arthroa leubnitziae*, are able to absorb the fog moisture through modified leaves. Gray’s lark (*Ammomanes grayi*), is endemic to the gravel plains.



Known as *Ikharos* in Damara/Nama the *Welwitschia Mirabilis* is found in remote parts of the Namib Desert and Southern Angola. This two-leafed plant can reach a venerable age of between 1000 to 2000 years. It is protected by law.



4. ECOLOGY



Damara Terns (*Sterna balaenarum*) arrive in September and normally start their breeding activity by laying a single egg by the end of that month. A section of the gravel plains area has been fenced off by the MET because it is one of the most important Damara Tern breeding areas along the coast. The commonest large wild mammal is the Black-backed Jackal (*Canis mesomelas*); these animals do not remain permanently in this zone but have their dens east of the B2 main road.

The endangered Brown Hyena rarely visits the area. These two mammals are important scavengers that help clear the beaches of the washed up carcasses of marine organisms. The Cape Hare (*Lepus capensis*) has been observed in the gravel plains near the Swakop River mouth. Other mammals include a number of rodent species. There are 47 species of mammals listed in the dune area and delta of the Swakop and Kuseb Rivers, mostly bats, rodents and carnivores.

Socio-economic factors

The gravel plains form an integral part of the dune fields. It is thus understandable that the same socio-economic issues experienced with the dune fields zone can be associated with this zone.

Biodiversity threats and management

The gravel plains are areas between the dunes that are low lying and flat and presents a harder surface than the constantly shifting dunes. These plains are characterised by sandy soils often associated with crystalline gypsum or salt deposits. These soils have a surface capping scattered with many cobbles and pebbles. The plains supports a number of fog-dependent plants including lichens. If the crust is disturbed it may never recover, providing instead another place for erosion to begin when the rain eventually falls. In areas of the gravel plains where the lichen crusts often constitute the dominant plant growth, any vehicle tracks seemingly last forever.

Gravel plains vegetation is sensitive, vulnerable to damage and takes a long time to recover. Damage as a result of trampling or off-road driving can cause fatal damage to plants with shallow root systems. Compacted soils mainly through ORV over-use retards both infiltration capacities of the soils and the potential for colonization by plants. The management of this zone is similarly integrated within the “Management and Monitoring Plan for the Dune Belt Management between Swakopmund and Walvis Bay” like the Dune Fields Zone.



White-fronted Plover (Charadrius marginatus)

Eastern White Pelicans (Pelecanus onocrotalus)



longshore drift.

The Walvis Bay Coastline

For the purpose of the WBBR the Walvis Bay Coastline is divided into two biodiversity zones namely: (1) The Coastline and (2) The Swakop River Estuary.

Zone 1: The Coastline

Location and extent of the zone

This is the area between the B2 main road in the east, and the Atlantic Ocean in the west. The northern boundary is the Swakop River mouth and the southern boundary the Kuisebmond Beach (also known as Independence Beach) near the Navy Base.

Biodiversity description

Bird Island (a rock covered by a wooden platform that stands in the sea about 9km north of Walvis Bay) and also called the Guano Platform, is the only place in Namibia where Eastern White Pelicans (*Pelecanus onocrotalus*) breed and where Cape Cormorants (*Phalacrocorax capensis*), White-breasted Cormorants (*Phalacrocorax carbo*), and Crowned Cormorants

(*Phalacrocorax coronatus*) roost. A large area of the coastline at Caution Reef has been fenced off by the MET because it is one of the most important Damara Tern breeding areas along the coast. The 30 km section of coastline from Swakopmund to Walvis Bay is designated as an Important Bird Area (IBA). This IBA is also part of a network of Important Bird Areas throughout southern Africa and Africa. The area has up to 450 birds per kilometre of shore which is the highest linear count of birds anywhere in Southern Africa. The importance of this coastline for birds is largely due to the high productivity especially on the rocky shores and the sheltering effect of the Pelican Point Peninsula.

The area is the focus of an intense upwelling system that begins off Lüderitz, where nutrients are brought to the surface, and algal and zooplankton blooms form as the water is swept north by the Benguela

In the area between Walvis Bay and Swakopmund, onshore winds push large quantities of nutrients close to the shore, 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 Pelican Point sand spit at Walvis Bay refracts waves around and into the bay, concentrating the nutrients still further on these shores. Stranded kelp washes up on some of the shoreline which provides a microhabitat for kelp flies and associated shorebirds. Along this beach is Caution reef, the only bulge along an otherwise straight shore.

Birds are more abundant in the summer months when thousands of Palearctic shorebirds (waders) and seabirds are present. During this time and the rest of the year, resident and intra-African migratory birds are also common.

4. ECOLOGY



*A Cape Cormorant
(Phalacrocorax capensis)*

Common Tern (*Sterna hirundu*), Sandwich Tern (*Sterna sandvicensis*), Black Tern (*Chlidonias niger*) and the Arctic Tern (*Sterna paradisaea*).

The resident birds either breed in the vicinity or use the shoreline throughout the year. One of the important

birds from a conservation perspective is the shorebird, the White-fronted Plover (*Charadrius marginatus*). It breeds near the coast laying 2 eggs that are partially buried in sand. These birds are territorial and breed throughout the year but peak in summer. The birds that breed on Bird Island that use the coastline as a feeding area and occasional roost are the Crowned Cormorant (*Phalacrocorax coronatus*), White-breasted Cormorant (*Phalacrocorax carbo*), Cape Cormorant (*Phalacrocorax capensis*), Kelp Gull (*Larus dominicanus*) and the White Pelican (*Pelecanus onocrotalus*). The Crowned Cormorant and White Pelican are of conservation concern and listed rare and endangered.

Other birds that use this coast are the Swift Tern (*Sterna bergii*) that breeds on the offshore islands and other localities on the southern African coast; the Hartlaub's Gull (*Larus hartlaubii*) which breeds in Swakopmund and Walvis Bay sewerage works; the Caspian Tern (*Hydroprogne caspia*) that breeds in Sandwich (55km south of Walvis

Bay) and Walvis Bay wetlands; the Grey Heron (*Ardea cinerea*) and Little Egret (*Egretta garzetta*) that breed in Swakopmund and Walvis Bay and occasionally the Greater and Lesser Flamingo (*Phoenicopterus ruber*, *Phoenicopterus minor*).

The coastal hummocks, namely vegetated mounds of sand that act as sand and detritus traps, are common near Caution Reef. A cable barrier excluding off-road traffic from the Damara Tern breeding colony protects the area. The plant communities here are dominated by *Arthraerua leubnitziae*, *Zygophyllum* species and *Salsola* species.

Socio-economic factors

The Bird Island "View Point" is visited by many tourists. The beaches in the vicinity of Bird Island up to Dolphin Park are also used by local entrepreneurs to collect black mussel shells that wash up on the beaches. The shells are used to make bracelets and necklaces and provide an important income.

The coastline is a national asset comprising a wide variety of ecosystems, such as coastal plains, sandy beaches and rocky shores. These ecosystems are the sources that generate benefits for coastal fauna and flora and the local communities. They are also important tourism attractions. Areas along the coastline such as Kuisebmond Beach, Dolphin Park and Long Beach serve as recreational areas for the public.

The broad groups of birds are Terns, Gulls, Cormorants, Pelicans, Sandpipers, Plovers, Grebes, Flamingos and other species. Several insects, such as flies and beetles are found associated with Kelp wrack washed up along the beaches. Kelp represents an important part of the food web as through this insect pool, lizards, spiders and birds are attracted.

The migratory Palaearctic birds breed in the northern hemisphere and are present along the coast from September to April. Some one year old and non-breeding birds remain throughout the year. The most abundant shorebird species are: the Ruddy Turnstone (*Arenaria interpres*), Curlew Sandpiper (*Calidris ferruginea*), Sanderling (*Calidris alba*), Grey Plover (*Pluvialis squatarola*) and Whimbrel (*Numenius phaeopus*). Other less abundant shorebirds are: the Knot (*Calidris canutus*), Bartailed Godwit (*Limosa lapponica*), Greenshank (*Tringa nebularia*) and Curlew (*Numenius arquata*).

Other palaeartic seabirds are the

These areas are mainly used for swimming and recreational activities by local residents and tourists. Long Beach has developed significantly in recent years and has become a residential area for the mainly affluent community. The Long Beach Resort is also a popular holiday destination and offers camping facilities, some chalets, tidal pools, open beaches, barbeque facilities, and a restaurant.

Biodiversity threats and management

The coast between Long Beach and Bird Island (8-10km.) is one of the richest feeding, breeding and roosting areas for sea birds. Due to the increased development and associated disturbance around Long Beach birds have moved further south of here. Recreational activities between Walvis Bay and the Swakop River with quad bikes, jet skis, microlights, gyrocopters and other off-road vehicles are also not well controlled especially during holiday periods, and are very detrimental to the coastal environment.

The biggest threat to the area is the degradation of habitats and the destruction of sea-bird nests by

ORVs, especially during holiday periods. Litter may also result from increased recreational activities on the beaches, through litter on the beaches from recreational activities is rather insignificant in comparison to the littering that occurs from the anchored vessels in the bay. Coastal vegetation is sensitive, vulnerable to damage and takes a long time to recover. Damage as a result of trampling or off-road driving can be fatal to plants with shallow root systems. Compacted soils mainly through ORV abuse retards both infiltration capacities of the soils and the potential for colonization by plants.

Vehicular traffic on the beaches can cause the bacteria and other marine organisms living in the soil to decline in numbers or to disappear completely, which interrupts the food webs. The disturbance of seabirds and the harvesting of any marine fauna and flora impact negatively on marine ecosystems and can result in a decrease in biodiversity, e.g. removal of kelp wash-ups on beaches can result in the marine ecosystem to be disrupted, since the kelp

serves as an important link in the food web.

Introduction of alien invasive marine species is also a potential threat from aquaculture activities. The introduction of invasive alien marine species can happen via aquaculture or by visiting ships. There is presently no adequate management or active protection of the biodiversity in this area with the exception of the Damara Tern fences and the municipal by-law that regulates the control of the seashore and covers bathing, camping and driving a vehicle in bathing areas.

The Damara Tern breeding colonies are protected with cable barriers to restrict off-road vehicles. To date 30 kilometres of cable have been placed around breeding areas. The cable fences have proved to be a success as no breeding failures have occurred since as a result of human disturbance and the number of chicks hatching has doubled.



Quad biking is a popular recreational activity in the designated areas near Langstrand (left), a resort and luxury suburb of Walvis Bay.

4. ECOLOGY

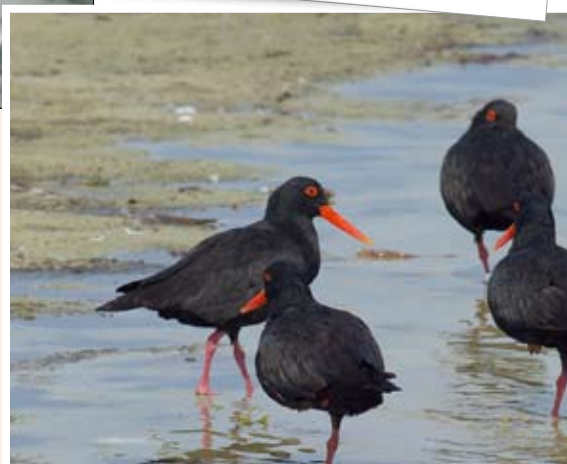
The Nature Conservation Ordinance 4 of 1975 protects all birds apart from those designated for hunting of which few exist on the coast, and all plants. It specifically mentions disturbance, removal of eggs, and destruction of breeding habitat of all protected birds. However this legislation is poorly enforced due to limited resources at the disposal of the MET (ministry responsible for the enforcement of the act). The Municipality of Walvis Bay has recently completed a Strategic Environmental Assessment (SEA) along this coastline. The SEA will be used to provide a balanced protection of the coastline environment, to integrate environment into urban planning and development, to promote sustainable development and to promote coastline development awareness.



Top: African Penguin (*Spheniscus demersus*)

TOP RIGHT: A Grey Heron (*Ardea cinerea*)

RIGHT: Black Oystercatcher (*Haematopus moquini*)



Zone 2: The Swakop River Estuary

Location and extent of the zone

This is the northernmost area within the Walvis Bay jurisdiction and constitutes the border between Walvis Bay and Swakopmund. This wetland covers a total area of about 750,000m² (1,000m x 750m).

Biodiversity description

Wetlands are a scarce resource in the Namib Desert and the Swakop Estuary is one of only two of its kind along the coast of Namibia, the other being the Ugab Estuary. This oasis is fed by the ephemeral Swakop River, and rejuvenated by infrequent floods and fresh water

seepage originating from inland rains and through inundation of sea water over the beach into the lagoon/wetland. The mouth is not often open to the sea.

This dynamic system creates a mosaic of habitats with variable salinity levels, making it attractive to a diversity of plants and birds as well as small mammals, reptiles, amphibians, fish and invertebrate animals. Various grasses, shrubs, herbs and other desert-adapted salt marsh plants support these forms of life. On the northern bank, the indigenous reeds (*Phragmites* species) provide food, shelter and nesting sites for many kinds of birds and other small animals. The small remnant salt marsh in the eastern part is a rare, conservation worthy habitat in Namibia and elsewhere. The southern banks of the estuary are characterised by small dune hummocks, upon which the sand is stabilised by dune vegetation.

The main plant species on the dune hummocks in the wider area are Dollar bush (*Zygophyllum stapffii*) and Pencil bush (*Arthroa leubnitziae*). The Dollarbush is a succulent plant that relies on ground water, and the Pencilbush utilises the moisture from fog. These coastal hummocks are vulnerable to damage and take a long time to recover. A few species of trees occur in the higher reaches of the river, namely Camel thorn (*Acacia erioloba*), Ana (*Faidherbia albida*) and Ebony (*Euclea pseudebenus*).

Along the river mouth, Tamarisk (*Tamarix usneoides*) is the most common species, especially on the northern side of the river. It appears to be more resistant to the wind and salt spray than the other species. Over 85 bird species have been recorded in the vicinity of the Swakop Estuary, including 30 species that breed in the greater area. The estuary and adjoining coast are an important breeding area for the internationally important Damara Tern (*Sterna balaenarum*), which uses the area as a nursery for its chicks.

Other Red Data Book species that use the wetland include Greater Flamingo (*Phoenicopterus ruber*), Lesser Flamingo (*Phoenicopterus minor*), White Pelican (*Pelecanus onocrotalus*), Black-necked Grebe (*Podiceps nigricollis*) and Chestnut-banded Plover (*Charadrius marginatus*), while Bank Cormorant (*Phalacrocorax neglectus*), Crowned Cormorant (*Phalacrocorax coronatus*), Cape Gannet (*Morus capensis*), African Penguin (*Spheniscus demersus*) and African Black Oystercatcher (*Haematopus moquini*) make use of the adjacent coastal and oceanic habitats.

In addition, a variety of waders found in the wetland area includes Black-winged Stilt (*Himantopus himantopus*), Red-knobbed Coot (*Fulica cristata*), Grey Plover (*Pluvialis squatarola*), various kinds of terns and gulls, and occasional rare vagrants such as Redshank (*Tringa totanus*), American Golden Plover

and Red-throated Pipit (*Anthus lineiventris*). The wetland also serves as an important sheltered roosting site for birds during high tides when the rocks are inaccessible or during high winds.

Socio-economic factors

The estuary's proximity to one of Namibia's premier tourist destinations, the coastal town of Swakopmund, and the special blend of the river mouth, dunes and ocean give it its special appeal. Its natural wealth is the quality often forgotten, but heavily relied upon to bring the special ambience to this tourist Mecca. Tourism is of key value to this area because of the diversity of coastal birds as well as the scenic views.

Social values of the estuary include non-consumptive forms of recreation for local residents and foreign visitors, e.g. bird watching and walking. Potential job creation is linked with the development of a walking trail and avi-tourism, and includes the promotion of trained field rangers and bird guides. The estuary is also an invaluable educational facility for the development of future conservationists via schools, universities and youth groups.

Biodiversity threats and management

The proximity of the estuary to Swakopmund and easy access to it from town are factors making it vulnerable to disturbance, as



One of many specially adapted succulent plants.



*The Iceplant (*Mesembryanthemum crystallinum*) is a succulent plant that derives its name from the coverage of large, glistening bladder cells.*



The Hoodia is a stem succulent, described as "cactiform" because of their remarkable similarity to the unrelated cactus family. They can reach up to 1m high and have large flowers, often with flesh colour and strong smell. Hoodia species are protected plants, ranging from Central Namibia to southern Angola, especially in plains and rocky areas. Common names include "Bushman's Hat" and "Queen of the Namib".

4. ECOLOGY



residents walk their dogs in the area. There has been an increase in quad bike and ORV activities in the area over the past five years, which cause damage to the system and its wildlife, and more particularly to the dune hummocks that are highly sensitive to this kind of disturbance. Illegal overnight camping has been noticed, accompanied by fires at night on the verge of the wetland and often loud music that disturbs the birds. Other recreational activities that are potentially disturbing in the area are horse riding, dogs walking and people picnicking during the day.

Water abstraction in the upper catchments is a threat to biodiversity as this reduces the annual flooding of the Swakop River and prevents the water from reaching the estuary. Uncontrolled gravel mining in the river bed is a further threat. Over recent years, infrastructural developments have encroached on the northern banks of the wetland. Upmarket housing development proposals on the southern bank were received by the City of Walvis Bay but were not approved, on the

TOP & TOP-RIGHT: The Swakop River mouth and Estuary.

RIGHT: Damara Terns are driven away from their usual breeding areas due to increased human activity.

recommendation of an EIA report.

The lack of, or unclear, legislation and boundary demarcation has resulted in duplication of mandates for the estuary. The coastal (western) side of the estuary falls under both the Ministry of Fisheries and Marine Resources (below the high water mark) and the Ministry of Environment and Tourism (above the high water mark). On the other hand, water abstraction from the river falls under the Ministry of Agriculture, Water and Forestry. In response to the rapid deterioration of the estuary, concerned residents realised the urgent need to instil a stronger conservation ethic and promote an appreciation for the wetland. The “Friends of the Swakop River” (FSR) was formed in 2005. This partnership includes representatives of national

and local government, private and non-governmental organisations and private individuals. The mission of the FSR is to ensure sustainable utilization of the Lower Swakop River by involving all in conserving its unique natural dynamics, for the benefit of all stakeholders. The conservation minded group consists of residents from Swakopmund and Walvis Bay. A section of estuary area is already protected by cable barriers, in addition to information signs restricting or urging vehicles to use only existing tracks. A hiking trail is being planned in the area.

The FSR has also initiated a Swakop River Environmental Project. The project aims to promote the conservation of the Swakop River Estuary, promote nature-based tourism activities and protect the economic value of the area.

5. ADMINISTRATION AND INTEGRATION



Sustainable development has become a popular phrase in most public institutions in Namibia over the past 10 years. The sustainable development concept promotes the sustainable utilization and management of the various components of biodiversity.



Governance

The importance of environmental management was realized by the political leadership in Walvis Bay, which led to the establishment of the Environmental Management section within the Department of Water, Waste and Environmental Management in 2001 as illustrated to the far right. The environmental management section is headed by a manager and two environmental officers. The primary functions of the section are to manage and to raise awareness on the environmental matters within the jurisdiction of

Walvis Bay. Other responsibilities are to advise and assist council with establishment and implementation of policies, plans and projects. Representing the municipal council in committee meetings that relate to the environment is also a line function of this section.

Previously the functions that related to environmental management were undertaken by the Town Planning Section. The WBM and the City of Windhoek are the only two municipalities in Namibia with environmental management sections within their organisational structures.



5. ADMINISTRATION AND INTEGRATION

In other cities biodiversity management is carried out by the Environmental Health Sections and the central government through the Ministry of Environment and Tourism.

Namibia gained her independence in 1990, at the onset of a new era of global environmental management and development. The United Nations Conference on the Environment and Development (UNCED) in Rio de Janeiro in 1992 formally marked this new era. From the beginning of Namibia's young democracy, the twinning of environmental and development issues has been pivotal. In a country as arid and dependent on natural resources as Namibia, this association is critical to our future. This is why the Namibian Constitution explicitly promotes development through sustainable resource use and the protection of biodiversity and ecosystems.

After Namibia's independence the Walvis Bay enclave remained part of South Africa (under the administration of the Cape Provincial

administration) until its reintegration to Namibia in 1994. Post 1994 the management of biodiversity was carried out by multiple stakeholders mentioned below. The Town Planning Section of the Municipality of Walvis Bay was the municipal section tasked with environmental management until the formation of the Environmental Management Section in 2001.

Presently there are many stakeholders involved in the management of biodiversity in Walvis Bay. Government stakeholders include the Ministry of Environment and Tourism, Ministry of Fisheries and Marine Resources, Ministry of Agriculture, Water and Forestry and many other government institutions. There are also various NGOs based in Walvis Bay and from other parts of the country who contribute to the sustainable management of biodiversity. The most prominent NGOs are the Coastal Environmental Trust of Namibia, Namibia Nature Foundation and Friends of the Swakop River.

The coastal area between Walvis Bay and Swakopmund is probably the most intensively utilized along the Namibian coast and it also contains some of the most important and most sensitive natural habitats. Apart from their ecological value and the high biodiversity in the area, these habitats also attract large numbers of tourists. Tourism is one of the main sources of income in the coastal areas of Namibia, therefore it is in the interest of Namibians that these habitats are utilized in a sustainable manner. Many people don't instinctively realize the links between a diverse environment and a healthy one. Environments that lose some of their biodiversity tend to become unstable in an ecological way.

They lose more species, and then lose some of their ecological processes- such as the pollination of the !Nara plant (*Acanthosicyos horrida*) by blister beetles. Degraded environments may become unstable not only ecologically but also in a socio-economic way, becoming less able to support people and their livelihoods. Biodiversity management has been a challenge in Walvis Bay. However, significant successes have been achieved in some areas of biodiversity management. One of those areas is the formulation of legal instruments, management plans and policies required to manage biodiversity even though most of them have not been enacted or implemented yet. Aspects such as the lack of law enforcement



are still hampering the efficient management of biodiversity.

This is mainly because the government institutions tasked with the enforcement of environmental conservation laws are understaffed, lack the necessary skills, and don't have the necessary equipment such as cars to effectively enforce the laws. The Municipality of Walvis Bay is however not able to do much regarding law enforcement since it only has control over the municipal areas. Other areas such the dune belt fall under the MET. The other shortcoming is that most of these laws are outdated and the fines are too low to deter offenders from repeating the offence.

The Municipality of Walvis Bay has introduced a system where all proposals for developments are circulated to the Environmental Management Section for the evaluation of potential impacts on biodiversity and the environment as a whole. The integration of biodiversity in the city's governance has helped to improve the promotion of sustainable development as each form of development is subjected to scrutiny by the Council's environmental staff.

Public Participation and Awareness

The general public in Walvis Bay is involved in the decisions on biodiversity at various levels. All developments that might have

Local Agenda 21 In Walvis Bay

1. Environment Policies and Strategies in WBM

Key Outputs

- Policy and Strategy Plan recognising LA21 principles
- LA21 Committee and Strategy implemented
- Capacity and experience improved in LA21 principles.

2. Walvis Bay Coastal Area Study

Key Outputs

- Comprehensive and coherent view of coastal area and monitoring initiated
- Hydrodynamic and ecological assessment
- Evaluation of scenarios of natural processes and human impacts.

3. Environmental Fund and Tariffs

Key Outputs

- Tariffs and levies in place supporting incentives in resource saving
- Funds available for Environmental Management and LA21 initiatives.

4. LA21 Micro Projects in WB

Key Outputs

- A number of LA21 micro projects planned and implemented in the Walvis Bay area.

negative impacts on the environment are subjected to an Environmental Impact Assessment (EIA) to determine the extent of the impacts and to devise mitigation measures where possible. The Namibian Environmental Assessment Policy makes provision for a public consultation process during the EIA study, whereby the public is accorded an opportunity to raise their concerns regarding the proposed development. Through this process the less privileged residents are given the platform to raise their concerns if they feel that the proposed development will compromise their access to biodiversity and other natural resources.

Members of the public are also invited to serve on some environmental committees and associations where decisions regarding biodiversity management are also made.

The Municipality of Walvis Bay has a strong environmental awareness raising programme that includes public talks during environmental days (e.g. World Wetlands Day,

World Water Day, National Harbour Day, etc), publications in municipal newsletters and lectures at the recently inaugurated Solid Waste and Environmental Information Centre. Over the few years the Municipality of Walvis Bay has carried out various environmental awareness raising projects. One of the most successful and the biggest to date was the Walvis Bay Local Agenda 21 Project which is described below.

Name of project:

Walvis Bay Local Agenda 21 (WBLA21) Project

Project description:

The WBLA21 project was a three-year project funded by the Municipality of Walvis Bay and the Danish government. The overall goal of the project was to make significant progress towards both studying and managing Walvis Bay's fragile and valuable environment. The project followed Local Agenda 21 principles that encourage the active involvement of local people.

5. ADMINISTRATION AND INTEGRATION

The project was divided into the following closely related components:

- Development of an environmental policy, strategy and action plans for Walvis Bay.
- Undertaking a Coastal Area Study to gain a full and authoritative understanding of the natural processes and human impacts affecting the Coastal Area. This area is made up of the lagoon, bay, harbour and Pelican Point peninsula.
- A study of the municipal budget and tariff system aimed at creating incentives to save scarce resources such as water and energy, and at funding current and future environmental activities and initiatives. With stakeholder citizen participation, implementation of Local Agenda 21 ‘micro projects’ that visibly express the environmental strategy and action plans to create further public awareness on environmental issues and resources shortages.

Timeframe of the project:

The project ran from 2001-2004.

Project Partners: The Municipality of Walvis Bay was the executing agency of the project but many other stakeholders and consultants were involved in the implementation of

the various project components. The key stakeholders were:

- Ministry of Agriculture, Water and Rural Development -
- Department of Water Affairs, Windhoek
- Namibian Port Authority, Walvis Bay
- Coastal Environmental Trust of Namibia, Walvis Bay
- Erongo Regional Council
- Ministry of Environment and Tourism
- Ministry of Fisheries and Marine Resources
- Walvis Bay Salt Refiners
- The fish processing industries and
- Representatives of the Topnaar community.

Funding:

The project was co-funded by the Danish International Development Agency (DANIDA) and the Municipality of Walvis Bay to the tune of N\$18,000,000 (about US\$2,571,400).

Conceptual structure of four project components as part of WB LA 21 project

This project was internationally and nationally recognised as a “Best Practice” example, and experience gained was shared with the local authorities throughout Namibia through four regional workshops. The project further received a certificate of merit from the Namibia Institute of Town and Regional Planners.

In addition the project was presented

at various events such as: the 2003 and 2006 ICLEI World Congress in Greece and South Africa respectively; 2002 World Summit on Sustainable Development in Johannesburg; Sustainable Development and Environmental Conferences and Workshops in South Africa and Namibia; the Danish Review Workshop in Nairobi, etc.

The component outputs of this project further ensure participation and sustainability as the Walvis Bay Integrated Environmental Policy has been endorsed by politicians and displayed in a number of institutions; the CAAP is being monitored and evaluated by a Steering Committee which consists of WBM, CETN, Walvis Bay Salt Refineries, MET, Namport and the fishing industry. The Environmental Fund continues to fund micro proposals from the general public and institutions on an annual basis.

Status of Management Policies, Programmes and Plans

Walvis Bay Integrated Environmental Policy

The Walvis Bay Integrated Environmental Policy covers all the areas under the jurisdiction of the Municipality of Walvis Bay. The Integrated Environmental Policy indicates the directions WBM will move towards in the forthcoming years to fulfill its responsibilities to manage the environment of



Different desert adapted shrub species are found in the Namib.

A massive sand storm at the Gobabeb Research Centre.



Walvis Bay together with the town's residents and institutions. It is a statement of purpose that commits the municipality to certain principles, policy directions, and tools.

Coastal Area Action Plan

The Coastal Area Action Plan is a management plan that consists of a set of mitigating, monitoring and institutional measures to be taken to eliminate adverse environmental impacts. The action plan addresses issues that require management to protect and restore the Walvis Bay coastal environment. The Action plan covers the lagoon, Pelican Point and the bay and harbour zones.

Walvis Bay Nature Reserve Management and Operational Plans

A final draft of this plan was developed for the proposed Walvis Bay Nature Reserve (WBNR) as part of the WB LA21 Project during March 2005. The management of the Walvis Bay Lagoon and the Kuseb Delta zones is fully described within this document. It has been recommended by a number of stakeholders to incorporate the Dune

Belt Area as part of the proposed WBNR. The purpose of these plans is to prescribe and document ways to ensure the proper management of the WBNR.

Dune Belt Management Plan and Regulations

The Dune Belt Management Plan and Regulations were developed specifically to promote sustainable utilisation, protection and proper management of the Dune Belt Area ecology.

Coastline Strategic Environmental Assessment

The Municipality of Walvis Bay commissioned the completion of a Strategic Environmental Assessment (SEA) for the Coastline between Walvis Bay and Swakopmund to provide a balanced protection of the coastline environment. Currently the SEA report guides the Municipal Council in decision making, integrates environmental issues into urban planning and development; and promotes sustainable development and awareness. The

SEA

also covers the Swakop River Estuary biodiversity zone.

Sea Shore By-law

This is a municipal by-law that regulates the control of the seashore and covers bathing, camping and driving a vehicle in bathing areas. This by-law also covers the Swakop River Estuary zone. It covers regulation relating to the control of the seashore, the sea and its environment within or adjoining the area of jurisdiction of the Municipality of Walvis Bay.

This by-law covers the following aspects: prohibition of recreational activities within restricted areas; life-saving devices and equipment; damage to property; interface with noticeboards and markers; prohibition of entertainment and trade; control of fires, anglers, intoxicating liquor, and firearms.

5. ADMINISTRATION AND INTEGRATION

The Internal Environmental Impact Assessment Guidelines

These are internal guidelines that have been developed in accordance with Namibia's Environmental Assessment Policy and the Environmental Management Act to guide the EIA process within the Walvis Bay municipal area of jurisdiction.

Habitat Restoration Guidelines for the Dune Belt Area.

The draft Habitat Restoration Guidelines document contains various suggested interventions to repair damaged ecologies. These interventions include removing infrastructure; cleaning up pollution and other processes of reinstating the habitats and environmental conditions, and plants and animals that had been in a specific habitat before the disturbance. This is useful for the continuous restoration of environments disturbed by unsustainable human activities. The guidelines only apply to the Dune Belt Area.

Integrated Coastal Zone Management Plan

The Integrated Coastal Zone Management Plan (ICZMP) for the Municipality of Walvis Bay is still in its initial draft stage and is envisaged to be completed early 2009. Once completed the ICZMP will be used to integrate environmental considerations into the planning and decision making process along the Coastal zone of Walvis Bay.

Environmental Data Sharing Policy

The Environmental Data Sharing Policy regulates the sharing of environmental data that is in the possession of the Municipality of Walvis Bay with external parties.

Monitoring and Review

Monitoring is an essential task in the framework of managing the city's biodiversity. With the implementation of all the environmental management policies, plans and programmes in place, monitoring and review will provide the continuous improvement feedback loop. In this sense, monitoring results will form the basis of future decisions and, finally, contribute to improving the state of the city's biodiversity. Monitoring, in order to be cost-efficient, must be firmly linked to the specific management goal prescribed for the individual areas and zones.

The overall responsibility for the long-term monitoring programme rests with the Municipality of Walvis Bay. Some of the monitoring activities will be done by the local key stakeholders having specific interest in the area or zone, with external assistance and facilitation as required. All monitoring data will be reported to the WBM, filled and further disseminated to all stakeholders taking into account the WBM "Environmental Research Data Sharing Policy".

WB Local Biodiversity Strategy and Action Plan

The production of the Local Biodiversity Strategy and Action Plan for Walvis Bay, the endorsement and the annual implementation thereof as well as integration into broader Council's policies, plans and programmes will follow the completion and endorsement of the WBBR in order to:

- Eradicate extreme poverty and hunger;
- Demonstrate positive economic benefits of maintaining biodiversity;
- Minimise negative impacts of climate change and facilitate adaptation needs;
- Ensure environmental sustainability through renewable energy sources and biodiversity and its influence on quality of life, and
- Develop a local, national and global partnership for sustainable development.

This will be achieved through continual monitoring, reviewing, corrective actions, planning and reporting beyond the three-year term of the WB LAB Project.



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**Walvis Bay Municipality
Documents**

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Policy

Coastal Area Action Plan

Walvis Bay Nature Reserve Management
and Operational Plans (Draft)

Dune Belt Management Plan and
Regulations (Draft)

Coastline Strategic Environmental
Assessment

Sea Shore By-law

The Internal Environmental Impact
Assessment Guidelines

Habitat Restoration Guidelines for the
Dune Belt Area (Draft).

Integrated Coastal Zone Management
Plan (Draft)

Environmental Data Sharing Policy



7. GLOSSARY

Avi-tourism	Birding ecotourism	Semi-arid	Areas where mean annual rainfall is between about 250 - 600mm, rainfall is seasonal and variable, and potential evaporation is high.
Anoxia	Lack of oxygen in the environment.	Siltation	Deposition of fine mineral particles (silt) on the beds of streams, lakes or wetlands.
Barchanoid	These are one of the several major classes of dune morphology known to exist generally	Southern Africa	The region encompassing Angola, Botswana, Malawi, Mauritius, Mozambique, Namibia, Swaziland, Tunisia, Zambia and Zimbabwe.
Benthic	Pertaining to the bottom of the sea or another body of water.	Wetlands	Areas of marsh, fern, peat land or water, whether natural or artificial. Permanent or temporary, with water that is static, or flowing fresh, blackish or salty, including areas of marine water, the depth of which at low tide does not exceed six meters.
Bivalves	Molluscs (shellfish) that have a shell made up of two halves for cockles, mussels and oysters.	Zone	An area of land, sea or atmosphere.
Debris	The remains of something that has broken down or is decomposing, such as brush collected at the bottom of a stream; organic particles large enough to serve as food for scavengers		
Detrivores	Heterotrophs that feed on detritus, the little altered remains of living organisms.		
Planktonic	Free floating, mostly microscopic micro organisms that can be found in almost all waters.		



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