Management Plan
Tsau //Khaeb (Sperrgebiet) National Park
2020/2021-2029/2030

Ministry of Environment, Forestry and Tourism
Directorate of Wildlife and National Parks

Republic of Namibia

Acknowledgement

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The views expressed in this publication are those of the publishers.

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Front cover: *Namibia cinerea*

Figure 1 *Fenestraria rhopalophylla* subsp. *rhopalophylla*, a species endemic to Tsau //Khaeb NP


WARNING.
PENALTY £500.OR ONE YEAR'S IMPRISONMENT.
THE PUBLIC IS WARNED AGAINST
ENTERING THE PROHIBITED
DIAMOND AREA WITHOUT PERMITS
WAARSKUWING.
STRAF: £500.OF EEN JAAR GEVANGENISSTRAF.
DIE PUBLIEK WORD GEWAARSKU
TEEN OORTREDING IN DIE VERBODE
DIAMANT GEBIED SONDER PERMITTE
WARNUNG.
£500 GELDSTRAFE ODER 1JAHR GEFANGNIS.


SPERRGEBIET
WAARSKUWING
GEEN TOEGANG
SONDER PERMIT
OORTREDERS
SAL VERVOLG
WORD
WARNING
NO ENTRY
WITHOUT PERMIT
TRESPASSERS
WILL BE
PROSECUTED
ELONDWELO
OVATAULUKI
OTAVA
LANDULWA


TSAU //KHAEB (SPERRGEBIET)
NATIONAL PARK
PARK BOUNDARY
NAMIBIA PARKS AND WILDLIFE

Foreword

National parks are a vital tool for conserving Namibia's essential biodiversity. By managing parks, their irreplaceable assets and unlimited potential will be conserved for future generations. In addition, every year Namibia's National Parks draw large numbers of tourists to Namibia, generating employment and stimulating development nationwide. National Parks also provide a unique opportunity to benefit local communities through rural development while providing research, education and recreation opportunities.

Namibia's parks are invaluable for tourism with more than 70% of tourism activities attributed to protected areas. Approximately 17% of the surface area of Namibia is currently gazetted as protected areas. Furthermore, tourism is the fastest growing sector in Namibia contributing approximately 16% to the country's GDP and immensely important as a source of employment. The importance of protected areas, not only for tourism and revenue creation, but also for biodiversity, cannot be stressed enough. It is thus imperative that protected areas are managed effectively and efficiently. Management Plans for Protected Areas is viewed as the guiding light for proper management.

This Management Plan sets out the vision, objectives and guidelines for the management and development of the Tsau //Khaeb (Sperrgebiet) National Park. As such, it represents the policies and intentions of the Ministry of Environment and Tourism (MET). The Tsau //Khaeb (Sperrgebiet) National Park is rich in biodiversity and is of international importance because it contains 90% of the Succulent Karoo Biome in Namibia. The Succulent Karoo Biome is internationally recognized as one of the Global Biodiversity Hotspots. The park is further unique because of the presence of diamond mining for more than 110 years. I acknowledge here the environmental stewardship of Namdeb Ltd which has left the greatest part of the Park intact and in near pristine condition. Namdeb has furthermore rehabilitated extensive parts of the areas that they mined, and I commend them for that. The Ministry of Environment and Tourism looks forward to further cooperation with Namdeb in the management of this very special National Park.

All involved with the Park, including MET decision-makers and management staff, personnel of other Ministries and Parastatals, private sector companies and individuals, all contractors, partners, tourists, any entity and individual dealing in any way with the Park, must ensure that any actions and decisions relating to the Park are in strict accordance with this document. The Management Plan must be viewed as a valuable and central document by all management- and policy-level staff involved with the Park. They should be familiar with its contents and should make use of it to familiarize new staff with the aims, objectives and Policies of the Park.

It is part of every staff member's job to help implement this Management Plan. Park management is a team effort. The future well-being and development of the Park depends on this team approach.

Pohamba Shifeta, MP

MINISTER

Preface

The Management Plan for the Tsau //Khaeb (Sperrgebiet) National Park has been designed and structured to be priority focused and action orientated, to facilitate implementation and the achievement of outputs and outcomes. The Plan is linked to an annual cycle of management and oversight, involving the preparation of annual work plans and budgets.

The plan gives a brief background to the Park, including its purpose and objectives, and placing it in a regional setting, before focusing on park management objectives, including the evaluation of the implementation of the previous plan and the identification of the most important threats to the Park and the conservation outcomes that we seek. Chapter 3 gives the new zonation for the Park according to the recently adopted Guidelines for Zonation of Protected Areas in Namibia. Subsequent chapters focus on the management of natural resources in the Park, adaptive management, regional conservation, park neighbours, prospecting and mining, tourism and infrastructure including waste management. The last chapter covers aspects of administration and management and provides a framework for a five-year plan of implementation and annual work plan.

The plan is designed around a uniform structure for easy reference and use and should be used in conjunction with park legislation and regulation. The plan therefore articulates, at the strategic level, the 'What' must be done; with a brief description of the 'Why' these actions must be implemented to attain the specified objectives. It is imperative to operationalize these actions in a clear and detailed annual work plan.

The Ministry of Environment and Tourism would like to thank all its staff members, partners and stakeholders who participated in developing this management plan, specifically the GOPA consultancy firm that was appointed to help implement the NamParks 4 Project which is co-funded by the Government of the Republic of Namibia and the German Government through KfW, who facilitated the compilation of this plan by the Agra ProVision consultancy team.

Teofilus Nghitila
EXECUTIVE DIRECTOR

Ministry of Environment & Tourism
Office of the
PERMANENT SECRETARY
REPUBLIC OF
NAMIBIA

Abbreviations and Acronyms

ARTP	/Ai-/Ais Richtersveld Transfrontier Park
CL	Confidence limit/s
DWNP	Directorate of Wildlife and National Parks
DSS	Directorate of Scientific Services
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPL	Exclusive Prospecting Licence
GPS	Global Positioning System
MAWF	Ministry of Agriculture, Water and Forestry
MEFT	Ministry of Environment, Foresty and Tourism
MFMR	Ministry of Fisheries and Marine Resources
MME	Ministry of Mines and Energy
MoU	Memorandum of Understanding
Namdeb or NAMDEB	Diamond mining subsidiary of Namdeb Holdings Pty (Ltd) co-owned by the Government of Namibia and the De Beers Group
NCE	Namibia Chamber of Environment
NDVI	Normalized Difference Vegetation Index
NGO or NGOs	Non-Governmental Organisation/s
NNP	Namib Naukluft Park
NP	National Park
PDA	Personal Digital Assistant
SMART	Spatial Monitoring and Reporting Tool
TFCA	Transfrontier Conservation Area

Figure 2 Spectacular flowers of *Hoodia* sp. in the Tsau //Khaeb NP

Table of Contents

Chapter 1 Overview of the Park

1.1 Introduction

The Tsau //Khaeb (Sperrgebiet) National Park, hereafter Tsau //Khaeb NP, TKNP or the Park, is located in the south-western corner of Namibia, between about 26° and 28.5°S and 13° and 17°E. It is about 320 km at its longest from the Northeast to the Southeast and up to about 100 km wide (East to West). It covers an area of about 2.1750 million ha (21,750km^2). The park is bounded by the low water mark on the Atlantic Ocean in the west, the Orange River in the south, the Namib-Naukluft National Park in the north and mainly freehold farmlands to the east. Settlements and towns occur at each of the four corners of the Park, i.e. Aus, Rosh Pinah, Lüderitz and Oranjemund (see Figure 3).

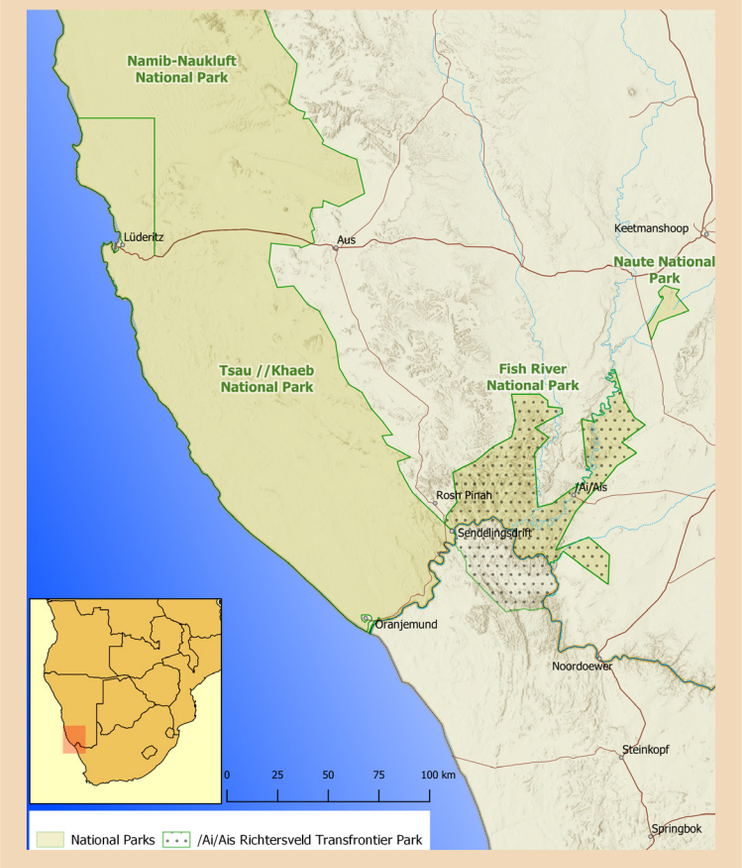


Figure 3 Tsau //Khaeb (Sperrgebiet) National Park is located within the //Karas Region of Namibia

The TKNP covers about 90% of the Succulent Karoo Biome in Namibia. The Succulent Karoo Biome is internationally recognized as one of the global biodiversity hotspots and contains many species of endemic plants. The park is thus recognised as a priority area for conservation. The entire area is considered a global Important Bird Area. At the same time, and because of the historical diamond mining activities, the park has a rich industrial heritage. Having been inaccessible to the public for a century and free of land-use activities such as livestock farming, the TKNP presents an area of high importance for conservation, tourism and research.

Figure 4 Landmarks and localities in the Tsau //Khaeb NP (from Burke 2006[1])

Because of its diamond riches, the Tsau //Khaeb (Sperrgebiet) has been closed to the public, under tight security restrictions, for 100 years. In areas where open-cast mining takes place environmental impacts are unavoidable. However, these areas make up a small portion of the Tsau //Khaeb (Sperrgebiet) and are restricted to the coast and along the Orange River. Large parts of the Park, where no mining has taken place so far, are in a fairly undisturbed condition.

1 From the Management plan for the Richtersveld NP

The Tsau //Khaeb NP borders on the /Ai-/Ais Richtersveld Transfrontier Park (ARTP) which comprises the future Fish River NP (currently named the /Ai-/Ais Hot Springs Game Park) and the Richtersveld NP in South Africa (Figure 5). The ARTP in turns is bordered by a range of private and communal conservation areas and there is considerable potential for further expansion and the development of a Lower Orange River Transfrontier Park or Transfrontier Conservation Area.

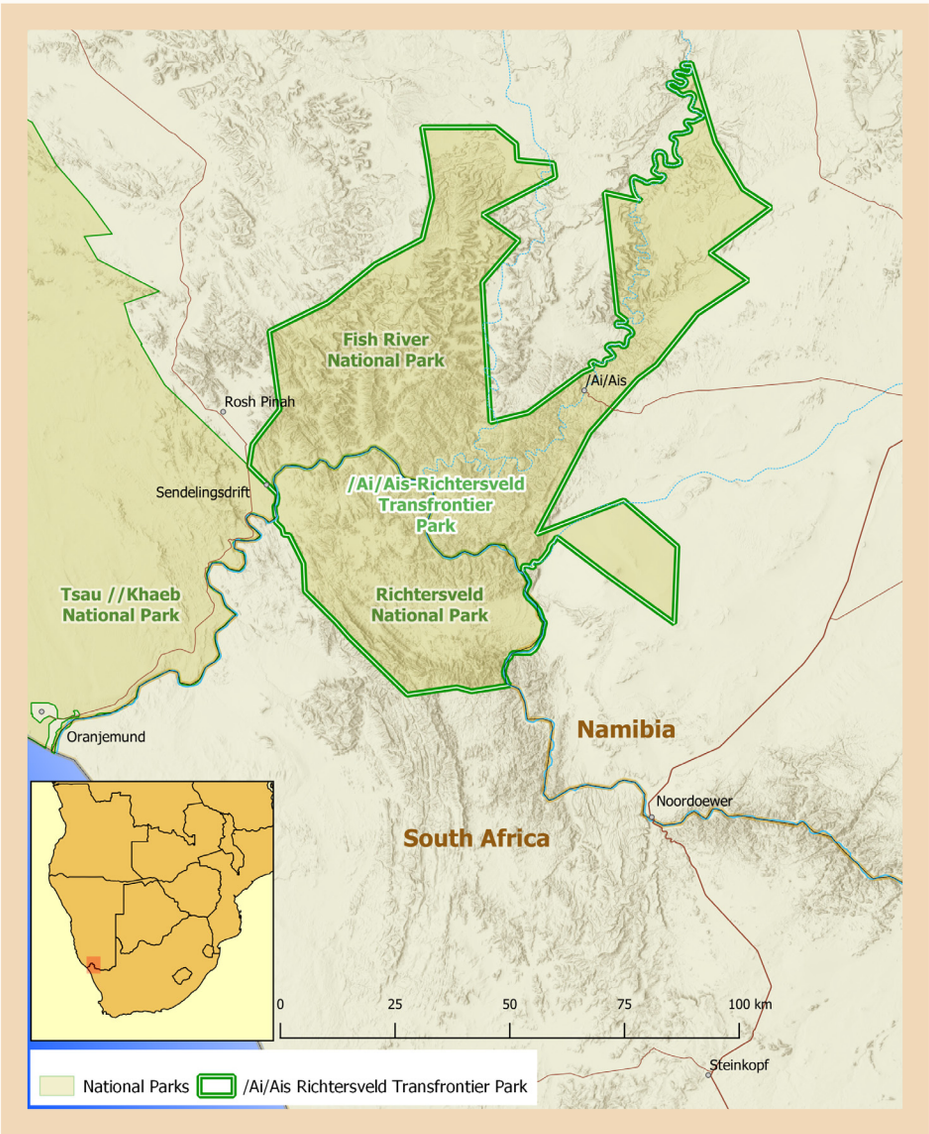


Figure 5 Tsau //Khaeb NP in relation to the /Ai-/Ais –Richtersveld Transfrontier Park[2]

2 From the Management plan for the Richtersveld NP

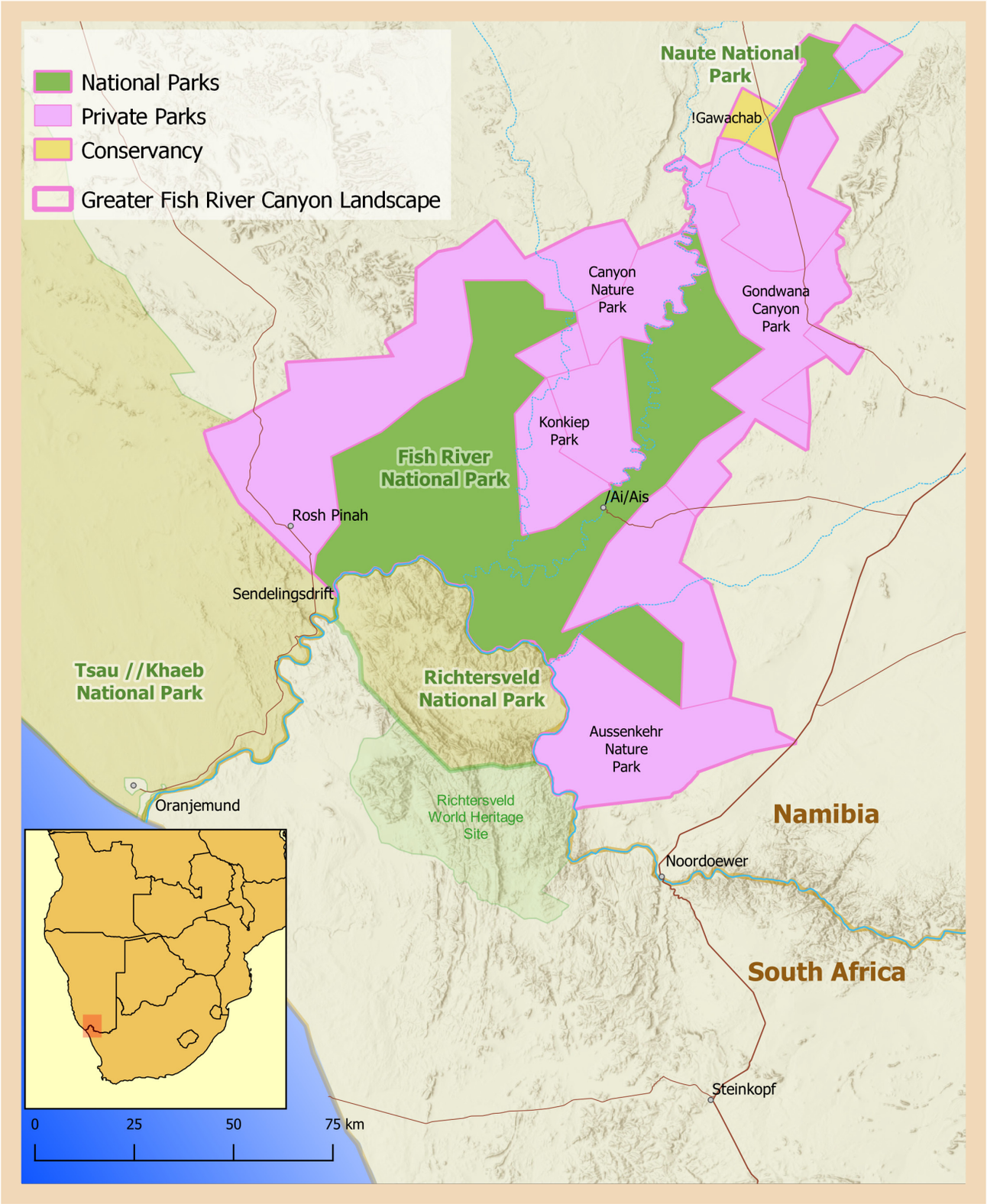


Figure 6 Tsau //Khaeb NP in relation to the Fish River NP (the former /Ai-/Ais Hot Springs Game Park) and the Greater Fish River Canyon Landscape

The Park contains important infrastructure related to its mining history but also for electricity transmission and transport as shown in Figure 8 and Figure 9. Several other major infrastructure developments have been mooted such as the Diaz Wind Park to be followed by potentially two more similar installations and in the longer term, potentially the development of the Kudu Gas to Electricity power station at Uubvlei in the southwestern part of the Park.

Figure 7 *Pelargonium* sp., probably *P. cortusifolium*

Figure 8 Transport (roads and rail) and electricity transmission infrastructure in Tsau //Khaeb NP

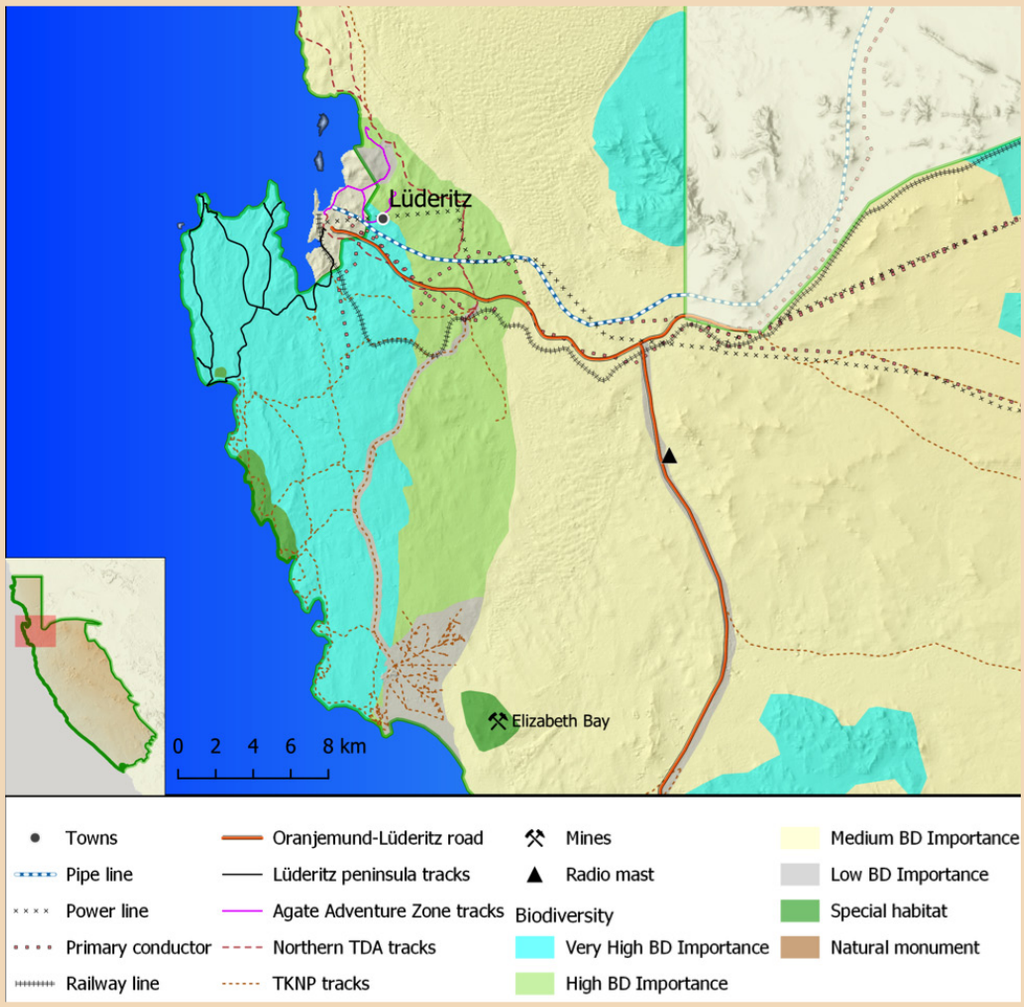


Figure 9 Infrastructure in and adjacent to the northern part of Tsau //Khaeb NP

Figure 10 Young plant of *Namibia cinerea*

1.2 Natural Environment

The Park contains 90% of the Succulent Karoo Biome in Namibia, while small areas in the north east and north west fall within the Southern Namib Desert Biome (Figure 11). In effect, these areas are transition belts, and contain elements of both biomes. To the west the park extends down to the low water mark on the Atlantic Ocean. The coast comprises mainly sandy shores in the south and rocky headlands and inlets in the north.

In addition to the biological values of the park, the area has spectacular terrestrial desert, coastal and island landscapes, is a rich open-air laboratory for geology and geomorphology, rich paleontological and archaeological records and a fascinating history of exploration and mining. At the same time, the Succulent Karoo Ecosystem is highly sensitive and fragile. Inappropriate land use would have a devastating impact on the biodiversity of the area, as well as on its future economic potential.

The main landscapes of the Tsau //Khaeb NP comprise sandy and rocky coastal plains with bays, sandy and gravel inland plains, sand dunes, mountain ranges and inselbergs, and the Orange River valley (Figure 11).

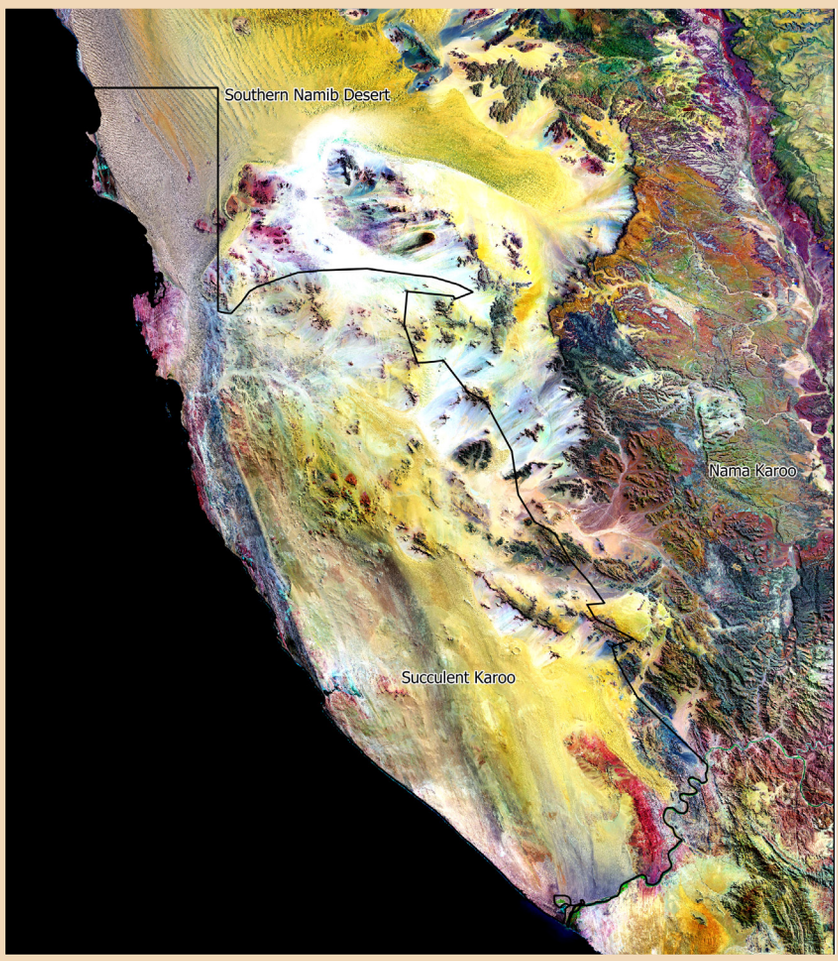


Figure 11 Satellite image of the Tsau //Khaeb National Park and surrounding areas showing the biomes, topography and landforms. (Note, the eastern boundary of the Park imposed on this satellite image is only indicative.)

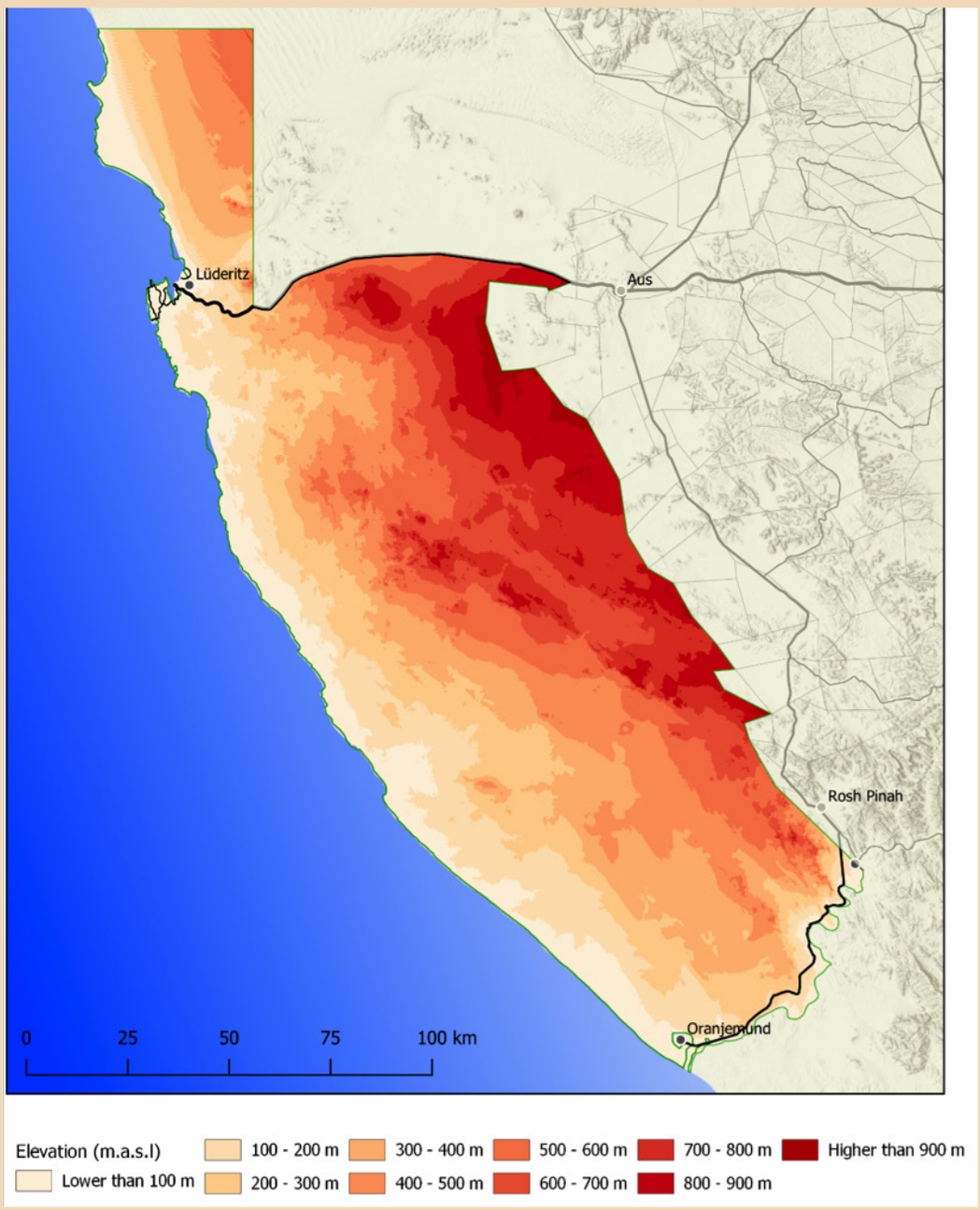


Figure 12 Digital elevation model of the Tsau //Khaeb NP showing the landforms of the Park, based on a dataset from JAXA (Japan Aerospace Exploration Agency)

The median annual rainfall in the Park varies between about 15 and 70 mm, is highly unpredictable (coefficient of variation of 70-90%), and rainfall events are equally likely in all months of the year. The fact that a significant component of the small amount of rain comes into the southwest Namibia as cold fronts from the Cape in winter may have contributed to a vegetation that is dominated by succulent species typical of adjacent winter rainfall areas in South Africa. The Park is in the transition zone of the summer and winter rainfall areas of Namibia (Figure 13) which is another reason for the diverse vegetation. The persistence of the small winter rainfall season is of great concern in the light of predicted climate change.

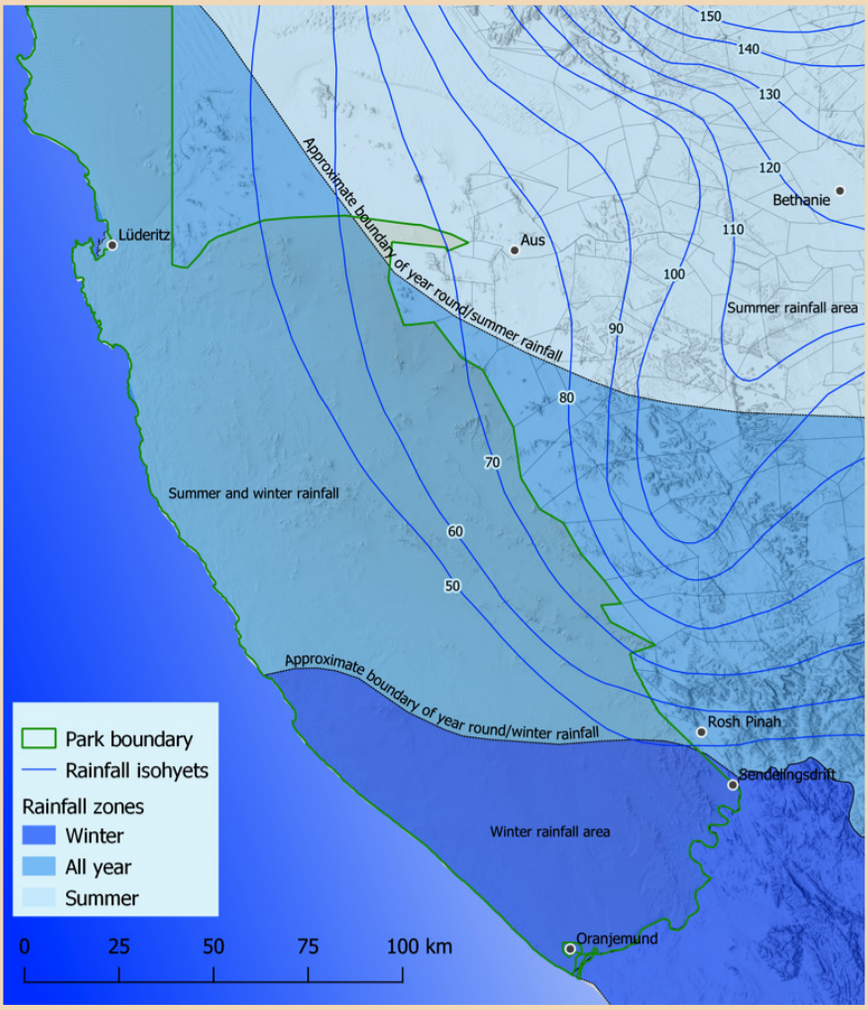


Figure 13 Rainfall isohyets and the approximate boundary of the winter and summer rainfall areas[3]

Figure 14 *Lithops optica*, a species endemic to the Park. A red form, *forma rubra*, occurs in some populations and are highly sought after by collectors. This form has been widely accessible from overseas growers but not in Namibia, and the risk of illegal collection can be reduced if plants can be obtained from a registered nursery in e.g. Lüderitz

3 Matthews, T, Measey, G.J. & Roberts, D.L. Implications of summer breeding frogs from Langebaanweg, South Africa: Regional climate evolution at 5.1 mya. South African Journal of Science 112..

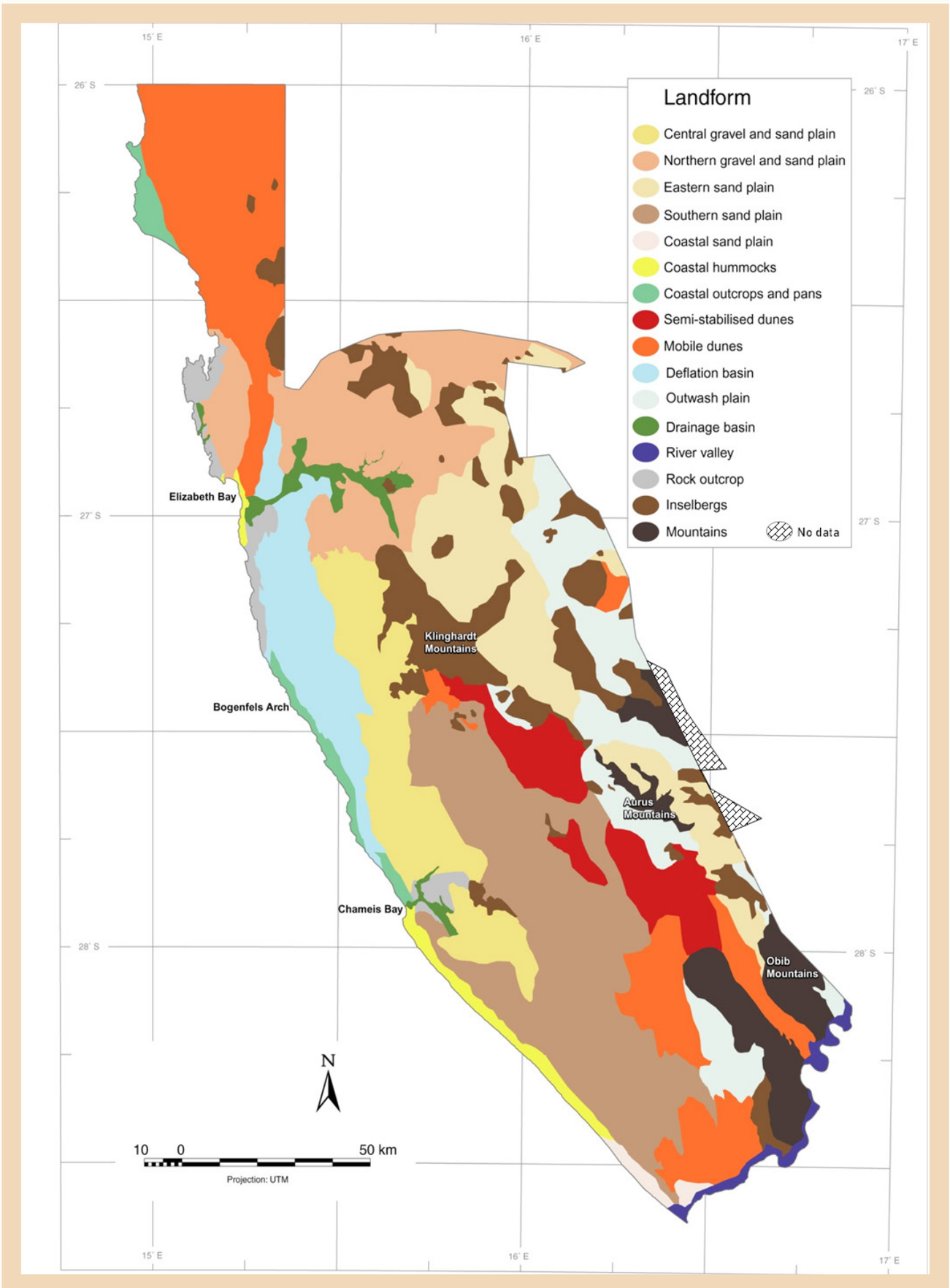


Figure 15 Landforms of the Tsau /Khaeb (Sperrgebiet) National Park (Burke 2006)

The park comprises 16 different landform units derived from the underlying geological components and structures and the geomorphological processes that continue to shape the land surface (Figure 15). Some 56 different vegetation types (Figure 17) have been identified in the Park. These are described in detail by Burke (2006[4]).

Figure 16 *Tylecodon* sp., possibly *T. schaeferianus*

4 Burke, A. 2006. The Sperrgebiet: Managing its biodiversity. EnviroScience, Klein Windhoek Namibia and Namibia Nature Foundation, Windhoek.

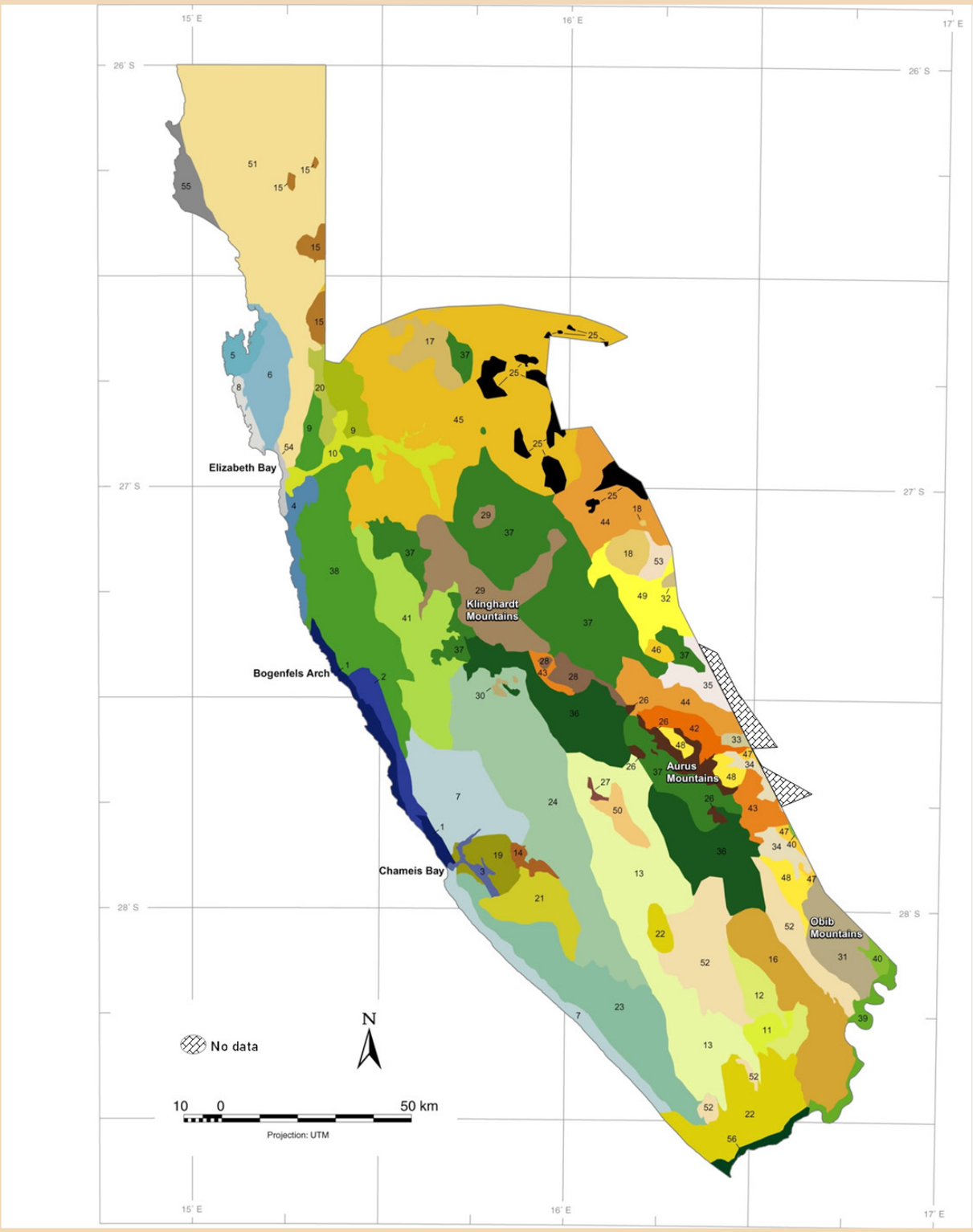


Figure 17 Vegetation types within the Tsau //Khaeb (Sperrgebiet) National Park (from Burke 2006)

Having been inaccessible to the public for a century and free of land-use activities such as livestock

farming, the TKNP presents an area of high importance for conservation, tourism and research.

The complex vegetation structure of the Park confirms that the Succulent Karoo ecosystem is the most diverse desert ecosystem in the world. In particular, there is high plant diversity. Some 1,050 species are known to occur in the Park, nearly 25% of the entire flora of Namibia on less than 3% of land area of the country. It is for this reason that the Succulent Karoo is listed amongst the world's top 25 "biodiversity hotspots".

In addition to plants, the Park has a rich but poorly studied diversity of animal life. These include some 80 terrestrial and 38 marine mammal species, the latter including the Cape Fur Seal with over 600,000 individuals (almost 50% of the world population), most of which are to be found in four main colonies at Wolf and Atlas Bays and on North and South Long Islands. Some 35 coastal and marine birds have been recorded, with islands such as Possession, Ichaboe, Sinclair, Plumpudding, Pomona and Albatross providing critical breeding grounds for up to 10 or more species, including African Penguin, Cape Gannet and various cormorants, gulls and terns. Almost 60 wetland (mainly along the Orange River) and some 120 terrestrial bird species have been recorded; almost 100 reptile species; some 16 frog species and a great number of insects and other invertebrates, probably 90% or more of the invertebrates yet undescribed to science (Griffin undated[5]).

Areas with very high conservation importance are (in no order): Lüderitz Peninsula dwarf-shrubland, Kowisberge and Tsaukhaib dwarf shrubland and Grillental corridor shrubland. In addition, the following inselbergs and mountain shrublands were also rated as of high conservation importance: Klinghardt Mountains, Heioab Mountains, Boegoeberg, Rooiberg, Aurus Mountains, Obib Mountains and Schakalsberge. Based on studies, the following areas within the TKNP were identified as areas of greatest importance for plant endemism: Lüderitz-Kowisberge, Klinghardt Mountains, Aurus- Heioab mountains, Skorpion, Obib-Schakalsberge, Grillental and the central coastal area (Bakers Bay to Pomona). These areas are extremely sensitive and take more than 10 years to re-establish plant cover and composition similar to that prior to the disturbance. Depending on the severity of the disturbance some areas may never recover, especially where substrate has been chemically or physically altered.

Burke 2006 also identified centres of plant endemism as shown in Figure 19 which largely correspond with these areas of very high conservation importance i.e. Lüderitz-Kowisberge; Klinghardt Mountains; Aurus-Heioab Mountains; Skorpion; Obib-Schakalsberg Mountains; Grillental; and the central coastal area from Baker's Bay to Pomona (Burke 2006)

Sites of relative biodiversity importance, natural monuments, special habitats and fossil sites in Tsau //Khaeb NP are shown in Figure 20 combined with the distribution of natural monuments (e.g. Bogenfels, Roter Kamm), fossil occurrences and special habitats (e.g. permanent springs, lichen fields), thus showing the overall sensitivity of different parts of the Park based on these criteria. The relative biodiversity importance was based on the number of endemic or threatened species per vegetation type.

5 Griffin, M. undated. Annotated checklist and conservation status of mammals, reptiles and amphibians of the Sperrgebiet, southern Namib Desert, Namibia. Ministry of Environment and Tourism

Figure 18 Desolate, barren and windswept desert plains south of Bogenfels

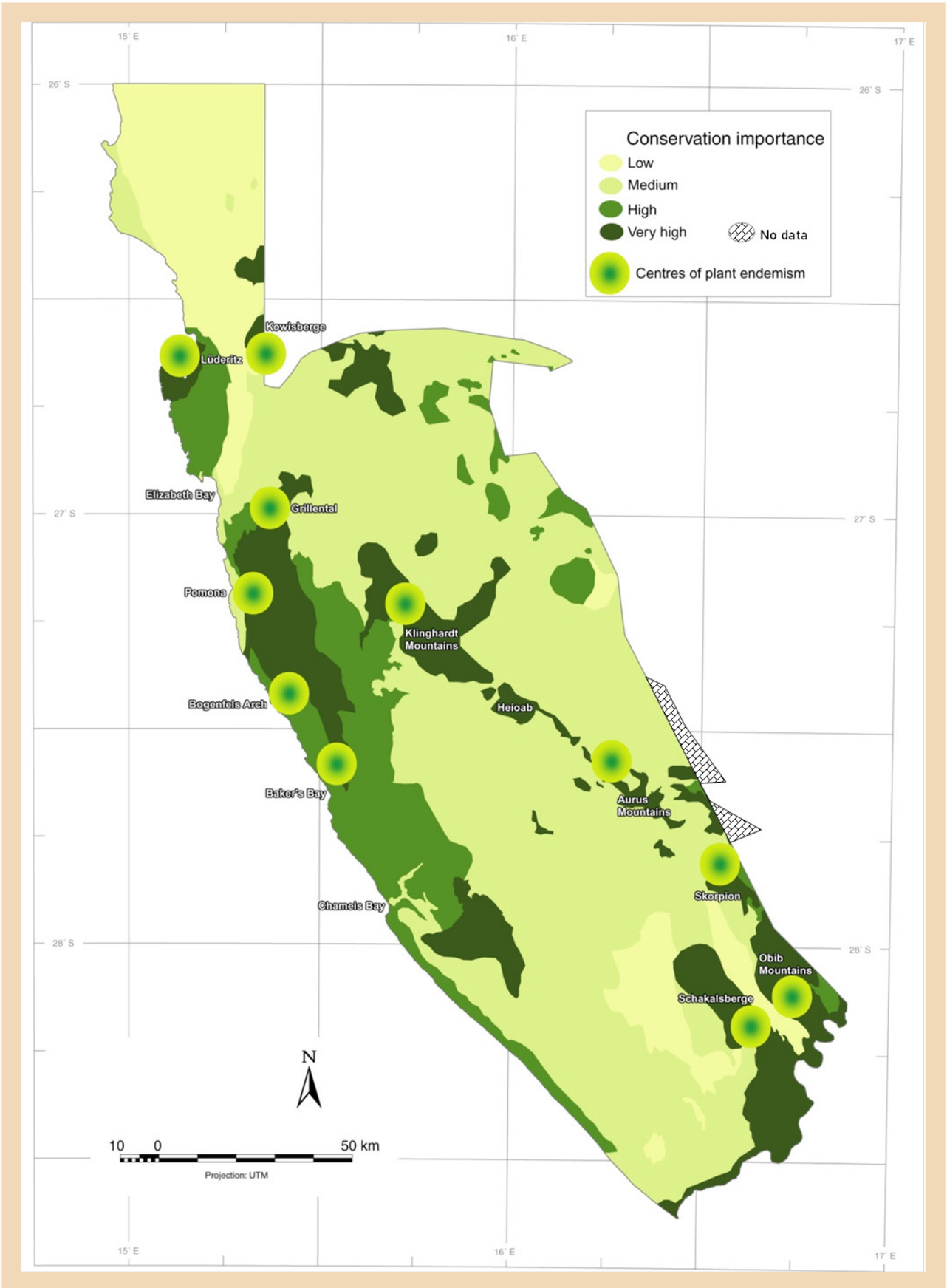


Figure 19 Centres of plant endemism in Tsau //Khaeb NP (Burke 2006)

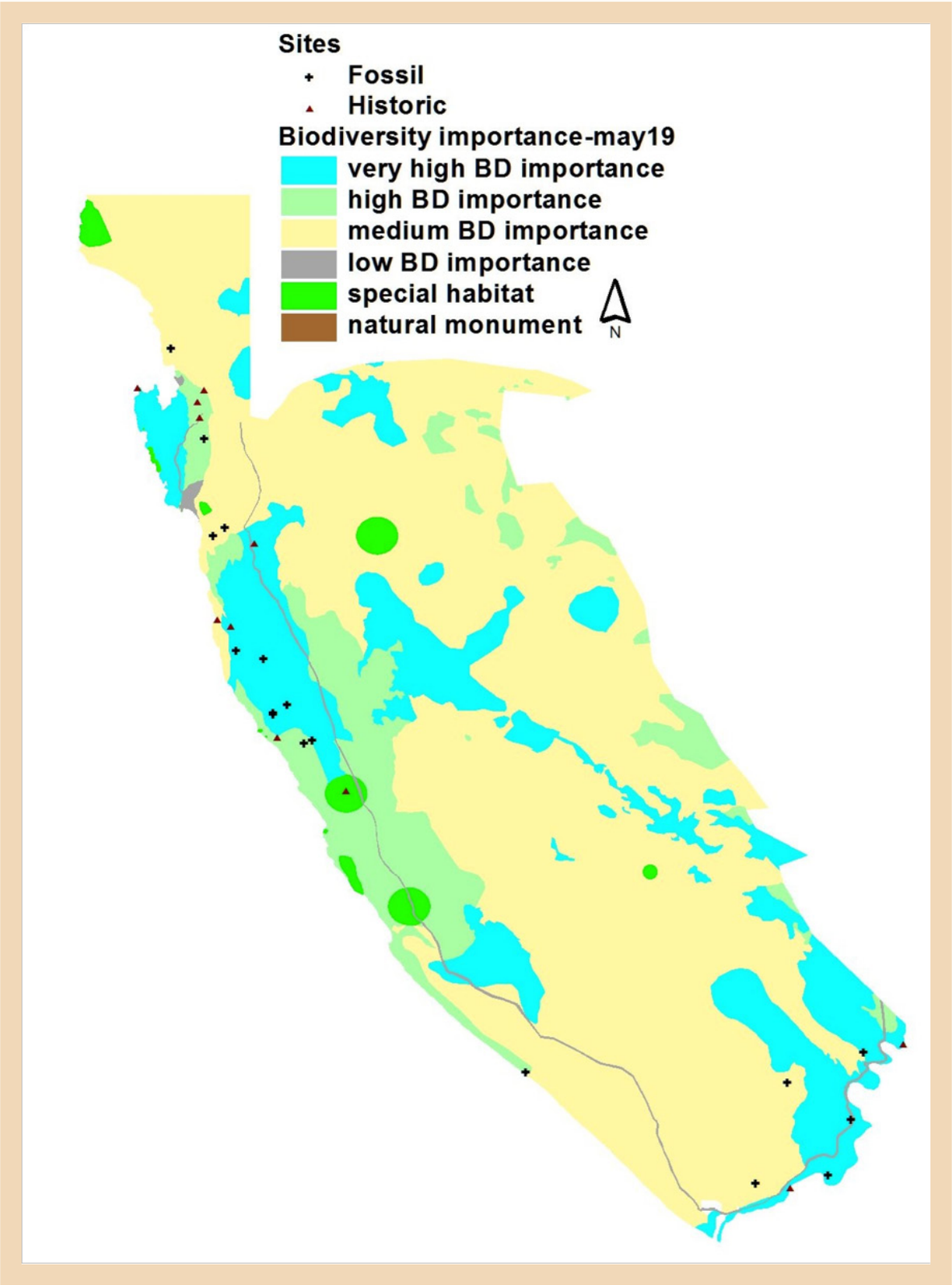


Figure 20 Sites of relative biodiversity importance, special habitats, natural monuments and fossil sites in Tsau //Khaeb History and legal status

1.3 History and legal status

The Sperrgebiet National Park later renamed Tsau //Khaeb (Sperrgebiet) National Park was proclaimed as a National Park in 2008 in terms of section 14 of the Nature Conservation Ordinance, No. 4 of 1975. The proclamation followed a Cabinet decision taken in 2004 (Decision No: 8th/06.04.04/006). This Cabinet decision was based on recommendations of the 2003 Sperrgebiet Land Use Plan commissioned jointly by the Ministry of Mines and Energy, the Ministry of Lands and Resettlement and the Ministry of Environment and Tourism. Cabinet directed the Ministry of Environment and Tourism to consult with stakeholders concerning a name for the new national park and explore alternative means of financing essential park management and maintenance through revenues earned from tourism. Consultations through the Park Advisory Committee were carried out till the proclamation was achieved. The park proclamation in 2008 coincided with the centenary of mining in the Sperrgebiet.

Government Notice 275 in the Government Gazette 4174 of 1 December 2008 provides a detailed (albeit not cartographically precise) boundary description:

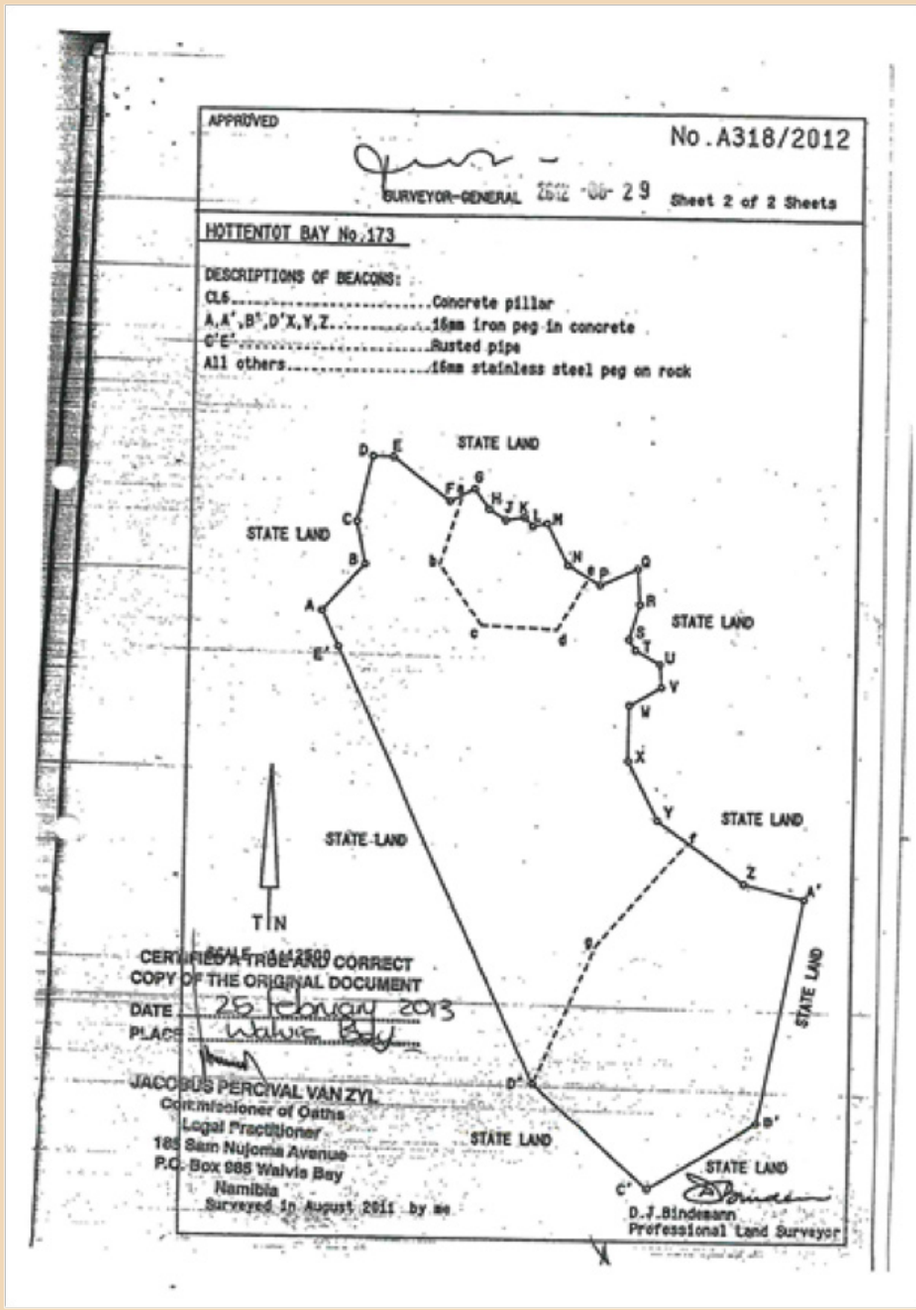
SCHEDULE

From a point on the low-water mark of the Atlantic Ocean due west of beacon No. 11 erected on or near the coastline of the Atlantic Ocean on the 26th degree of south latitude situated at a distance of approximately 2 kilometres northwards from the isolated rock known as Höhlenberg (Cave Rock) between Hottentot Bay and Saddle Hill and proceeding eastwards in a straight line, to a point intersected by an imaginary line drawn due north from the trigonometrical beacon Klammerberg 12 situated on the Kowis mountains, thence southwards along that imaginary line through the trigonometrical beacon Klammerberg 12 to a point where that line intersects the southern boundary of the road reserve of trunk road 4, section 2 between Aus and Lüderitz, thence eastwards along the southern boundary of that road reserve to a point where the road reserve intersects the northwestern boundary of Farm Ausweiche 46, thence in a southwesterly direction along the western boundary to the point where it meets the northeastern boundary of Farm Tsirub 13, thence along the northern, western and southern boundaries of Farm Tsirub 13 to a point where it meets the western boundary of Farm Paddaputs 90, thence generally in a southerly direction along the western boundaries of Farms Grens 92, Anib 93, Sandykop 94, Swartkloofberg 96 and Nord Witputz 22 to a point where the western boundary of Farm Nord Witputz 22 meets with the northern boundary of Farm Witputs Wes 86 to a point where it meets the northeastern boundary of Farm Trekpoort 96, thence along northern and western boundaries of Farm Trekpoort 96 to a point where it meets the northern boundary of Farm Spitskop Wes 128, thence along the western boundary of Farm Spitskop Wes 128 in a southerly direction along the western boundaries of Farm Spitskop Wes 128, thence in a southeasterly direction in a straight line through beacon No. 10 situated on the Dreigratberg to a point situated on the north bank of the Orange River, approximately 1,3 kilometers from such beacon, thence generally in a westerly direction along the northern boundary of the Orange River to a point of junction with the low-water mark of the Atlantic Ocean, thence generally in a northerly direction along the low-water mark of the Atlantic Ocean to the point of beginning.

For purpose of this Schedule "low-water mark" means the lowest line to which the sea recedes during periods or ordinary spring tides.

This boundary description is not reflected in the Eastern boundary demarcation of the Park. Importantly, there is an issue of demarcation, where the current boundary fence was erected, for reasons unknown, inside the legal boundary of the Park, leaving un-demarcated Park land in some areas outside this fence line. This matter can be addressed through signposting as it is not necessary for the management of the Park nor in the interest of landscape connectivity to realign the fence.

It is further known that there are four parcels of land with private titles in the Park, as shown in Figure 21. The titles to three of the parcels of land date back to the German colonial era and Namdeb acquired these in succession to Consolidated Diamond Mining (CDM). The fourth parcel is at Hottentots Bay[6] and is owned by a private company Hottentot Bay Investments cc. It extends to 161,368 ha (nearly 1% of the area of the Park) and was acquired with a waiver from the Minister responsible for land for N$1 million in 2002. Its coordinates are shown in the survey map below.



The future status of these units needs to be addressed in this management plan.

6 This name should be replaced. Older maps should be consulted for an alternative name or the traditional authority for the area could be asked for a different name

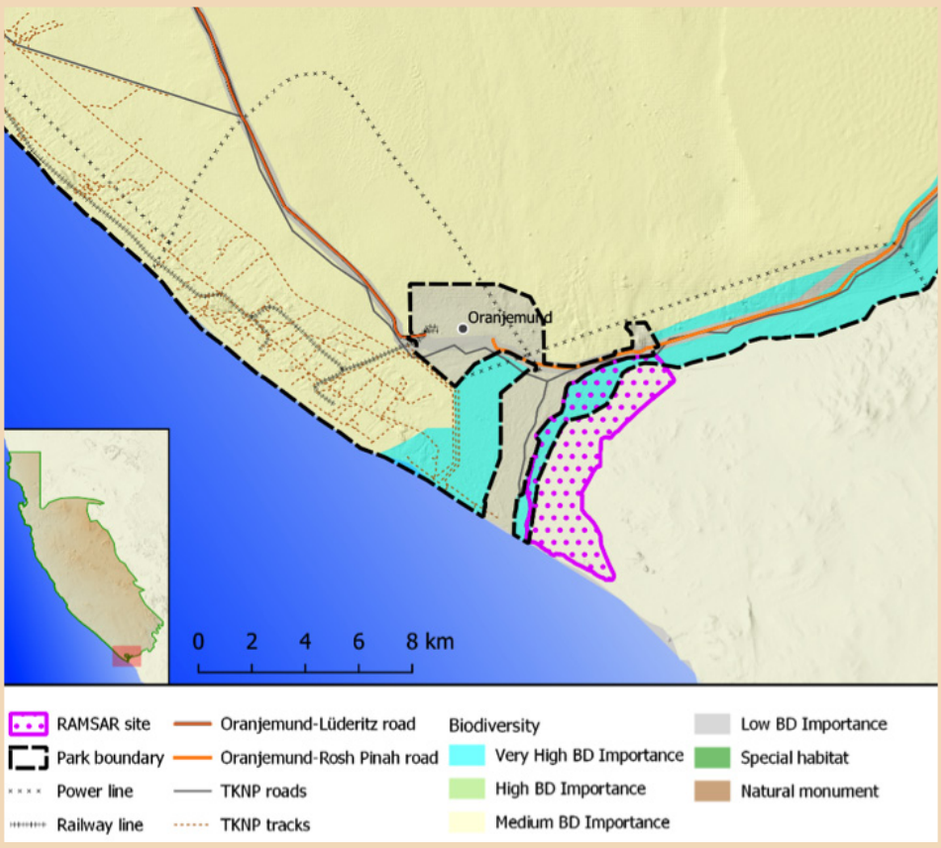
Figure 21 Private land in the Tsau //Khaeb NP owned by Namdeb

Much uncertainty has existed about the status of the Orange River Ramsar Site, i.e. whether it falls within the Park or not. This has been exacerbated by the proclamation of Oranjemund Town. The Orange River mouth is a registered Ramsar wetland of international importance as indicated in Figure 22. It should be noted that the boundary description given in Government Notice 275 in the Government Gazette 4174 of 1 December 2008 is not cartographically precise and that the boundaries of the Park to some extent remain subject to interpretation. There is no precise definition of the "northern boundary of the Orange River", the phrase used in Government Notice 275 to describe the southern boundary of the Park. Neither has the boundary of the Ramsar Site, on the Namibian side at least, been adequately or accurately mapped and described.

For the purposes of this management plan, at least a part of the Ramsar Site – although a very small but important part - is considered to be part of the Park and its management is incorporated in the management of the Park. Much of the Ramsar Site is bordered by the Oranjemund Town boundary but because the northern boundary of the Orange River has not been defined, it is precautionary to assume that at least some part of the Ramsar Site falls within the Park. This part is effectively the westernmost section and the remainder of the riverbank part of the Ramsar Site, see Figure 22 A-C.

The situation is further complicated by the extension of the Namibian part of the Ramsar Site to the middle or deepest channel of the Orange River (as evident from the maps available, as no boundary description for the Ramsar Site is available). The southern boundary of the Park extends up to the undefined northern boundary of the Orange River and therefore clearly does not include the greater part of the Ramsar Site. It is important that this situation is addressed within the lifespan of this management plan to provide legal certainty, assign a clear jurisdictional responsibility over the Ramsar Site in line with its international status and land use and to facilitate management and, in particular, law enforcement.

A



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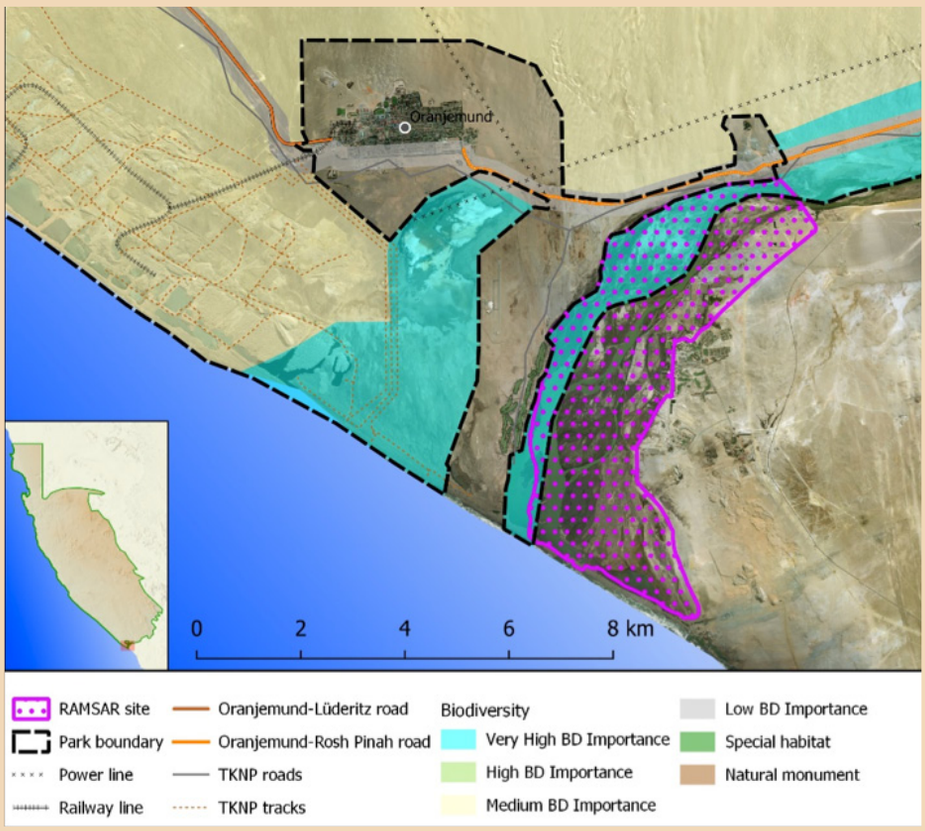


C

Figure 22 A-C Orange River Mouth Ramsar Site in relation to the zone of very high biodiversity importance and existing infrastructure in A and B. Figure 22C provides greater detail of the Ramsar Site overlaying a satellite image and being bordered in the North and West by the Oranjemund Town boundary but being connected to the Tsau //Khaeb National Park through a panhandle lying between the Oranjemund Town boundary and the middle of the Orange River.

The Diamond Act, Act 13 of 1999 applies to areas where diamonds are mined and processed. It does not provide for any area to be declared as a "Diamond Area" as such but in Section 50 provides for the establishment of a security plan for all areas where diamonds are mined and processed, to be approved by the Minister. It is this security plan that provides the strict controls over access into such areas. It appears that security plans may also cover land outside diamond mining areas, thus explaining the current restricted access over the entire Park. To allow for tourism development in the Park, MEFT and MME have initiated a process to exclude the area falling outside the NAMDEB Mining License Areas in the Park from such security restrictions as well as to relax certain restrictions for access to certain parts of Namdeb Mining License Areas for controlled tourism. A similar arrangement needs to be explored concerning Lewcor as the new owners of the Elizabeth Bay mine.

1.4 Economic opportunities

Although closed to the public for more than a century the Tsau //Khaeb NP has high tourism potential. A number of viable low impact tourism options have been identified in the park. The Park offers tranquil unspoiled wilderness, rare and endemic species, natural monuments such as Roter Kamm and Bogenfels, seal colonies, historical artefacts and structures such as the historic or ghost mining towns, a Ramsar Site and river adventures. A tourism plan has been developed for the Park and is summarized in this plan. Tourism activities will be offered through concessions to be awarded on the basis of the Policy on Tourism and Wildlife Concessions on State land, in terms of powers vested in the Minister of Environment, Forestry and Tourism by the Nature Conservation Amendment Act (Act 3 of 2017). The making of commercial films in the Park is to be encouraged.

The extraordinary plant biodiversity of the Park presents considerable economic opportunities. The unique succulent plant species of the Park are in local and international demand and can be cultivated from seed that can be sustainably harvested. The establishment of one or more indigenous plant nurseries in towns such as Lüderitz or Oranjemund should be encouraged and seed collection in the park should be facilitated. A legal source for succulent species is very likely to prevent attempts to illegally collect.

There are interests around other economic activities in Park such as mariculture[7] and agriculture. The former would require on-land infrastructure and could be considered in already disturbed areas, subject to environmental impact assessments. The Ministry of Fisheries and Marine Resources is the regulator for mariculture but the national park status of the Tsau //Khaeb NP requires compliance with all relevant legislation administered by the Minister of Environment, Forestry and Tourism, including the Environmental Management Act, Act 7 of 2007. Agriculture presents a specific problem and conflicts with the objectives of a national park. The Minister of Environment, Forestry and Tourism will not have a specific legal basis in existing legislation or the Draft Wildlife and Protected Areas Management Bill[8] upon which to grant any permission to conduct agriculture. If any consideration is to be given for economic activities such as agriculture, already disturbed areas within the Managed Resource Use Zone (see Chapter 3) could potentially be used provided that such activities are compatible with the objectives of the Park, as outlined in the Draft Wildlife and Protected Areas Management Bill.

All applications for economic activities in the Park (other than exploration and mining for which there is an established application procedure) must be directed to the Minister of Environment, Forestry and Tourism. The same applies to applications concerning the expansion of town lands.

7 Mariculture is the term used for aquaculture as defined in the Aquaculture Act, Act 18 of 2002, involving marine species.

8 All references to the Draft Wildlife and Protected Areas Management Bill in this plan should be taken to refer to the Wildlife and Protected Areas Management Act once this Act has been promulgated.

Figure 23 Tourists at Bogenfels, a natural monument and one of the main tourism attractions of Tsau //Khaeb NP

Chapter 2 Management objectives

2.1 Purpose of the management plan

This management plan describes the objectives, principles and strategies for the management of the Tsau //Khaeb NP so that all interventions can be planned, focussed and co-ordinated according to agreed principles.

As an official document issued by the MEFT, the management plan is secondly a statement of commitment that binds its staff to manage TKNP according to provisions of the plan. Timelines for activities are included and it is incumbent on MEFT management to agree on responsibilities for ensuring that approved activities are timely addressed.

Thirdly, the plan obliges the wide variety of people and organisations (private sector contractors, public service agencies, neighbours, tourists, etc.) associated with TKNP to ensure that their activities are congruent with provisions of the plan.

Finally, implementation of the principles provided in this plan will reduce the need for reactive, unplanned responses to unexpected events. Indeed, the management plan should provide guidance over the next ten years and may only be changed with the approval of senior management in the MEFT. In line with MEFT's management plan guidelines, this plan should be reviewed every five years for the establishment of the following five-year operational plan.

2.2 Park management objectives

The overarching Mission of the Ministry of Environment,Forestry and Tourism is "To promote biodiversity conservation in the Namibian environment through the sustainable utilization of natural resources and tourism development for the maximum social and economic benefit of its citizens".

Tsau //Khaeb is classified as a National Park:

i. to protect the ecological integrity of one or more ecosystems for present and future generations, and exclude exploitation or occupation inconsistent with such protection; and
ii. to provide a foundation for compatible cultural, scientific, educational, recreational and visitor opportunities;

From the mission statement the following strategic objectives were derived for the management of the Tsau //Khaeb NP.

Strategic objectives

The main purpose of Tsau //Khaeb NP is captured in the following five objectives:

1. To secure and increase landscape connectivity
2. To protect and maintain biodiversity
3. To maximise regional economic development, based on the principles of sustainable utilisation
4. To develop, implement and maintain regional conservation synergy through effective interaction with all park neighbours
5. To protect and maintain cultural and historic assets

Enabling objectives

In order to achieve the strategic objectives, the following two enabling objectives must be realized:

1. To develop, implement and maintain an efficient and functioning park management system
2. To develop, implement and maintain effective and efficient systems, infrastructure and equipment that can support core functions

Specific objectives for Tsau //Khaeb NP

Linked to the strategic objectives, specific objectives for the Tsau //Khaeb National Park were identified, as follows:

Strategic objectives	Tsau //Khaeb National Park specific objectives
To protect and maintain biodiversity	• The recognized biodiversity hotspot must be managed and protected • The coastal ecosystem must be managed and protected
To protect and maintain cultural and historic assets	• The historical and cultural value of the park must be protected (historic mining sites and graves to be recorded and protected) • Palaeontological and archaeological assets must be recorded and protected

2.3 Conservation and management targets

Based on the consultations and inputs received as part of the review of the previous management plan, the most important short to medium term threats to the park and consequently the most important conservation and management targets in terms of these objectives and the current status of the park are:

Greatest threats to Tsau //Khaeb NP	Key conservation and management outcomes for Tsau //Khaeb NP
Strategic Objective: To secure and increase landscape connectivity	
Loss of landscape connectivity	• Landscape level conservation has been promoted through the expansion of the Ai-Ais Richtersveld Transfrontier Conservation Area to include the Park • East-west wildlife movement corridors have been re-established to mitigate against habitat fragmentation and climate change by negotiating agreements with cooperative park neighbours • Priority land units to be acquired to establish an effective permanent land link with the future Fish River NP have been identified, and acquisitions negotiated. • The management of the Orange River mouth Ramsar Site has been integrated with the management of the Park • The management of the southern part of the Namib Naukluft Park has been integrated with the management of TKNP • The boundaries of the Park are adequately demarcated
Strategic Objective: To protect and maintain biodiversity	
Destruction of wildlife or wildlife habitat through mining, infrastructure development and tourism	• The policy on mining in protected areas is strictly adhered • The implementation of Environmental Management Plans established in terms of the Environmental Management Act for mining and infrastructure development are monitored and enforced. • DPWM staff are appointed as Environmental Inspectors • Long-term research on the flight paths of seabirds are established considering potential energy generation and transmission projects
Climate change may fundamentally change the rainfall regime and cause the geographical displacement of the winter rainfall region	• Effective monitoring for early detection of declines in biodiversity and key species, especially endemic species has been introduced • Increased research on the lifecycles and habitat needs of endemic species has been undertaken • A ranking of vulnerability for endemic species based on factors such as life cycle, distribution, habitat availability has been compiled.

Greatest threats to Tsau //Khaeb NP	Key conservation and management outcomes for Tsau //Khaeb NP
Failure to restore and rehabilitate disturbed areas	• Priority habitats and landscape features to be rehabilitated have been identified and rehabilitation is taking place • A long-term rehabilitation plan for the Park has been established • The ongoing rehabilitation of disturbed areas by NAMDEB or any other future mining operator/s is encouraged • A monitoring system for the rehabilitation programme is established and functional
Biodiversity impacts through illegal activities in the park	• Illegal grazing, illegal plant collecting and illegal fishing in the park are controlled
Strategic Objective: To develop, implement and maintain regional conservation synergy through effective interaction with all park neighbours	
Management of the park in isolation of its geographic and social context	• Encourage cooperation with MFMR regarding the management of the Marine Protected Area (MPA) and the management and monitoring of species that use both the Park and the MPA • The operations of the Ontanda Environmental Education Centre as a repository of knowledge on the park and surrounding areas has been revitalised • Operationalize the Park Advisory Committee to serve as an advisory body for the Park comprising all major stakeholders
Unclear park boundaries may compromise law enforcement	• The Park boundary description and demarcation have been harmonized • The boundary description and legal status of the Orange River Ramsar site have been improved
Conflict over the future of the feral horses	• The new plan of the Ministry regarding the horses is implemented and applied
Strategic Objective: To maximise regional economic development, based on the principles of sustainable utilisation	
The park is not contributing to sustainable economic development	• The tourism development plan is implemented
Given the hyperaridity and sensitive landscapes of the park, tourism results in negative impacts	• The effectiveness of the tourism development plan to ensure sustainable tourism is being monitored • Compliance by concessionaires with concession contracts is being monitored • The impact of tourism concessions on the Park is being monitored, and in consultation with Head Office remedial actions are taken before impacts become aggravated
Private land ownership in the park	• Encourage the voluntary transfer of private land in the Park to the Ministry • Apply the provisions of the Protected Areas and Wildlife Management Bill once enacted

Greatest threats to Tsau //Khaeb NP	Key conservation and management outcomes for Tsau //Khaeb NP
Strategic Objective: To protect and maintain cultural and historic assets	
Risk of degradation of historical sites without appropriate management	• An inventory of historical sites is established • Historical sites are classified into categories of management (preservation, no interference, removal) • A protocol or manual for the management of sites in these categories has been developed in collaboration with specialist organizations • A list of priorities for sites requiring attention in the ten-year period of the management plan has been developed in collaboration with specialist organizations • The impact of tourism on sensitive high value sites (e.g. Kolmanskop, other historic mining villages) is being monitored • Archaeological sites are registered and excluded from disturbance
Risk that geological and paleontological values will deteriorate without appropriate management	• An inventory of sites of geological and paleontological importance is established • An assessment of the specific management needs of such sites has been developed in collaboration with specialist organizations • A list of priorities for sites requiring attention in the five-year period of the management plan has been developed in collaboration with specialist organizations, and an action plan is being implemented • The impact of tourism on sensitive high value sites (e.g. Bogenfels and Roter Kamm) is being monitored
Private land ownership in the park	• The voluntary transfer of private land in the Park to the Ministry has been secured • The provisions of the Protected Areas and Wildlife Management Bill once enacted are applied
Enabling Objectives	
Insufficient operating budget	• Sustainable financing is secured for all priority activities in the management plan
Degradation of infrastructure and equipment due to a lack of maintenance	• Maintenance schedules for plant and equipment are adhered to resulting in well maintained facilities
Inadequate monitoring of the implementation of the management plan and ecological changes in the park	• All priority parameters are effectively implemented to enable timely intervention and corrective measures • The management team for the Park has reviewed the implementation of the management plan at quarterly review meetings
Park management is compromised by the lack of staff due to excessive vacancies or unmotivated staff	• Key positions are filled by well-trained staff members who are willing to learn all there is to learn about park management and teach the same to newcomers • Adherence to national policies on human resource management and capacity development to ensure that the Park staff is motivated

Figure 24 *Pelargonium crythmifolium,* a species endemic species to the Succulent Karoo Biome

Figure 25 *Aloidendron ramosissimum* (formerly *Aloe ramosissima*). The northernmost distribution of this species occurs in the Park and the distribution of this species may be an indicator of climate change. As with many populations of the three species of Aloidendron in Namibia (A. *dichotomum,* A. *pillansii* and A. *ramosissimum*) there is a scarcity or complete absence of small plants and recruitment may not have taken place for many decades.

Chapter 3 Zonation

Zonation helps prioritise management activities and resources, focus economic opportunities, and provides guidance for medium to long-term development, and is hence a valuable tool for planning and managing parks. An overarching principle that must be adhered to in the zoning of protected areas is that it must be used to simplify management.

Management zones define what can and cannot occur in different areas of the park in terms of natural resources management; cultural resources management; human use and benefit; visitor use and experience; access; facilities and park development; maintenance and operations. Through management zoning the limits of acceptable use and development in the park are established, as well as the types of management actions that will be required.

Typically, zoning is used to:

- provide protection for critical or representative habitats [and species], ecosystems and ecological processes;
- separate [or contain] conflicting human activities;
- protect the natural and/or cultural qualities while allowing a spectrum of reasonable [compatible] human uses;
- enable damaged areas to be set aside to recover or be restored; and
- simplify management.

Although in most cases zoning is reflected as the delineation of management zones on a map of a protected area, i.e. a spatial association, further zonation may be achieved in time where a zone may be used for different (sometimes incompatible activities), but at different times of a given period (e.g. seasonal limits to use and access opportunities).

The Guidelines for the Zoning of Protected Areas in Namibia (2019) defines the management zones applicable to Namibian protected areas, and how they should be applied.

Principles

- Zonation will be applied to:
  - comply with formal agreements or legislation
  - protect scarce and sensitive landscapes, habitats and organisms
  - protect important ecological processes, such as game movements
  - protect cultural, heritage and other important sites
  - achieve the economic goals of the Park
  - achieve specific management requirements

- The Guidelines for the Zoning of Protected Areas in Namibia[9] will be followed when defining management zones within any protected area, considering:
  - The biodiversity objectives of the park
  - Unique landscape features, plant assemblages, cultural, historical or heritage sites
  - Wider landscape and connectivity objectives
  - Economic development objectives, including areas for tourism and other uses

9 Guidelines for the Zoning of Protected Areas in Namibia, Ministry of Environment and Tourism 2019

- Regardless of management zones:
  - Environmental Impact Assessments (EIA) are to be undertaken as prescribed
  - All developments inside the Park should be subject to a cost/benefit analysis through an environmental assessment process. The analysis should examine all costs and benefits, including those of an ecological, economic, social and political nature
  - No off-road driving is permitted in any zone (except by park management for official purposes)

Objective

To ensure that management zones are applied according to the official guidelines for zoning of protected areas in Namibia, and to support the management objectives of the park

Figure 26 *Sarcocaulon* sp. in Tsau //Khaeb NP

Tsau //Khaeb NP management zones

Figure 27 provides the map of Tsau Khaeb NP showing the management zones for the park, and Table 1 provides an overview of each area.

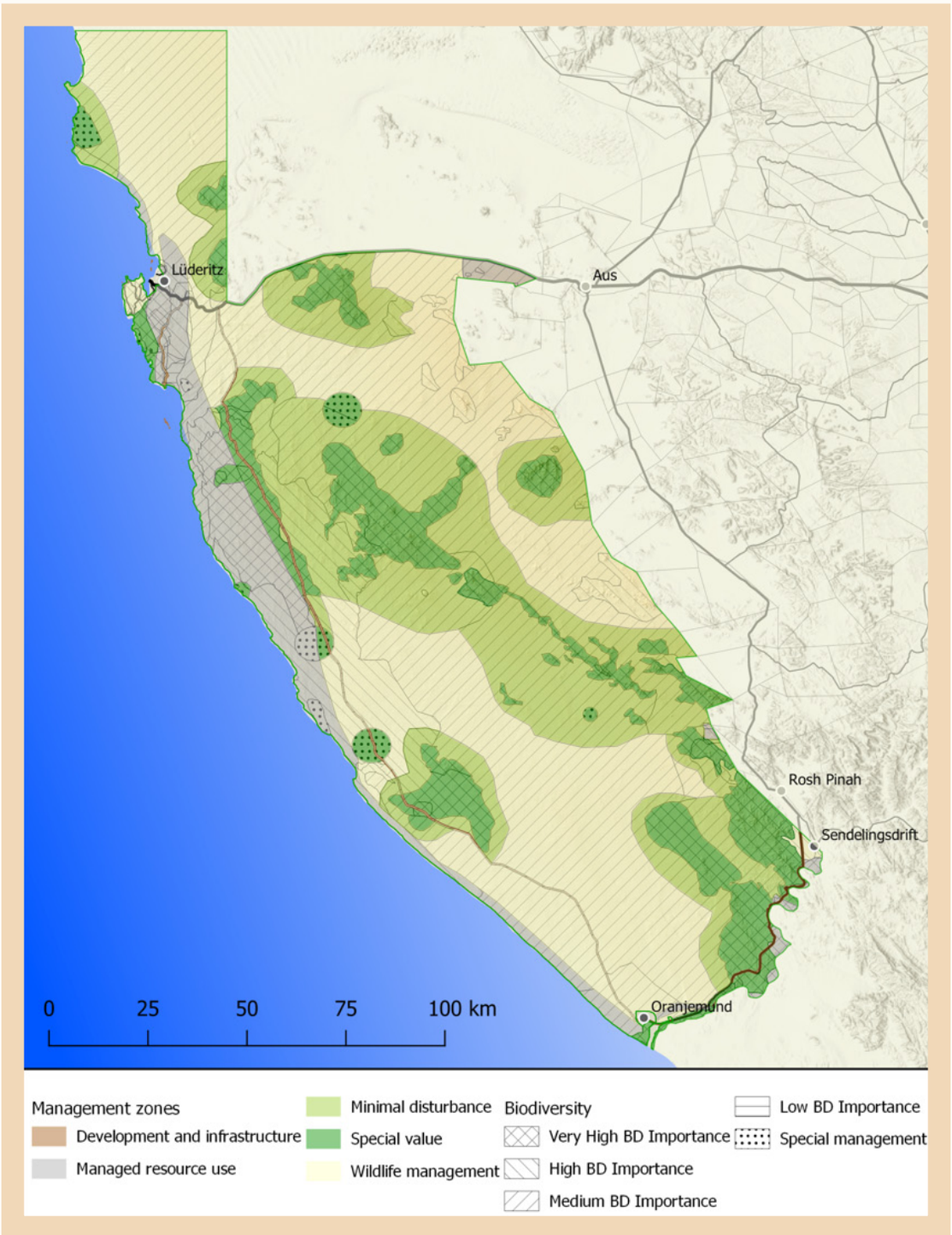


Figure 27 Management zones of the Tsau //Khaeb NP

Table 1. Description of Tsau //Khaeb NP management zones

Management zone	Description of area	Key properties	Management guidelines
Special Value	1. Springs	• Important habitats for flagship species, e.g. feeding or breeding sites, special habitat for wildlife or providing essential ecosystem function (e.g. wetland)	• Not suitable for roads • Where re-routing of roads is required, old parts should be rehabilitated. • No mining or prospecting is allowed according to the policy on mining and prospecting in protected areas. • No tourism infrastructure development within these areas • Guided tourism is permitted but precautions are needed to avoid impacts on rare plant species (e.g. through the environmental guidelines that will be developed for each tourism concession) • No new patrol camps • No artificial water to be provided • Prioritize rehabilitation • Close non-essential tracks Red flags • New roads are likely to result in unacceptable environmental impacts. • The effect of any development or activity on soil stability should be considered and appropriate measures taken to avoid erosion. • Tourism impacts are likely unless tourism activities are closely monitored and mitigated.
	2. Rocky outcrops (Kowis mountains, Lüderitz peninsula, Tsaukhaib-Haalenberg inselbergs, Grillental-Pomona corridor, Boegoeberg, Klinghardt mountains, Tsaus mountain, Heioab-Aurus mountain range, Chamnaub inselbergs, Rooiberg-Nudavib mountains, Skorpion inselbergs, Obib mountains, Schakalsberge and the Orange River valley.	• As Areas of very high[10] or high plant biodiversity[11]	
	3. Natural feature / monument	• Natural feature of outstanding importance • High scenic and tourism values	
	4. Riverine band	• High biodiversity • Rare and sensitive habitat that has already been impacted by mining • Important habitats for flagship species, e.g. feeding or breeding sites, special habitat for wildlife or providing essential ecosystem function (e.g. wetland) • Ramsar Site	
	5. Fossil and archaeological sites	• High scientific and cultural values • Sensitive to disturbance	

Footnotes

[10] At least two of the following four criteria must be satisfied for designating areas as Very high biodiversity zones (Burke, in prep.):
≥ 1 plant species endemic to mapping unit
; ≥ 150 plant species
; ≥ 5 park endemics
; ≥ 10 protected species

[11] At least two of the following four criteria must be satisfied for designating areas as High biodiversity zones (Burke, in prep.):
≥ 100 plant species
; ≥ 5 park endemics
; ≥ 5 protected species

Management zone	Description of area	Key properties	Management guidelines
Minimal Disturbance	6. Buffer zones	• Areas of medium biodiversity[12] that interconnect areas of high or very high biodiversity or provide a buffer zone around such areas	• No new roads should be constructed in this area • Only guided tourism • No harvesting • No permanent structures to be developed (except possible rest / picnic points, which must be developed in a way that blend into the environment) • No off road driving • No mining or prospecting is allowed according to the policy on mining and prospecting in protected areas
Wildlife Management	7. Remainder of the Park except the Managed Resource Use Zone	• Lower sensitivity	• The same management guidelines as for the minimal disturbance zones, except that the following tourism activities can be offered by tourism concessionaires: o Game drives and viewing o Guided hiking and biking trails o Bush picnics o Stargazing tours o Fishing at designated sites in the Lüderitz peninsula and Orange River estuary o Catch-and-release fishing as part of tourism concession activities, only as specified in concession agreements
Managed Resource Use	8. Mining licences / active mining	• Areas subject to mining licenses	The same management guidelines as for the minimal disturbance zones, except that mining can take place or that horses are protected as outlined in this management plan
	9. Namib horse management area	• Area designated for the protection and management of the Namib horses	
Development and infrastructure	10. Major roads, airfields, Park and Mine stations & Tourism development areas	• These zones provide for the infrastructure needed for park management as well as tourism and recreation opportunities. • It includes the existing mining facilities, wind farm as well as park management infrastructure. • Any new developments must be compatible with the objectives of the park, and negative impacts on the protected area must be minimized.	

Footnotes

[12] At least one of the following four criteria must be satisfied for designating areas as Medium biodiversity zones (Burke, in prep.):

≥ 500 plant species

; ≥ 1 Namib endemic

; ≥ 1 protected species

; poor data, but protected or Namib endemics expected

Figure 28 Archaeological (Stone Age) petroglyphs (rock engravings) at the Orange River Pomphuis. There are even more spectacular petroglyphs on deep blue dolomite in the Orange River near Daberas that should be important tourist attractions once the area becomes accessible

Chapter 4 Landscape connectivity

Increasingly there is a need to think in terms of landscape connectivity in the era of anthropogenic climate change. The south-western part of Namibia will be one of the most affected parts of the country despite its already hyper-arid status. Many local adaptations to low but predictable levels of rainfall in the winter months as well as moisture laden winds or fogs may be at risk due to climate change. Very little can be done to mitigate climate change at local level except to enhance landscape connectivity. Landscape connectivity means that dispersal corridors are functional, and that species can over the short to long term migrate to climatic refugia.

This requires that conservation in this part of Namibia and adjacent South Africa be managed through a large mosaic of interconnected protected areas and wildlife-compatible land management units. Connectivity in this large arid landscape has been severely impacted but can potentially be restored.

Greatest threats to Tsau //Khaeb NP	Key conservation and management outcomes for Tsau //Khaeb NP
Strategic Objective: To secure and increase landscape connectivity	
Loss of landscape connectivity	• Landscape level conservation has been promoted through the expansion of the Ai-Ais Richtersveld Transfrontier Conservation Area to include the Park • East-west wildlife movement corridors have been re-established to mitigate against habitat fragmentation and climate change by negotiating agreements with cooperative park neighbours • Priority land units to be acquired to establish an effective permanent land link with the future Fish River NP have been identified, and acquisitions negotiated. • The management of the Orange River mouth Ramsar Site has been integrated with the management of the Park • The management of the southern part of the Namib Naukluft Park has been integrated with the management of TKNP • The boundaries of the Park are adequately demarcated

Historically, a large population of oryx occurred in the Sperrgebiet and moved east-west to and from the Huib Hoch Plateau escarpment (east of the Aus-Rosh Pinah Road) where the oryx would be able to benefit from the slightly earlier and higher rainfall in the escarpment zone before retreating deep into the hyper-arid zone of the Park[13]. Today there is only a remnant oryx population left in the Park and the two new fences (although not actively maintained at all times, as e.g. in 2019) currently on either side of the Aus-Rosh Pinah Road have created a formidable barrier to movements. No underpasses were left, although some of the culverts under his road could potentially function as underpasses as long as the fences are not maintained. From the little information available, the oryx population of the park numbers less than 500, the lowest it has been for decades, undoubtedly also showing the consequences of an exceptionally dry period from to 2012 to 2019.

13 Interestingly, Killian (1995) was not able to show large scale movements of oryx in and out of the Park. There could be several explanations for this i.e. that the fences were more effectively maintained at that time or that rainfall conditions in the Park were atypically high in the early 1990s. It is also likely that the major population decline has already occurred before the 1990s as he gave estimates of oryx numbers in the same order as current estimates. Killian, W. 1995. The ecology of the gemsbok (*Oryx gazella*) in the southern Namib. Ministry of Environment and Tourism

Figure 29 Large culvert under the Aus-Rosh Pinah Road

The Wildlife and Protected Areas Management Bill makes provision for the Minister to enter into agreements with any party to further the objectives of the legislation. This includes entering into agreements with park neighbours to breach fences to allow movements. This would require that the land use on the neighbouring land is compatible with the Park and that there is a robust monitoring mechanism in place to prevent abuse. The Bill also makes provision for landscapes of special conservation importance as a category of protected area, which could be suitable for areas adjacent to the Park that in effect serve as a buffer zone for the Park or provides an essential corridor for wildlife movements or a wildlife dispersal area that will benefit the Park and the conservation of species such as oryx, springbok and ostrich.

If agreements were to be established with Park neighbours, the following elements should be included in such agreements aimed at establishing free passage for wildlife:

- Undertakings of both Parties to act in the best interest of conservation by enabling wildlife movements in response to natural environmental factors and to prevent the accidental killing of wildlife in fences
- Limitations on the hunting of oryx, springbok and ostrich on land neighbouring the Park
- Procedures regarding the deliberate opening of gaps in border fencing
- Limitations on the construction of any new artificial watering point within 5 km of any gaps in border fencing, artificial feeding or the use of licks and salt to attract game
- Procedures regarding the monitoring of wildlife movements through such gaps
- Joint wildlife monitoring of the larger park and neighbouring land complex
- Cooperation on the prevention of illegal killing of wildlife
- Removal and storage of loose wiring to prevent creating a hazard for wildlife

Principles

- Landscape connectivity needs to be maintained and restored
- Management of the Park should harmonise and align to the management of adjacent protected and other conservation areas
- Key wildlife dispersal areas within Namibia and across international borders must be conserved

Figure 30 Huib Hoch Plateau escarpment mountains east of the Tsau //Khaeb NP to which oryx migrate at the start of the rainfall season

Figure 31 Thousands of *Aloidendron dichotomum* and *Euphorbia* spp. occur in the Huib Hoch Plateau east of the Tsau //Khaeb NP as part of the historical range of oryx in the Park and adjacent land

Objective

To mitigate the effects of climate change by securing and increasing landscape connectivity

Strategies

- The most urgent intervention is to restore the east-west wildlife movement corridors to mitigate against habitat fragmentation and climate change by negotiating agreements with cooperative park neighbours. The Wildlife and Protected Area Management Bill makes provision for such agreements. Large parts of the area east of the Park are not commercially farmed and could by such agreement functionally become a buffer zone for the Park
- A feasibility study should be undertaken of the establishment of one or more underpasses for oryx, ostrich and springbok under the Aus-Rosh Pinah road
- Land for acquisition should be identified to expand the land link between the Park and the future Fish River NP (currently Ai-Ais Game Park)
- The Ai-Ais Richtersveld Transfrontier Conservation Area should be expanded to include the Park
- Integrate the management of the Orange River mouth Ramsar Site with the management of the Park.
- Integrate the management of the southern part of the Namib Naukluft Park with the management of the Park
- Improve the demarcation of the Eastern boundary of the Park

Chapter 5 Management of Natural Resources and special sites

The protection of biodiversity is a fundamental objective of any State-protected area and is amongst the most important considerations in the management of Tsau //Khaeb NP. The Park has possibly the highest biodiversity of any protected area in Namibia, with the greatest degree of endemism of any protected area in Namibia. Biodiversity conservation is thus without question the highest priority for this Park.

Special sites included in this chapter are natural sites of special conservation importance based on their geological history or other landscape features. Historical sites linked to the mining exploitation and the management of the Diamond Area or Sperrgebiet are covered in Chapter 7.

Namdeb as the former custodian of Diamond Area I has left an important legacy of strict protection of the areas outside the Mining License Areas, i.e. more than 70% of the Park, as well as rehabilitation of mined areas. Rehabilitation is a highly expensive and complex activity and in extreme environments such as that of the Park, may have variable results. Important achievements have nevertheless been made in the rehabilitation of certain areas important to biodiversity conservation and should be replicated elsewhere in the Park and over the long term.

Principles

- Protecting and maintaining biodiversity is a core function of MEFT and protected areas play a crucial role in this regard
- The comprehensive diversity of landscapes, habitats, plants and animals indigenous to the Succulent Karoo Ecosystem and adjacent transition belts are protected and both ecosystem functioning and natural evolutionary processes take place effectively
- The park must be managed in a way that protects, and where possible restores, its original suite of species and habitats within an open, dynamic and resilient ecosystem
- Ecosystem functioning and resilience depends on a dynamic relationship within species, among species and between species and their abiotic environment, as well as the physical and chemical interactions within the environment
- Disturbed areas should be rehabilitated, whether by mechanical or natural means (e.g. surface contouring or smoothing, wind, tides, seed dispersal and natural recolonization)
- Additional artificial water points for wildlife within the Park are discouraged. However, subject to risk analysis, water may be strategically located (a) to increase the numbers of vulnerable, rare or threatened species, or (b) for economic reasons, such as tourism in the Park, provided this does not adversely impact on priority habitats or important species. The provision of any additional artificial water points must demonstrably contribute to one or more of the goals of the park. The goal(s) must always be clearly stated
- The effects of water points must be reviewed regularly in the light of objectives. Total benefits (environmental and economic) must outweigh the likely management and environmental costs

Objectives

Greatest threats to Tsau //Khaeb NP	Key conservation and management outcomes for Tsau // Khaeb NP
Strategic Objective: To protect and maintain biodiversity	
Destruction of wildlife or wildlife habitat through mining, infrastructure development and tourism	• The National Policy on Prospecting and Mining in Protected Areas is strictly adhered • The implementation of Environmental Management Plans established in terms of the Environmental Management Act for mining and infrastructure development are monitored and enforced. • DWNP staff are appointed as Environmental Inspectors • Long-term research on the flight paths of seabirds are established considering potential energy generation and transmission projects
Climate change may fundamentally change the rainfall regime and cause the geographical displacement of the winter rainfall region	• Effective monitoring for early detection of declines in biodiversity and key species, especially endemic species has been introduced • Increased research on the lifecycles and habitat needs of endemic species has been undertaken • A ranking of vulnerability for endemic species based on factors such as life cycle, distribution, habitat availability has been compiled.
Failure to restore and rehabilitate disturbed areas	• Priority habitats and landscape features to be rehabilitated have been identified and rehabilitation is taking place • A long-term rehabilitation plan for the Park has been established • The ongoing rehabilitation of disturbed areas by Namdeb or any other future mining operator/s is encouraged • A monitoring system for the rehabilitation programme is established and functional
Biodiversity impacts through illegal activities in the park	• Illegal grazing, illegal plant collecting and illegal fishing in the park are controlled

5.1 Habitats and special sites

The Tsau//Khaeb NP contains a variety of special habitats and sites but no systematic inventory or mapping of sites has been done. These include numerous fossil sites of great paleontological importance, amongst the most important fossils in Namibia were recorded from the Park[14] as well as archaeological sites. The most important priority is to catalogue such habitats and sites and make an assessment of specific management needs. A good introduction to both the paleontological and archaeological finds in the Park is given in Williamson & Williamson (2016) and the paleontological record in Schneider (2004).

14 Schneider, G. 2004. Passage through time – the fossils of Namibia. Gamsberg Macmillan, Windhoek

Figure 32 Important rock engravings depicting elephants at the Orange River Pomphuis. This site next to the Rosh Pinah – Oranjemund road has been partially vandalized and should be rehabilitated and protected by fencing as a high priority

Greatest threats to Tsau //Khaeb NP	Key conservation and management outcomes for Tsau //Khaeb NP
Strategic Objective: To protect and maintain cultural and historic assets	
Risk that geological and paleontological values will deteriorate without appropriate management	• An inventory of sites of geological and paleontological importance is established • An assessment of the specific management needs of such sites has been developed in collaboration with specialist organizations • A list of priorities for sites requiring attention in the five-year period of the management plan has been developed in collaboration with specialist organizations, and an action plan is being implemented • The impact of tourism on sensitive high value sites (e.g. Bogenfels and Roter Kamm) is being monitored

Objective

- To protect and conserve the diversity of landscapes, habitat, biota and sites of geological and paleontological importance within the Tsau //Khaeb NP
- To protect, document, understand and conserve the rich plant diversity within the TKNP, with particular attention to areas of exceptional succulent richness and endemism, such as inselberg and mountain shrublands, the Orange River valley shrublands, the Lüderitz peninsula and Boegoeberg Dwarf Shrublands
- To restore and protect archaeological sites at risk, such as the engravings at the Orange River Pomphuis site

Strategies

- Extend the vegetation mapping to detailed assessments of biodiversity hotspots
- Establish a national succulent atlas project, with particular attention to the Succulent Karoo Ecosystem and the TKNP
- Set up a monitoring programme for carefully selected critical plant populations
- Conduct a systematic inventory of special habitats and sites of geological, paleontological and archaeological importance in collaboration with e.g. the National Museum and the Geological Survey and make an assessment of specific management needs, building on published records and sites found by Namdeb in the mining process
- In collaboration with Namdeb, remove the buildings at the site of the rock engravings at Orange River Pomphuis site, restore it to its natural state and fence off the engravings to prevent further vandalism
- Monitor areas at high risk to invasion by alien vegetation, such as drainage lines, roadsides, mining and prospecting areas and around human settlements, and implement control measures as required
- Support and promote botanical surveys and research that will lead to a better understanding of the flora of the Succulent Karoo Ecosystem and the TKNP
- Key habitats, special sites and invasive alien species should be clearly identified and mapped, and management guidelines developed in year two
- The status and threats to habitats and special sites must be reviewed every five years and new management strategies developed to counter any significant threats
- Threats posed by aliens must continually be assessed and addressed

Figure 33 Lichen field in north-western Tsau //Khaeb NP with virtually every sizeable stone covered in crustose lichens

Figure 34 Ostrich shell fragment, possibly fossilized, south of the Lüderitz peninsula

Figure 35 Highly fragile micro-mesemb dominated vegetation on sandy soil in south-eastern Tsau //Khaeb NP

Figure 36 Quartz fields in south-eastern Tsau //Khaeb NP which host several endemic plant species

Figure 37 Mountain and sand dune landscape in the south-eastern part of the Tsau //Khaeb NP

Figure 38 Annual *Mesembryanthemum* sp. showing extreme adaptation to seed production whereby all the remaining moisture in the plant is directed to the fruit capsules

5.2 Biodiversity conservation

The Tsau //Khaeb NP is the most biodiverse protected area in Namibia, with around 1,073 species of plants (including ferns and mosses) alone. This is nearly 25% of the entire number of plant species in Namibia (Burke & Mannheimer, 2004). Biodiversity conservation is therefore the most important conservation objective of the Park. Some of the most important biodiversity hotspots in the Park occur within mining license areas or in areas being targeted for wind farm development or areas such as the Lüderitz peninsula which is used for recreation. More research is needed on other groups of species such as the reptiles which may also show high diversity. The Park further holds a small but important assemblage of large mammals such as brown hyaenas, the largest colonies of the Cape fur seal in the world and the remnant of a large oryx population which has for various reasons been reduced to a historically low number (see Chapter 5.5). Biodiversity conservation presents considerable challenges. All of the species in the Park have life history strategies that are adapted to hyper-arid conditions, but large fluctuations in population size and local species composition may nevertheless occur. The seven year drought period that the Park experienced from 2013 to 2019 has had a severe impact on many populations of plants and animals. A greater threat looms from climate change and how that will affect the winter rainfall species in particular. Drought and climate change are outside the control of park management but making it even more important to prevent negative impacts from factors that can be managed such as direct human impacts from mining, infrastructure development and tourism.

Objective

- To protect and conserve the diversity of landscapes, habitats and biota in healthy and productive condition within the Tsau //Khaeb NP

Strategies

- Because of the large areas involved, and the intention to create corridors for west-east movement of wildlife, ecosystem management should be minimal, and indeed a minimalist and largely hands-off approach should be adopted
- Should it become necessary to apply active management, interventions should aim to manage the arid ecosystems for long-term diversity, health and productivity and climate change variations, by ensuring that they are not over utilized to the extent that long-term damage results
- Allow and promote variability in management and "patchiness" in ecosystem expression in response to variable climatic conditions and ecosystem functioning
- Build up a good monitoring record of ecological and bio-climatic information, including the diversity and abundance of various species in different taxa, including the less studied lower plants, invertebrates, etc.
- Monitor the health of populations of species high on the food chain (e.g. key predators and scavengers), flagship and key-stone species and other strategic key indicator species (including indicator species for early warning of climate change impacts) – if these species prosper it follows that the base of the food chain is likely to be diverse and in good condition
- No poisons or pesticides (or other toxic chemicals) will be used in the Park under any circumstances other than MEFT approved herbicides for the eradication of *Prosopis* sp. (Mesquite) infestations
- Areas of exceptional plant diversity, with high numbers of range-restricted endemic species within a biodiversity hotspot of global significance are afforded the highest levels of protection that legislative, zonation and management practices can provide

Figure 39 *Aloe erinacea*, an iconic and highly localized species that is endemic to the Park and a small area of adjacent land

Figure 40 Newly described endemic plant species in the Park *Polemanniopsis namibensis*

Figure 41 *Namibia cinerea*, an endemic mesemb species in the Park that is of high interest because of its name. There is only one other species, *N. ponderosa*, in the genus *Namibia* and it is endemic to the Park and the southern part of the Namib-Naukluft Park

Figure 42 Cape fur seal haul-out site at Van Reenen's Bay

Figure 43 Dormant *Conophytum* sp. amongst quartz rubble in southern Tsau //Khaeb NP

5.3 Rehabilitation

Natural landscapes and biodiversity should be as far as possible and practical, re-established to a pristine condition or in line with agreed future land use. Considerable work has already been done by Namdeb to rehabilitate certain mined areas[15], and from a distance such areas are indistinguishable from the rest of the Park. A very large area (roughly estimated as about 1% of the Park or around 260 km^2 including an estimated 75km of the coastline) has nevertheless been significantly disturbed. A highly focussed strategy is therefore needed to rehabilitate priority areas of the Park (Burke 2006).

A number of criteria can be considered as the basis for prioritization. One such priority should be areas of very high biodiversity importance that were disturbed before biodiversity assessments were made for the Park and before the current zonation and restrictions on mining applied. Another priority is to rehabilitate any disturbed parts of any special value zone (see Figure 27) or special habitats, natural monuments, archaeological or fossil deposits.

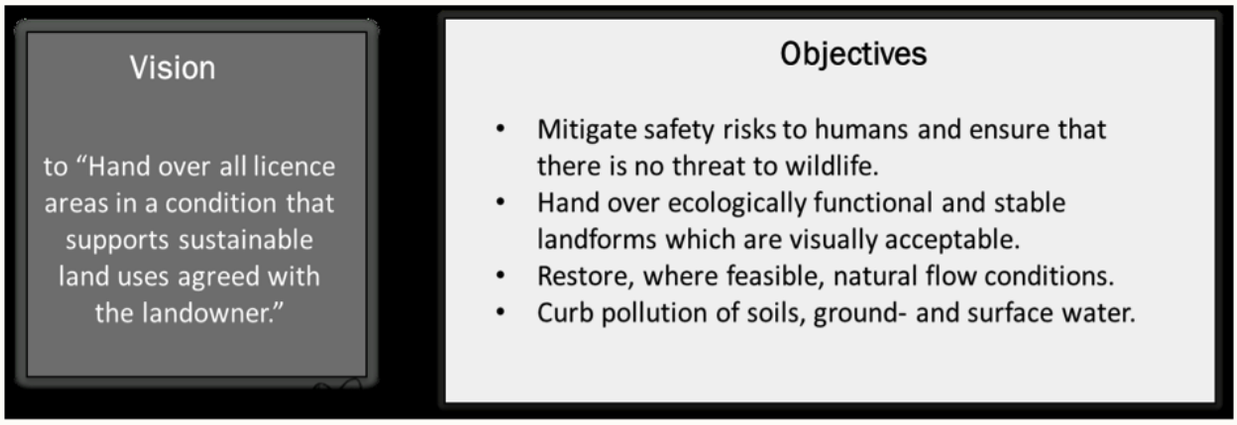
Figure 44 *Sarcocaulon, Euphorbia* and mesemb species on undulating sandy terrain will pose a challenge for any rehabilitation programme

Considerable experience has been acquired in rehabilitation of the Park by Namdeb[16], as also reflected in Burke (2005)[17]. The best practice guidelines of Burke (2005) should serve as a basis for developing a rehabilitation plan for the Park. Namdeb established the following vision and objectives for rehabilitation as part of their closure plan, noting that these objectives may not be the same as may be required for any future rehabilitation by MEFT.

15 Namdeb. 2019. A summary. Namdeb biophysical rehabilitation plan 2006-2019. Report No. DOCS-# 125934, Namdeb

16 See Namdeb (2019)

17 Burke, A. 2005. Best practice guidelines for minimising impacts on the flora of the southern Namib. EnviroScience, Klein Windhoek. Namibia and Namibia Nature Foundation, Windhoek.



The Namdeb rehabilitation plan was derived from obligations in terms of the Minerals Act, Act 33 of 1992 and the Environmental Clearance issued in terms of the Environmental Management Act, Act 7 of 2007, and focussed on removal of redundant infrastructure (inclusive of linear infrastructure); profiling and shaping of dumps, pits, trenches; cleaning up of pollution and restoration of biodiversity. The final assessment of compliance with the applicable regulatory requirements has not yet been done nor have Namdeb's responsibilities regarding rehabilitation come to an end. It seems most practical to defer the consideration of any additional rehabilitation by MEFT for the Namdeb mining licence areas, similarly for Skorpion mine, until after such obligations have been met and assessed. Other parts of the Park outside recent mining licence areas which have also been impacted to variable degrees, also taking into account ongoing work in the surveying of historical mining sites and infrastructure (see Chapter 7) could be the initial focus of rehabilitation work by MEFT.

The standard of rehabilitation is an important issue. This is derived from the regulatory requirements for mining operations but may not meet the ideal standard of rehabilitation that MEFT would wish to see in the Tsau //Khaeb National Park. Levelling and profiling disturbed areas and removing waste and pollution for example will have immediate beneficial impacts on the conservation value of the affected parts of the Park but the restoration of biodiversity and recreating ecologically functional and stable landforms will involve a much longer process and period of time. MEFT needs to be very careful in agreeing to any proposed standard of rehabilitation, noting that the mining companies may primarily focus on physical rehabilitation rather than biological rehabilitation. The standard to be accepted should as a minimum require that ecologically functional and stable landforms that are visually acceptable are created to enable longer-term biological rehabilitation to occur.

A final point is that the translocation of live plants is far less successful than may have been considered previously. The extreme arid period of the past seven years is a case in point, as there would have been almost certainly no success with any translocation or replanting on any significant scale without the most rigorous watering and after care programme. Translocation of plants should not be accepted as an agreed mitigation method for disturbing a previously undisturbed area unless a multi-year trial independently conducted and supervised by MEFT has proven that translocation is effective for the particular species, soil types and locations concerned.

Principles

- Rehabilitation of disturbed areas is an ongoing process pursued by Namdeb (and any other mining operator with this responsibility in the Park) in compliance with regulatory requirements
- A minimum standard of rehabilitation acceptable to park management should be that:
  - All safety risks to humans and wildlife from past mining activities have been mitigated (noting that the safety aspects of the historical mining infrastructure will be covered in Chapter 7)
  - All redundant infrastructure must be removed unless otherwise agreed by MEFT
  - All waste and pollution must be removed or mitigated in a manner agreed to by MEFT
  - All dumps, pits, trenches and the like must be profiled and shaped to be visually acceptable by MEFT
  - All disturbed areas must be returned to ecologically functional and stable landforms that will enable long-term rehabilitation of biodiversity
  - Rehabilitation should target priority areas based on agreed criteria

Objectives

- To rehabilitate degradation caused by humans especially where it impacts on ecosystem functions and processes as well as aesthetic considerations, and where rehabilitation is practicable and appropriate
- To remove all unnecessary evidence of human occupation from the Park, except agreed infrastructure and impacts in designated sites, which will serve as historic museums, and to rehabilitate landscapes and biodiversity, using best available practices, with emphasis on those areas of greatest ecological and aesthetic importance
- Natural landscapes and biodiversity are, as far as possible and practical, re-established to their pristine condition or in line with agreed future land use

Strategies

- MEFT should ensure that all mining licence holders meet their regulatory responsibilities regarding rehabilitation
- MEFT should require that all mining license holders must submit a register and map of all rehabilitated sites upon closure to facilitate long-term monitoring of rehabilitated sites
- The visual or other impacts of degraded areas must be assessed against the costs and benefits of rehabilitation
- Commission a rehabilitation plan based on an inventory and criteria (prioritization, costs and timelines) for the whole park
- Identify responsibilities for rehabilitation
- Namdeb, MEFT and other relevant parties to systematically implement rehabilitation in areas and on aspects of respective responsibilities, to agreed standards and levels, starting with the affordable priorities;
- Identify areas where degraded, rundown or unnecessary structures occur
- Make use of old structures or material for building and/or recycling where practical, cost-effective and feasible
- Explore the possibility of allowing tourism operators to rehabilitate areas allocated to them within concessions (once concessions are awarded)

Figure 45 Rehabilitated area after mining between the Rosh Pinah – Oranjemund road on an old terrace along the Orange River

Figure 46 Example of the successful rehabilitation by Namdeb of a track

Figure 47 *Fenestraria rhopalophylla* near Pomona showing extreme adaptation to the arid environment

Figure 48 *Mesembryanthemum hypertrophicum* as a pioneer plant in disturbed areas

Figure 49 Natural revegetation in progress of a small gravel sorting dump, of which there are thousands in various parts of the Park, by *Augea capensis*, a pioneer species

5.4 Coastal management

Objectives

- The intertidal coastal zone, its biota and the species that transcend the marine/terrestrial interface are managed jointly by the MEFT and MFMR under agreed co-management principles and protocols that promote synergy, efficiency and elevated conservation management, monitoring and protection of habitats, processes and species
- To ensure that management of the coastal environment for the Tsau //Khaeb NP is effective

Strategies

- A close and mutually supportive working environment must be created between the Park MEFT and MFMR institutions and their respective staff. To this end, the Tsau // Khaeb NP Advisory Committee should serve as the starting point for enabling coordination and cooperation between MEFT and MFMR
- MEFT and MFMR should identify the key areas, issues and species that require monitoring and management
- MEFT and MFMR should establish operational principles, procedures and protocols for monitoring, managing and reporting on the areas and biota of mutual interest, as well as means of collaboration, communication and mutual support
- There is interest in developing mariculture in the coastal zone of the Park. MFMR is the regulator for mariculture but MEFT should at all times be involved. Mariculture should target already disturbed areas of the coast, subject to environmental impact assessments

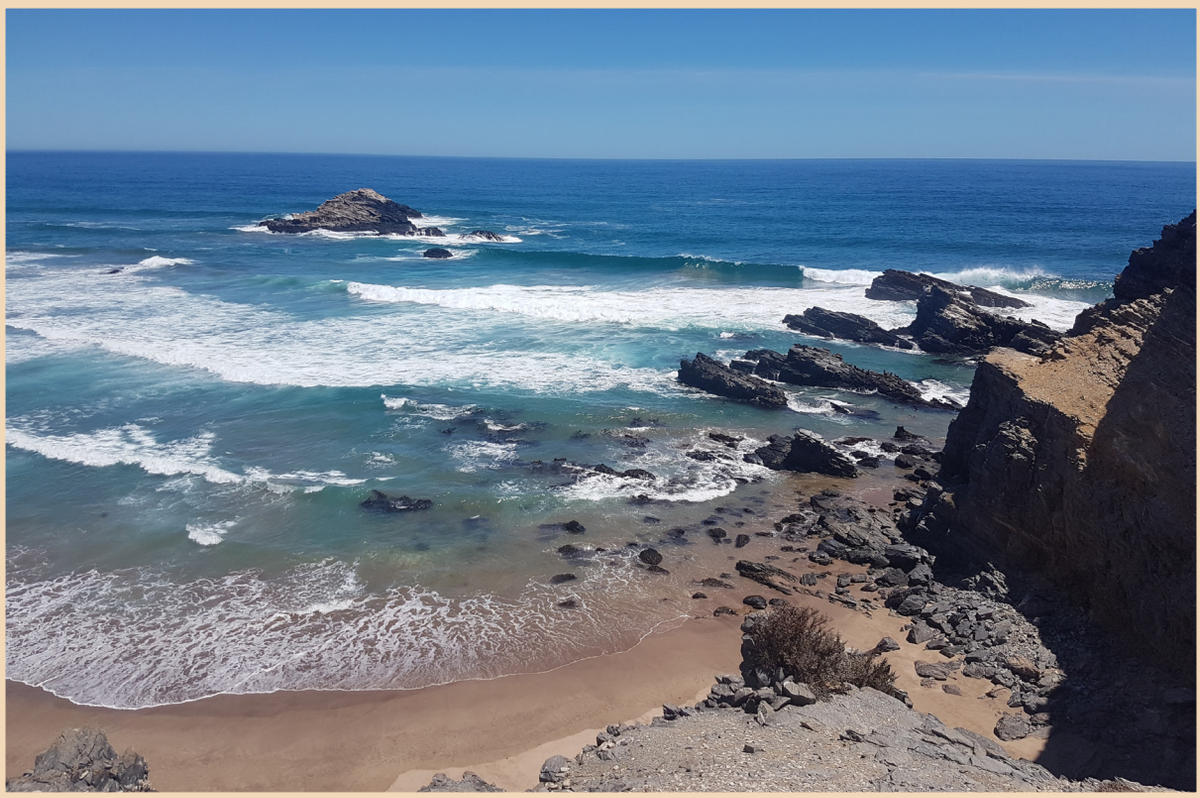


Figure 50 The spectacular coastal zone of Tsau //Khaeb NP with high tourism potential but requiring coordinated management with MFMR

5.5 Wildlife population management and introductions

Appropriate and strategic management of wildlife is required for a number of reasons. First, several animal species in Tsau //Khaeb NP have been identified as priorities for management within Namibia. Second, some species of large mammals have become uncommon or rare in the Park. Finally, some species cause human-wildlife conflicts, which increase tensions between neighbours and the MEFT. If the TFCA is expanded, see Chapter 4 and Chapter 9.1, the reintroduction of certain species may become feasible in the long term, as the lower Orange River historically had populations of hippopotamus, buffalo, elephant, black rhinoceros, lion and possibly the grey rhebuck (*Pelea capreolus*)[18].

Figure 51 Engraving of an elephant at the Orange River Pomphuis and elsewhere along the Orange River in the Park (see Williamson & Williamson 2016, who also recorded a petroglyph of a rhinoceros, probably a black rhinoceros in the same area). There are historical records of the presence of elephants in the lower Orange River area as recently as the 1880s.

The status of the oryx population is of some concern. The current population is estimated at around 500 but there has not been any recent aerial census and no such census is foreseen for the park due to the high cost of doing one. If the current estimate is accurate, it indicates a very low density of around 0.02 oryx/km^2 or one oryx per 52km^2 and a more than tenfold decline over the past 20-30 years. The population is not evenly spread but aggregates in areas of relative resource abundance, such as the gravel or sandy plains in the eastern third of the Park after rains or even smaller patches after localized rains.

18 There have been many unconfirmed reports of this species in the Huns Mountains east of the park and Shortridge (1934) mentioned that it occurred in the lower Orange River valley. Shortridge, G.C. 1934. Mammals of South West Africa. William Heinemann Ltd, London. Griffin (undated) reports a confirmed sighting and states that it occurs in the Schakalsberg as a rare vagrant. Griffin, M. undated. Annotated checklist and conservation status of mammals, reptiles and amphibians of the Sperrgebiet, southern Namib Desert, Namibia. Ministry of Environment and Tourism

Killian (1995) pointed out that the population is highly dependent on the dune fields of the park but that the nutritional quality of the forage in the dunes is very low compared to the more varied vegetation on the plains. Density of oryx correlates best with rainfall two years previously, this lag effect is probably the result of the time that it takes for woody, herbaceous and grassland vegetation to respond to rainfall events. There are nevertheless much quicker local responses to rainfall and oryx aggregate in areas where it had rained in a matter of days or weeks.

The current status of the oryx population is something of an enigma; it is evident from Table 1 that this population used to be much more abundant and mobile before the eastern boundary of the Park was fenced in the late 1970s (the exact date is not available[19]) but there are insufficient data on the size of the population at that time. Owen-Smith (1980)[20] mentions population estimates from several aerial surveys (see Table 2) but there is no other information about these surveys. After the drought in the seventies, the population built up to around ten thousand in around five years. Immigration from other areas must have contributed to this increase. The estimates for 1984 and 1997 in Table 2 are from Killian (1997) and the estimate for 2019 is from the former Chief Warden, Richard Fryer.

Significant illegal killing or live capture (after being lured into neighbouring farms through funnels in fence lines, as many as 17 such funnels were recorded by G. Owen-Smith in the period around 1980) of oryx was a major management problem in the Park in the 1980s and possibly earlier, but it is unknown if this led to a population decline. Killian (1995) concluded that oryx populations in hyper-arid areas undergo large fluctuations in population size and it is thus essential to consider population trends over a period of several decades rather than a few years. The current low numbers of oryx, possibly around 500, is very low compared to the most recent aerial survey of 1997 when the population was estimated at 6,167 (661-6,167) noting that this is not the standard way of calculating a population range in that 661 represents the number actually seen and 6,167 the estimated population size[21]. It is likely that the very arid conditions from 2012 to 2019 reduced the population or kept numbers at the current low levels. The role of the boundary fences can be assumed to have been negative as well.

Table 2 Population estimates of oryx in the present-day area of the Park

Year	Population estimate for oryx in Diamond Area I or Tsau//Khaeb NP
1971	Less than 1,000[22]
1975	2,560
1976	3,705
1978	At least 6,000[23]
1980	4,697
1984	9,938[24]
1997	6,167
2019	Approximately 500

19 Farms were established east of Diamond Area I between 1950 and 1978 and farm boundary fences were gradually erected even before the eastern boundary of Diamond Area I was fenced (Owen-Smith 1980).

20 Owen-Smith, G. 1980. Ecological observations on a large gemsbok population in the southern Namib, with recommendations for future management. Department of Agriculture and Nature Conservation, South West Africa/Namibia.

21 Killian, J.W. 1997. Aerial survey of wildlife in the southern Namib. September/October 1997. Ministry of Environment and Tourism

22 This estimate was not based on an aerial survey. The 1960s and early 1970s experienced a very severe drought and emergency grazing was granted in the present-day Park, with many thousands of sheep present and competing with oryx (Owen-Smith 1980).

23 This estimate was not based on an aerial survey. After the emergency grazing was stopped and consecutive years of high rainfall, allowing the oryx population to recover (Owen-Smith 1980).

24 Roberts, K. 1984 in Killian, J.W. 1997. Aerial survey of wildlife in the southern Namib. September/October 1997. Ministry of Environment and Tourism

Oryx in the Park are not dependent on the availability of water, and artificial water sources should not be established to increase oryx numbers. This species is adapted to virtually waterless habitat which it uses opportunistically. It is interesting to note that Owen-Smith (1980) argued strongly for a management intervention i.e. to remove oryx by live capture to protect grazing when the population was around 4,700. This management action was not taken, and the population four years later numbered nearly 10,000.

It is probably safe to conclude, on the basis of the available information, that a hands-off approach is appropriate regarding oryx population management in the Park, except to take measures to prevent that the eastern boundary fence further restrict movements.

There is even less known about the springbok population (see Table 3), except that it has shown slightly less dramatic population fluctuations. The current population is possibly at a historical low and it may not persist if the current drought continues.

A variety of interventions may be employed to manage wildlife in general. These include the provision and innovative management of artificial water sources; creation of wildlife corridors and grazing areas around the Park that can act as buffer zones; monitoring of populations; patrolling; fencing; park zonation; and control of livestock and wildlife/livestock diseases. There seems to be little doubt that the eastern boundary fence of the Park has severely impacted large mammal populations and its removal or breaching should be a high priority.

Table 3 Population estimates of springbok in the present-day area of the Park

Year	Population estimate for springbok in Diamond Area I or Tsau//Khaeb NP
1979	Approximately 1,528[25]
1980	Approximately 800
1984	1,125[26]
1997	1,552
2019	Approximately 250[27]

Principles

- The park is managed such that the historic diversity of wildlife and their full suite of interactions are reinstated, as far as is practically possible under prevailing conditions
- Facilitate the migration and movement of fauna where possible and investigate anthropogenic factors that may limit movements (such as inappropriate land-use practices on the Park boundaries), with a view to eliminating them

Objectives

- A rich diversity of indigenous wildlife prospers within an open, dynamic and resilient ecosystem
- To ensure that wildlife population numbers increase to levels where biomass carrying capacity is considered conservatively appropriate and sustainable, per species and for the total wildlife population, under different rainfall and range conditions

25 Owen-Smith, G. 1980. Ecological observations on a large gemsbok population in the southern Namib, with recommendations for future management. Department of Agriculture and Nature Conservation, South West Africa/Namibia.

26 Roberts, K. 1984 in Killian, J.W. 1997. Aerial survey of wildlife in the southern Namib. September/October 1997. Ministry of Environment and Tourism

27 Estimate by former Chief Warden, Richard Fryer

Strategies

- Remove or breach the eastern boundary fence of the Park to allow free movement of large mammal to adjacent areas where cooperation agreements can be established with landowners and with the ARTP
- Population trends, health (age and sex structures and body condition) and distribution of populations will be monitored, and decisions taken based on rainfall, veld condition and other variables
- Wildlife management decisions will be taken in an adaptive manner, with a minimalist intervention philosophy, and based on good monitoring and research information, as may be decided from time to time
- Carry out an assessment of species that historically occurred in the Succulent Karoo Ecosystem and Transition belt vegetation types
- Review which species that no longer occur, or occur at below optimal numbers, could be re-introduced under current conditions, and prepare a prioritized list
- Be mindful that the park is on the extreme western edge of a number of species' ranges. In higher rainfall years such species may/would have moved westwards into the park area, and in lower rainfall years they would have retreated eastwards into the escarpment. Once large, open areas have been secured, reintroductions into the greater area may be viable, but which would probably not be effective if such populations are confined to the park
- Introduce game in phases as per the list, and subject to rainfall and veld condition being adequate to enhance survival chances
- Acquire game from similar habitats (e.g. Namib and Karoo Transition ecosystem) for genetic integrity and optimal chances of success
- Introduce game in sufficient numbers to be viable, rather than having small token introductions
- Where species are likely to recolonise or to augment existing populations by in-migration, allow this to happen rather than active reintroduction
- No species exotic to the park will be introduced
- No subspecies or components of populations from elsewhere will be introduced if there is any risk of genetic pollution to the indigenous populations' genetic integrity, and where suitable animals can be acquired from within the required gene pool
- In the case of introductions that have a potential impact on neighbours (including transboundary implications, e.g. hippopotamus in the Orange River), full consultations will take place prior to any introductions
- A feasibility assessment should be made on the potential reintroduction of black rhinoceros in the eastern part of the Park. The Park does not offer ideal habitat for this species (except possibly along the Orange River) but should be assessed in light of the need to identify all potentially available habitat for Namibia's growing black rhinoceros population

Figure 52 Micro succulents dominate the vegetation associated with rock outcrops in the coastal zone. Dormant dome of *Conophytum saxetanum* in left bottom corner.

5.6 Consumptive resource utilization

It is widely agreed that while protected areas should serve the purpose of conservation, natural resources within those areas may be used on a sustainable basis for economic and social gain. In the case of Tsau //Khaeb NP where there has not been a history of consumptive use of biological resources, this will need to be considered on a case by case basis. The consumptive use of these resources in the Park will therefore occur within the guidelines directly and indirectly stated in this management plan.

The large mammal population which is often targeted for harvesting is at a very low density and harvesting should not be allowed before a status assessment has been done. The oryx population – at least in the southern part of the Park - has been found to be contaminated with a parasite that is very dangerous to humans, i.e. *Echinococcus* sp. Meat from oryx and other large mammals such as springbok and zebra are therefore considered unfit for human consumption.

The high diversity of endemic plant species of the Park are part of Namibia's natural resource asset base and heritage and should be made available to the horticulture industry which is otherwise at a disadvantage if such species are only accessible to the South African industry or international horticulture where many of these species are already trade on the internet.

The harvesting of seals or fish takes place under the jurisdiction of MFMR and are excluded from this management plan. Recreational fishing is allowed in the Park in designated areas (see Chapter 3).

Principles

- Consumptive use of natural resources on a sustainable basis can be practiced in national parks
- The endemic species of the Park are part of Namibia's natural resource asset base and heritage and should be made available to the horticulture industry

Objective

- To allow for sustainable use of natural resources as a wildlife management strategy in line with the National Policy on Utilization of Game in Protected Areas and Other State Land and the Nature Conservation Ordinance, 1975 (4 of 1975) as amended
- All resource utilisation in the Park will be done in accordance with the National Policy on Utilisation of Game in Protected Areas and other State Land and should be economically and ecologically sustainable
- All harvesting must be cost effective and should take into account the full costs of managing the resource, including the costs of control, monitoring and effects on the environment
- The Park may be used as a source of wildlife for introduction to other areas

Strategies

- Before any harvesting is undertaken, assess the resource to ensure that ecological objectives are not violated (prior to any harvesting)
- Establish procedures and protocols for how, where and when the harvesting will be conducted and managed (on a case-by case basis)
- Clearly define, as far as possible, the consumptive and non-consumptive wildlife use benefits as generated from the park
- Harvesting for festivals and other important functions will be in accordance with the National Policy on Utilization of Game in Protected Areas and Other State Land
- Tsau //Khaeb NP will be used as a source of wildlife for introduction to other areas – i.e. live capture and can be a source of seed and propagules for artificial propagation for rehabilitation and horticulture purposes
- The sharing of consumable and non-consumable wildlife goods must be in compliance with the existing national and international legal frameworks and conventions especially pertaining to species listed by CITES

5.7 Diseases and parasites

Little is known about diseases and parasites in the Park, and there is limited risk of wildlife coming into contact with domestic livestock under current land use arrangements adjacent to the Park. There are nevertheless some risks to be aware of. As mentioned in Chapter 5.6, the oryx population of the Park, particularly in the vicinity of Oranjemund, has been found to be contaminated with the *Echinococcus* sp. tapeworm which is very dangerous to human health. There is further risk of transmission of diseases such as rabies, canine distemper and sarcoptic mange (scabies or brandsiekte) between wild and domestic carnivores especially canids (i.e. between domestic dogs and black backed jackals).

Principles

- No domestic animals are allowed in the park to prevent the risk of disease transmission to wildlife
- Feral dogs or cats must be destroyed on sight (but not in front of tourists) to reduce the risk of disease transmission to wildlife

Objectives

- To monitor for and manage notifiable and contagious human, livestock and wildlife diseases

Strategies

- While fencing may be effective in preventing contact between wildlife and domestic livestock, the costs of fencing and their impacts on compartmentalizing wildlife habitat at the expense of landscape connectivity far exceeds any benefit from preventing disease transmission
- While local parasite levels may potentially limit oryx populations around e.g. Oranjemund, disease or parasites are not likely to be the main factors limited ungulate populations compared to drought, starvation and strangulation in fences
- Prevent domestic livestock encroaching on the Park and thus reduce the risk of contact between livestock and domestic animals and wildlife
- Develop a working relationship with neighbouring landowners, municipalities and DVS for effective and efficient response to animal disease issues in and around the Park
- All natural mortalities must be recorded see Chapter 6

Figure 53 *Hoodia* sp. *officinalis* subsp. *delaetiana* a Park endemic

5.8 Fire management

Fire is a rare occurrence in hyper-arid areas and normally does not play a significant role in desert ecosystems. It is possible that localized fires may occur as the result of human activity and thus have a local effect. Fire is furthermore not a traditional habitat management tool on adjacent farmland and the risk of spreading into the park from the farmland to the East is low.

The Fire Management Strategy for Namibia's Protected Areas (MET 2016[28]) does not specify any Controlled Fire Management Programme for Tsau //Khaeb NP.

5.9 Human wildlife conflict management

The Tsau //Khaeb NP borders commercial farms to the east as well as the Lüderitz, Oranjemund and Rosh Pinah Municipal areas. Predators such as black-backed jackal, brown hyaena, caracal, leopard and spotted hyaena residing (or perceived as) in the Park and preying on neighbouring domestic stock could potentially lead to conflict situations.

There seems to be a trend away from sheep farming as a land use east of the Park towards wildlife production and tourism. The latter form of land use reduces human wildlife conflict considerably. The current low incidence of Human Wildlife Conflict (HWC) does not warrant any special measures and the Revised National Policy on Human Wildlife Conflict Management[29] should be followed. If the incidence of Human Wildlife Conflict escalates, a local HWC Management Plan could be established.

All incidents of human wildlife conflict outside the park on farmland that are reported to the park should be recorded as part of the monitoring system for the Park.

5.10 Alien species

Alien species are species that were introduced since historical times by humans into habitats far outside their native range. These species have the potential to cause significant ecological damage, often out-competing native species or changing the environment to such an extent that entire indigenous ecosystems may become threatened. Not all alien species are invasive, however, the chances of an invasive species being introduced increases rapidly with the number of alien introductions. It is therefore widely accepted that alien species should be controlled, or better still, removed from areas where biodiversity conservation is the main objective.

Although Tsau //Khaeb National Park is relatively free of alien species, continuous vigilance is required to maintain this status.

Griffin (undated) mentions that the Park has the dubious status of the area in Namibia with the highest number of vertebrate alien species: European rabbit, house mouse (Grosse Bucht), house rat, horses (Garub area) and donkeys (Orange River area). This reference dates to the late 1980s or early 1990s and the current status of these species in the Park needs to be verified. This section does not deal with the horses in the Garub area of the Park, see Section 5.15.

28 Fire management strategy for Namibia's protected areas. 2016. Ministry of Environment and Tourism

29 Revised National Policy on Human Wildlife Conflict Management, 2018. Ministry of Environment and Tourism

There is a large stand of several hundred alien eucalyptus trees at Hohenfels along the Orange River, i.e. a former plantation. This site is earmarked for the development of a lodge, camping site and a public recreation area. The retention of some of the trees for shelter can be allowed but the remainder should be removed, and the area rehabilitated. There is limited risk of the species spreading downriver and because if being so conspicuous, new stands should be easy to control by physical removal or treatment with arboricides. An assessment should be done of the most cost-effective way of removing the unwanted part of the plantation, taking into account that the trees have a high value as firewood in an area nearly devoid of other sources of firewood.

Principles

- National parks should, as far as practically possible, be free of alien plants and animals. Strategies and activities must therefore be set to prevent, eradicate or manage feral populations of plants and animals as appropriate

Specific Objective

- To identify and control invasive species
- To ensure that no feral populations of alien plants and animals are permitted within the Park, with the exception of the wild horses, which will be confined to the Garub area and treated as part of the history of the area

Strategies

- Staff must be vigilant and report any occurrences of alien species immediately
- Alien species control must be planned and implemented in a systematic manner with clear targets, and the results must be monitored regularly
- Eradicate feral populations of alien plants and animals in the Park, with the exception of the wild horses at Garub, with priority placed on the most invasive species (e.g. *Prosopis* spp., *Opuntia* spp., *Nicotiana glauca*, *Eucalyptus* spp., Port Jackson wattle (*Acacia saligna*), Rooikrantz (*Acacia cyclops*) and species likely to pollute the genetic integrity of wild populations (e.g. domestic cat)
- Establish a monitoring system for alien species, with particular attention to high risk areas such as along rivers and drainage lines, roadways, mining areas, water points, etc
- Clearly identify and map key habitats, special sites and invasive alien species, and develop management guidelines in year two
- Alien species control must be planned and implemented in a systematic manner with clear targets, and the results must be monitored regularly

Figure 54 *Argemone ochroleuca*, one of the alien invasive species in Tsau //Khaeb NP that is difficult to control due to its annual lifecycle and prolific production of seed

5.11 Domestic animal management

While domestic animals are important resources for some neighbouring communities, animals must be managed to contain associated risks. For example, contact with certain wildlife species can result in the spread of disease (e.g. mange in populations of jackal and hyaena). This section does not deal with the horses in the Garub area of the Park, see Section 5.15.

Principle

- No domestic animals are allowed in the park

Objective

- To ensure exclusion of domestic animals, which pose or are exposed to animal health and other risks
- To remove all domestic animals should these occur at any time within the park as domestic animals potentially affect the genetic diversity (e.g. domestic/feral cats) and threaten indigenous wildlife directly either through hunting (e.g. dogs, domestic/feral cats), competition (e.g. ungulates) and/or disease (e.g. all domestic animals)

Strategies

- In collaboration with affected stakeholders, develop and enforce a livestock removal strategy for the Park

- This strategy may include to destroy any dog, donkey, horse or any other riding or pack-animal or with the consent of the Cabinet, kill any live-stock or domestic animal found in park, other than any such live-stock or domestic animal which is in the lawful possession or under the lawful charge of an officer or which is being conveyed through such game Park or nature as determined in the Draft Wildlife and Protected Areas Management Bill and its Regulations
- Identify responsibilities for destroying domestic stock located within the park
- Identify ownership of livestock (i.e. brands, ear tags) and liaise with neighbouring farmers regarding the removal thereof from the park
- Establish a forum for regular reporting and exchange between MEFT and other relevant parties (e.g. Namdeb, Scorpion, Lüderitz and Rosh Pinah Municipalities, and neighbouring farmers) on domestic livestock issues (this could be the Park advisory committee)

5.12 Law enforcement and crime prevention

Much of the law enforcement effort in the Park was historically - and will continue to be - directed at the illegal trade in diamonds and was handled by the Namibian Police and Namdeb within the strict provisions of the Diamond Act. There was nevertheless a time period some decades ago of large-scale incursions into the area of the present-day Park as well as the use of illegal funnels in the boundary fence for the illegal killing of oryx for meat. This problem may have subsided, and good park neighbour relations may prevent any recurrence, but some vigilance is needed. Further, as the plant or reptile biodiversity riches of the Park become better known, illegal collectors may become interested in the Park.

Principles

- A zero-tolerance approach will be followed against all illegal activities within and adjacent to the Tsau //Khaeb NP
- A partnership of collaboration will be established with all relevant stakeholders, under MEFT leadership, to secure adherence to law and order in and around Tsau //Khaeb NP

Objectives

- To control and limit the illegal use of wildlife and natural resources within Tsau //Khaeb NP and, through all efforts possible, to ensure the safety and security of tourists

Strategies

- Develop a practical, harmonised approach to the implementation of law enforcement within the context of this management plan, relevant legislation and regulations, by working closely with law enforcement agencies and neighbouring communities
- Record all incidents of wildlife or environmental crime or violation of the park Regulation as part of the long-term monitoring of the Park, see Chapter 6
- Develop a practical, harmonized approach to the implementation of various pieces of legislation within the park, particularly those relating to the Park and the Diamond Act, but also including MME and MFMR legislation
- Plan, develop and implement, in partnership with Namdeb, an efficient and effective tourism management and access control system

- Ensure security and anti-poaching (including plant, reptile and other natural resource collection/theft) patrols and surveillance are conducted at frequent but unpredictable intervals, particularly in high risk areas (e.g. along main access routes and around urban and mining areas) and that they are highly visible
- Develop an attractive reward system and let it (and the zero tolerance approach) be widely known in the area
- Develop active security relationships with Namdeb Security, government law enforcement agencies (including customs officials) and neighbours
- Ensure that Park staff members are trained to preserve and collect evidence so that arrests result in convictions
- Develop, in collaboration with Namdeb, a security plan for the Park

Figure 55 Ancient *Conophytum* sp. (probably *pageae*) in dormant state may attract illegal collectors

Figure 56 The Tsau //Khaeb NP holds over 100 species of mesembs which are the dominant plant components over large parts of the Park. A *Brownanthus* sp. above in dormant form and a stunning unknown mesemb, possibly *Cheiridopsis brownii*, below in the coastal zone south of Lüderitz peninsula in the area of interest for developing wind farms

5.13 Environmental Impact Assessment and management

Activities associated with both conservation management and tourism but especially mining and infrastructure development, including wind energy generation and trasmission may degrade or change vegetation, disturb or alter animal populations, destroy archaeological artefacts and sites, and affect cultural habits and social systems.

The assessment and subsequent management of these potential impacts are key principles in ensuring that the utilisation of Park resources is done sustainably. Proposed projects that are listed activities[30] in terms of Section 27 of the Environmental Management Act (Act 7 of 2007) are subject to an Environmental Impact Assessment which requires public participation in the process of conducting environmental screening and doing an environmental impact assessment. Proponents of any such project in the park and its neighbouring areas must notify the public of their intentions. Such notification is done through the printed media and occasionally by posting notices of intended projects and public consultations about them at some public offices such as the Regional Council, Local Authorities or even conservancy offices. In practice, such notification is mostly insufficient to reach all parties that may be interested or affected by intended projects[31].

If there is such a project, the park managers should register as interested and affected parties and attend all public meetings on such projects. The park managers should do their own assessment of the potential implications of such projects and should raise these at the public meetings and follow that up in writing (email) to the representative of the proponent. The proponent is legally obliged to address how any concern raised in this manner will be addressed, and the park managers should evaluate if their concerns were addressed satisfactorily in the responses given by the proponent. A checklist of issues to consider when a proposal is notified is given below.

Checklist of issues to consider when projects that are listed activities are proposed to be done in the park or neighbouring land:

- Potential impacts on the security of key wildlife populations
- Potential impacts on the movements of key wildlife species
- Potential impact on endemic, near endemic and red data species
- Potential impacts from the extraction of water for the project (exploration and mining projects can require huge quantities of water)
- Potential impacts on tourism and hunting operations
- Potential impacts on sites of cultural or historical significance
- Potential impacts on the livelihoods of the park residents and on the members of the conservancies who derive benefits from the park

30 The following is a list of activities that may not be undertaken without an Environmental Clearance Certificate (but note that this is currently under review by MEFT):

- Energy generation, transmission & storage
- Waste management, treatment, handling & disposal
- Mining & quarrying activities
- Forestry activities
- Land use & development
- Tourism development activities
- Agriculture & aquaculture activities
- Water resource developments
- Hazardous substance treatment, handling & storage
- Infrastructure
- Other: Military demonstration & testing sites and construction of cemeteries, camping, leisure & recreational sites

31 To circumvent this problem, the Chamber of Environment can be requested to inform park managers of any proposed listed project in the park or neighbouring land (as they already do for NACSO)

If a project is approved, it would receive an Environmental Clearance from the Environmental Commissioner. This clearance will be granted subject to conditions. Where an Environmental Clearance is granted for a project in a protected area, a copy of such Environmental Clearance should be provided to park management, to ensure that park management can inform the Office of the Environmental Commissioner in the event of non-compliance.

Park managers should familiarize themselves with the provisions of the Environmental Management Act, Act 7 of 2007, especially section 27 on Listed Activities, and Government Notice No. 30 of 6 February 2012[32] that gives such Listed Activities. These activities may not be undertaken in Namibia without an Environmental Clearance. To do so otherwise is a criminal offence.

An almost universal condition attached to the granting of an Environmental Clearance is that an Environmental Management Plan is submitted, approved and implemented. Where an Environmental Management Plan is a requirement for an Environmental Clearance for a project in a protected area, a copy of such Environmental Management Plan should be provided to park management, to ensure that park management can inform the Office of the Environmental Commissioner in the event of non-compliance with such plan.

Consideration should be given by the Minister of Environment, Forestry and Tourism to the appointment of park management staff as Environmental Officers who can serve as inspectors, or, similarly, any other person who is not in the service of the Government (as provided for in section 18 of Environmental Management Act).

Figure 57 Tiny plants of *Tylecodon* sp., mostly buried beneath the surface with lichen in the coastal zone south of Lüderitz peninsula in an area earmarked for a wind farm

32 In the process of being amended

Figure 58 Lichen encrusted *Sarcocaulon* sp. at the site of the Diaz wind farm. Such old plants cannot be successfully translocated.

Figure 59 *Augea capensis*, a typical species of the Succulent Karoo Biome amongst blue marble rubble

Principles

- Environmental management should always include a careful evaluation of potential impacts and of ways to prevent, avoid or mitigate these impacts to a point where the environmental cost is commensurate with the overall purpose of the Park as well as with any legal requirements
- Park management staff should take an active part in compliance monitoring regarding the conditions attached to environmental clearances and the implementation of environmental management plans.
- The precautionary principle should apply to activities that may impact on the Park, even though they do not require formal EIAs. This would include all activities that affect the general habitat or species (e.g. artificial water installations, burning programmes, re-introduction of mega-herbivores, etc.) and which should be assessed
- All developments inside the Park should be subject to a cost/benefit analysis through an environmental assessment process. The analysis should examine all costs and benefits, including those of an ecological, economic, social and political nature
- Activities or developments are not automatically precluded from zones having higher conservation status. However, higher levels of EIA scrutiny will be required in these zones
- The whole region has a long history of settlement and contains some pre-historical sites that have not been adequately mapped. EIA processes must thus consider the potential occurrence of sites of archaeological significance in proposed development areas
- Tourism facilities and activities should maximise social, economic or political benefits and minimise environmental costs
- In keeping with the general aim of sustainable utilisation, preference will be given for developments with small environmental footprints. This means that low-impact building materials and techniques must be used, and energy and carbon budgets minimized
- Preference will be given to developments close to park boundaries and existing service infrastructure such as major access roads, power lines and so on
- Where possible new developments will be done on so-called brownfield sites (sites that have previously been impacted)
- The emphasis is on managing total environmental impact, from construction or implementation to operational environmental impacts
- Commercial tourism operations are required to dispose of their waste outside the parks in a properly appointed facility designed for that purpose. No permanent waste disposal is allowed inside the parks.
- No potentially polluting activities (such as frequent vehicle servicing and/or other mechanical maintenance or repair activities) may be conducted in any zone. Within reasonable limits, vehicles may undergo small services, providing all hydrocarbon fuels, lubricants and waste products are handled according to national regulations and in line with the applicable EMP, and disposed of outside the Park in a properly appointed facility.
- Where relevant, handling, storage and disposal of all hydrocarbon or any other potentially polluting substances must be an explicit part of all EMPs. The use and storage of pesticides and herbicides are not allowed, except in small quantities such as may be required to control insect pests in dwellings

Objective

- To prevent and mitigate negative effects and enhance positive effects of conservation management and tourism activities on the environment, by conducting a due environmental impact assessment and management process
- To prevent and mitigate negative effects and enhance positive effects of conservation management and tourism activities on the environment, by conducting a due environmental impact assessment and management process

- All development activities impact on the receiving environment – i.e. biophysical (e.g. fauna, flora & archaeology), social and cultural – and consequently require assessment, management and monitoring to ensure the least impact and guarantee sustainability
- To prevent negative effects and enhance positive effects by conducting an Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) on development activities

Figure 60 Remnant of a girdled lizard *Cordylus* sp. (possibly *C. subtesselatus*, the dwarf plated lizard) within 2km of the coast and far west from the nearest known records of *Cordylus* spp. in the Tsau //Khaeb NP which were all along the eastern boundary of the Park (Griffin undated). The reptile fauna of the Park has clearly not been adequately surveyed.

Strategies

- Environmental Impact Assessments are to follow relevant legal and policy guidelines as provided by Namibia's Environmental Management Act of 2007
- Environmental management should always include a careful evaluation of potential impacts and of ways to prevent, avoid or mitigate these impacts to a point where the environmental cost is commensurate with the overall purpose of the Park as well as with any legal requirements
- The separation of powers in MEFT requires that the Directorate of Parks and Wildlife Management, and the protected area staff in particular, should actively engage in any EIA process and represent the interest of the park as outlined in this management plan (as well as adjacent areas in light of the importance of ensuring compatible land uses and sustainable development in neighbouring land to maintain landscape connectivity in ARTP)
- Guidelines provided for each zone in the Park are the key management tool to guide the environmental assessment and management process during planning and implementation of tourism activities and the development of any infrastructure to be used for Park management
- Some conservation management activities undertaken in the normal course of biodiversity protection are intended to affect habitats or populations of species. Such types of conservation management actions (e.g. the provision of water) are not subject to a formal environmental assessment process, but decisions should always be taken within the framework of adaptive management and be fully informed of potential outcomes and risks
- For all tourism concessions, environmental guidelines will be developed and enforced. The development of such guidelines is part of the process of defining concessions

- Each development proposal will be required to show, even in broad terms, how it will minimise waste and carbon production and energy use (the detail of these plans will depend on the total extent of the proposed development or activity). In addition, waste management protocols must be drafted wherever relevant, with the general aim to reduce, re-use and recycle (in that order of priority)
- MEFT will ensure that zonation plans, tourism development plans and guidelines are followed in the planning and implementation of all activities and developments:
    - EMPs and monitoring plans must be implemented
    - Development will be aligned to the Park management and zonation plans
    - Adaptive management strategies will always be adhered to

Figure 61 Fragile desert 'pavement' landscape of wind-polished marble near Charlottental

Figure 62 Fragile desert landscape north of Baker's Bay

Figure 63 Mountainous terrain of the lower Orange River valley in Tsau //Khaeb NP

5.14 Management of the Orange River Mouth Ramsar Site

The Orange River Mouth Ramsar Site is 500ha in extent in Namibia and is a transborder site with South Africa where a further 2,000 ha is located. The Orange River as the sole perennial river in the region forms a linear oasis (floodplain) of islands and sand bars through a hyper arid region. The site provides habitat for a variety of endemic plants and during the summer is the sixth richest wetland in southern Africa, in terms of bird numbers supported. The abundance of three species exceeds 1% of their respective global populations. Restricted recreation takes place within the Site. In surrounding areas, activities include diamond mining, irrigation, and large-scale water abstraction.

The Orange River Mouth is one of the most important wetlands in southern Africa based on the number of birds occurring there. More than 1% of the global population of Damara Terns (*Sterna balaenarum*) and Hartlaub's Gull (*Larus hartlaubii*) and more than 1% of the southern African population of an additional six species, as well as fourteen species of birds listed in either or both of the Red Data books for Namibia and South Africa. The site also supports 33 species of mammals, including the straw-coloured fruit bat (*Eidolon helvum*) and Cape clawless otter (*Aonyx capensis*), 41 reptile species, including water leguaan (*Varanus niloticus*) and the coastal legless skink (*Acontias littoralis*), and 16 amphibian species, one of the highest diversities in Namibia. The Namaqua barb (*Barbus hospes*) is a fish that is endemic to the lower Orange River and is one of three IUCN red listed fish species found in the river.

Management arrangements for this site have been unclear, largely because it had not been clear that the Site falls within the Park, which as shown in Chapter 1.3, only a small part does.

The major part of the border of the wetland coincides with the border of the Oranjemund Townlands but may not be clear and should be demarcated and signposted. At times, officials of Namdeb as well as Oranjemund Town Council have taken management actions such as opening the estuary without consultation with MEFT. A further complication is that it is a cross-border Ramsar Site which requires coordination and cooperation between two countries. This will be difficult in the absence of a common approach towards the management of this Site. It is also not clear which agency/ies in South Africa has/ have a mandate over the South African side of the wetland.

33 The Convention on Wetlands or the Ramsar Convention. www.ramsar.org

34 Ibid

35 Ibid

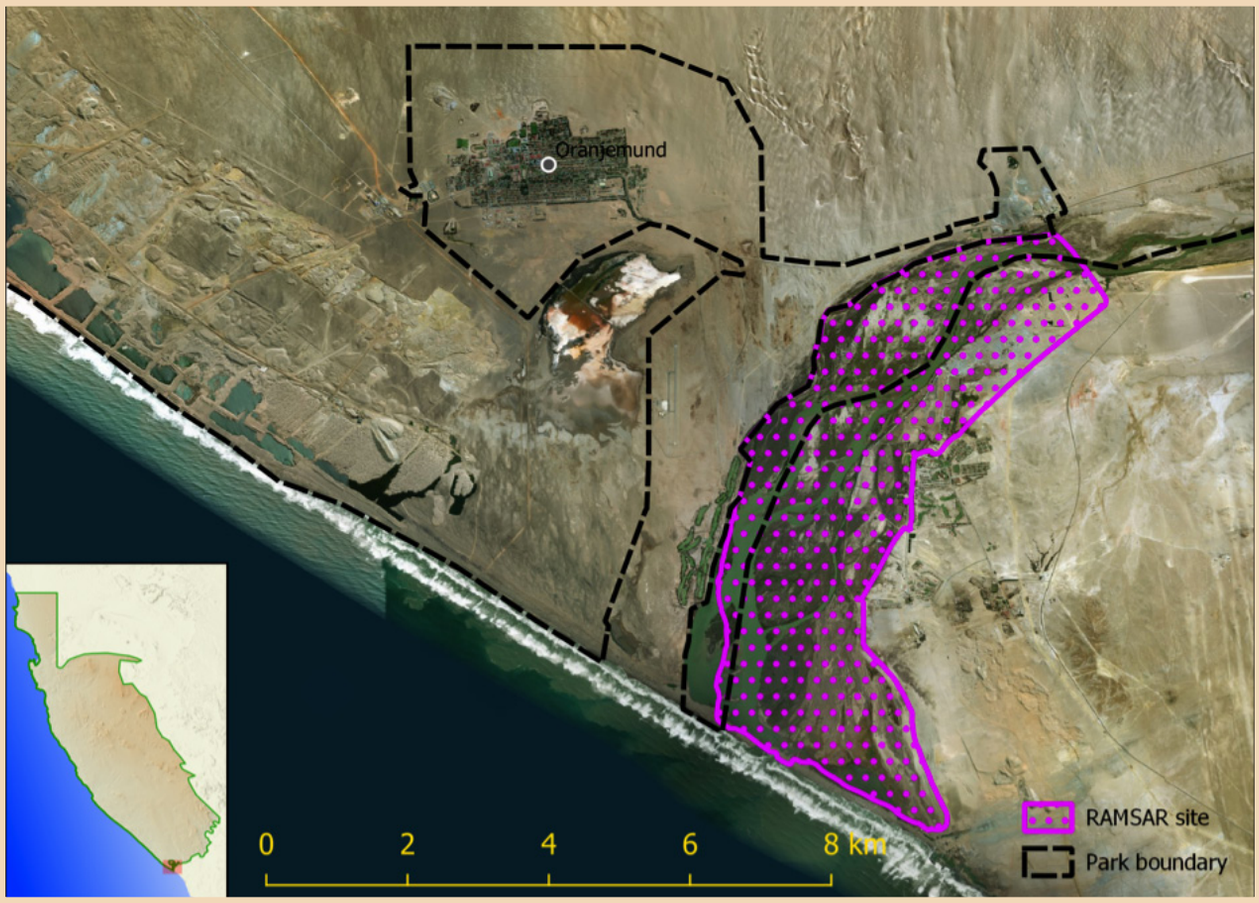


Figure 64 Orange River Mouth Ramsar Site overlaying a satellite image and being bordered in the North and West by the Oranjemund Town boundary but being connected to the Tsau //Khaeb National Park through a panhandle lying between the Oranjemund Town boundary and the Orange River.

Greatest threats to Tsau //Khaeb NP	Key conservation and management outcomes for Tsau //Khaeb NP
Unclear park boundaries may compromise law enforcement	• The Park boundary description and demarcation have been harmonized • The boundary description and legal status of the Orange River Ramsar site have been improved

The key management issues seem to be limited to:

- Coordination with South Africa needs to be improved to jointly manage the wetland
- Management of the sand bar that periodically blocks the flow of the river and creates an estuary, and which requires coordination with South Africa
- Access by people and vehicles to the site and recreational fishing

Principle

- The boundary description and legal status of the Orange River Ramsar Site should be improved to facilitate management and law enforcement

Objective

- Cooperative management of a wetland of international importance based on an agreed management plan

Strategy

- There is need to engage the South African Department of Environmental Affairs to determine who is the management authority for the wetland in South Africa
- Thereafter, that entity should be engaged to develop a basic management plan for the site, building on the very comprehensive draft management plan developed by South Africa[36]

5.15 Management of the Garub horses

MET in 2019 developed a management plan for the horses inhabiting the Garub area of the Tsau //Khaeb NP and the adjacent Namib-Naukluft Park (NNP)[37]. This plan sets out a vision to sustainably manage the horse population of the Tsau //Khaeb NP and Namib-Naukluft Park for improved tourism development and cultural heritage. This history of the horses is given in Goldbeck & Greyling (2014)[38]. In order to sustainably manage the horse population of the Namib for improved community development and cultural heritage, the management plan sets out six management strategies which include zonation; management and tourism development; supplementary feeding and water provision; predator management; research and monitoring; public awareness, stakeholder engagement and coordination. The plan also established the following five guiding principles.

Principles

- Horses of the Namib are the property of the State through MEFT
- Horse population management is promoted as an economically viable land use type in a Managed Resource Use Zone of the NNP and TKNP
- The State is willing and will continue to commit resources to the protection and management of the horses
- Cooperation between MEFT and other stakeholders to achieve the protection and management of the horses will be pursued at all times
- Predators make significant ecological and economic contribution to wildlife-based land uses and shall be conserved in the Garub area or Managed Resource Use Zone of the NNP and TKNP

36 Draft Orange River Mouth Ramsar Site Strategic Estuarine Management Plan October 2015. Department of Environmental Affairs

37 Management Plan for the Garub Horses of the Namib Namib Naukluft Park and the Tsau //Khaeb (Sperrgebiet) National Park 2019 – 2029. Ministry of Environment and Tourism, 2019.

38 Goldbeck, M. & Greyling, T. 2014. Wild horses in the Namib Desert. An equine biography. Friends of the wild horses.

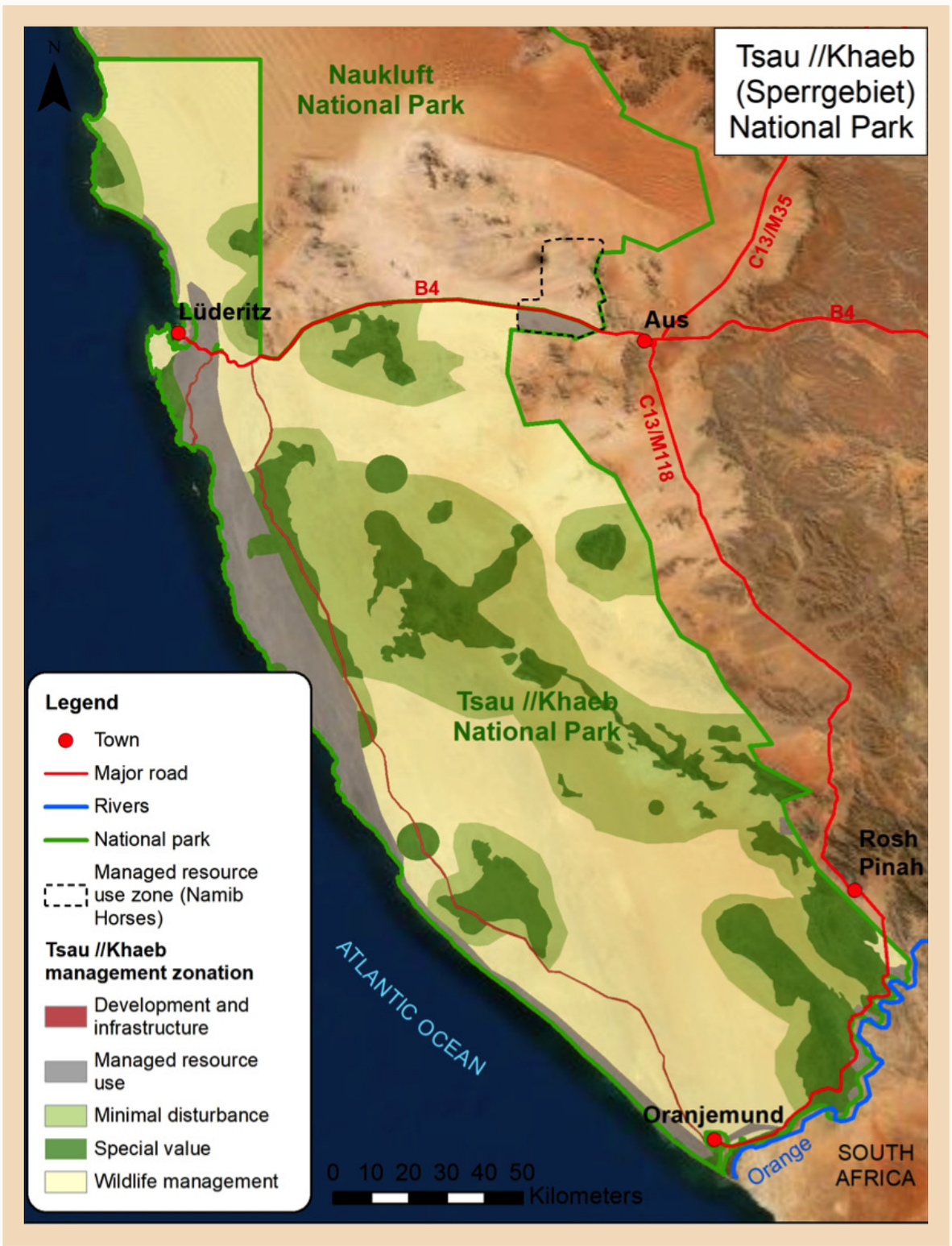


Figure 65 Namib horse Managed Resource Use Zone in the extreme northeast of the Park

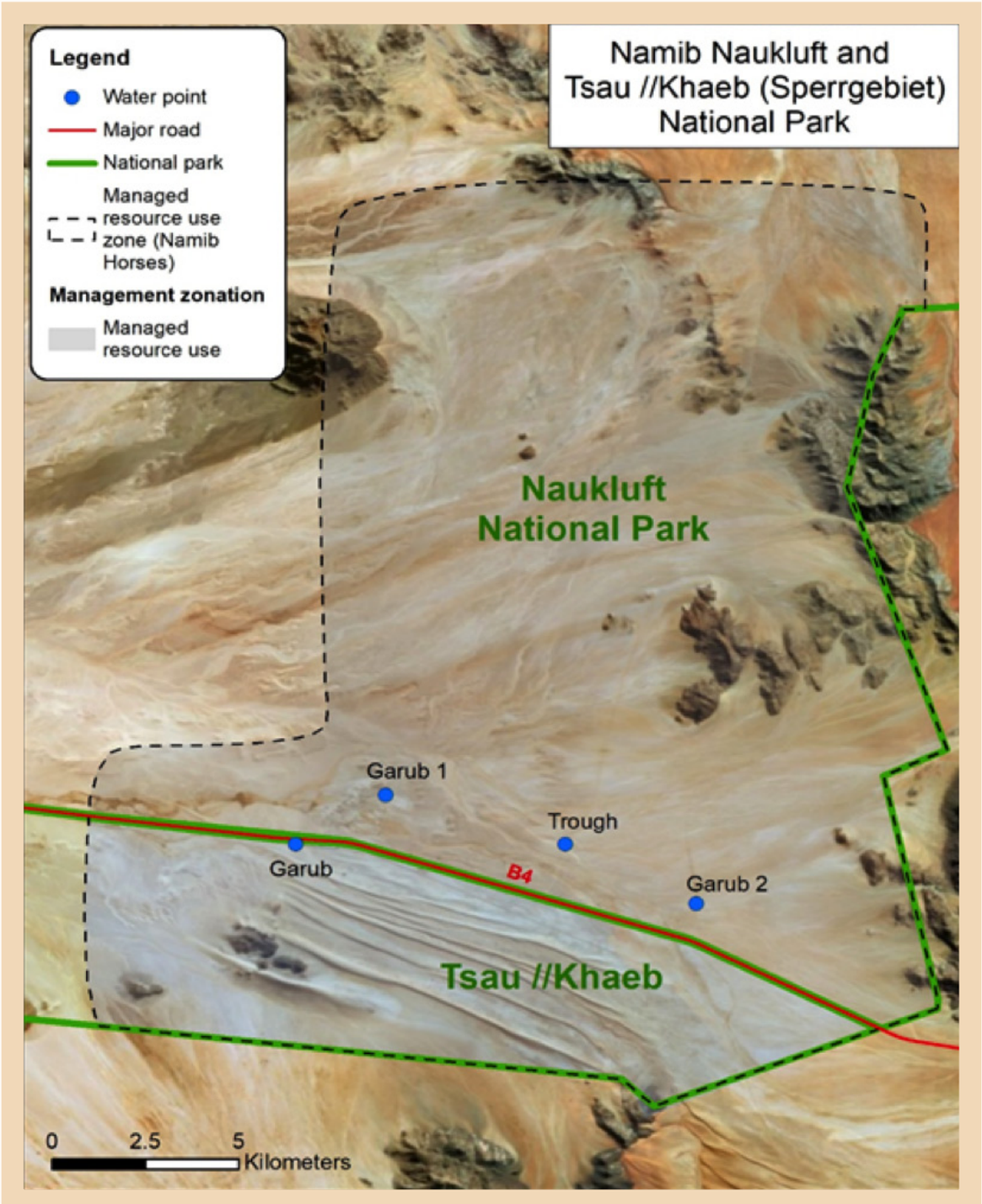


Figure 66 Details of the Namib horse Managed Resource Use Zone in the extreme northeast of the Park and the south-eastern part of the Namib Naukluft Park

Objectives

- To maintain the integrity of the horse population in the Garub area of the NNP and TKNP
- To reduce conflict between horses and hyaenas (and people) and create conditions under which horses and hyaenas are a benefit to communities
- To manage the Garub area in the NNP and TKNP as a Managed Resource Use Zone for the protection and conservation of the horse and hyaena populations
- To enable the realization of full economic potential of the horses to the neighbouring communities and the country in general

Strategies

- The Garub area of the NNP and TKNP is zoned as "Managed Resource Use Zone" and referred to as "Garub Managed Resource Use Zone, Namib Naukluft Park and/or Tsau //Khaeb National Park" and managed according to the Management Plan for the Garub Horses of the Namib Naukluft Park and the Tsau //Khaeb (Sperrgebiet) National Park 2019 – 2029
- Permitted activity in the Garub Managed Resource Use Zone shall be the existence and management of horses, which are not wild animals. However, this zone shall retain its natural and cultural appeal to the extent that they are able to accommodate tourism facilities such as viewing hides and related activities, which shall be oriented towards cultural features of the Aus community
- Levels of use for the Garub Managed Resource Use Zone will be strictly controlled to prevent any damage to the environment
- The zone will retain its ecosystem functionality and the capacity to deliver a wide range of ecosystem goods and services. This shall include management of wild animal species such as hyaenas, oryx, springbok and others in the area, as well as regulatory services such drought mitigation and provision of services such as fresh water and forage for horses
- Since the Garub Managed Resource Use Zone have become an integral part of the tourism portfolio in the Aus/Lüderitz area, horses shall remain in this zone and not be relocated to other parts of the Namib Naukluft Park or Tsau //Khaeb (Sperrgebiet) National Park
- Translocation of horses to private land under a custodianship programme shall not be considered
- Any possibility for creation of a sanctuary for the horses shall be done so within the Garub Managed Resource Use Zone
- To provide for supplementary feeding and water supply and maintain the status quo with regard to supplementary feeding and water distribution[39]
- When necessary, and in time of drought, provide supplementary feeding to the horses
- Maintain current existing artificial water points and supply water to the horses on daily basis
- Feeding and water supply for the horses should be replenished with the least possible noise
- Horses in the Garub Managed Resource Use Zone shall be fenced off or a small sanctuary shall be provided for times of drought and severe predation, or their range extended further in the park
- Regular patrols shall be conducted to scare off the hyaenas and protect the horses from predation
- A healthy indigenous wildlife population shall be maintained or managed in the Garub Managed Resource Use Zone. This is however dependent on the drought situation in the area
- Hyaenas in the Garub Managed Resource Use Zone shall not be destroyed or captured as problem causing animals. Any capture or destruction of hyaenas in the area shall be done so for management purposes
- The location and size of the fenced-off Garub Managed Resource Use Zone still need to be determined, if at all needed in future

39 The Garub Managed Resource Use Zone needs to be managed in synchrony with the larger part of the distribution area and equivalent zone to be established in the Namib-Naukluft Park. Providing feed and water will not be done in the Tsau //Khaeb part of this zone but will take place in the Namib-Naukluft Park part.

A

B

Figure 67 A&B Not-so-wild Namib horses near Garub demonstrating their lack of fear of people and the risk of contact with vehicles

Chapter 6 Adaptive management

6.1 Adaptive management cycle

The adaptive management process (see Figure 68) in its simplest form is:

- Setting management objectives
- Implement management actions to achieve those objectives
- Assess the impact of those actions towards achieving the objectives
- Adjust the management objectives if necessary
- Repeat the cycle

Management actions derived from the Strategic and Enabling objectives (Chapter 2.3) and the Specific objectives in the other chapters as described in the annual work plan are implemented and the results of these actions monitored. If the results are not satisfactory, the activities should be refocussed in the next annual work plan and/or the objectives may need to be revised (i.e. in the next management plan). Adaptive management can be applied to wildlife management, law enforcement and indeed each and every aspect of the management plan. In practice, adaptive management is most often used in wildlife population management and this will be further elaborated below.

Step 3 above is the assessment of impacts after implementing a management action. This step requires data, and this is both one of the fundamental reasons why monitoring is necessary and if data for making the assessment are lacking, one of the greatest causes of unsuccessful implementation of a management plan. The key challenge is the need to be able to easily access relevant and current data to inform management decisions.

Monitoring therefore needs to be integrated into adaptive management. For this, a) research is needed to ensure that the right things are monitored and b) training is needed to ensure that data are correctly recorded.

This is illustrated in Figure 69. The monitoring data is analysed to determine whether the stated objective (impact) has been attained and then the next set of planned actions are formulated accordingly. Issues or problems that are identified through this process are then prioritised for applied research in order to better understand the problem and its contributing factors. This applied research, which is linked to the adaptive management process, may then highlight the need for associated academic research.

Adaptive management needs to be supported by training activities at each stage of the process. Training needs to be given to all staff – whether park management staff or conservation scientists – on how to determine the necessary management actions and then the implementation of the management actions according to accepted standard operating procedures. Further training is needed to ensure that monitoring data is collected using consistent and appropriate methodology and that the data collected is entered into data bases timeously for analysis. For the data to be used effectively and efficiently for the purposes of adaptive management, it needs to be accessible and available in a synthesized format that facilitates its use for the intended purpose.

Thus monitoring, training and both applied and academic research are all essential components of the adaptive management process.

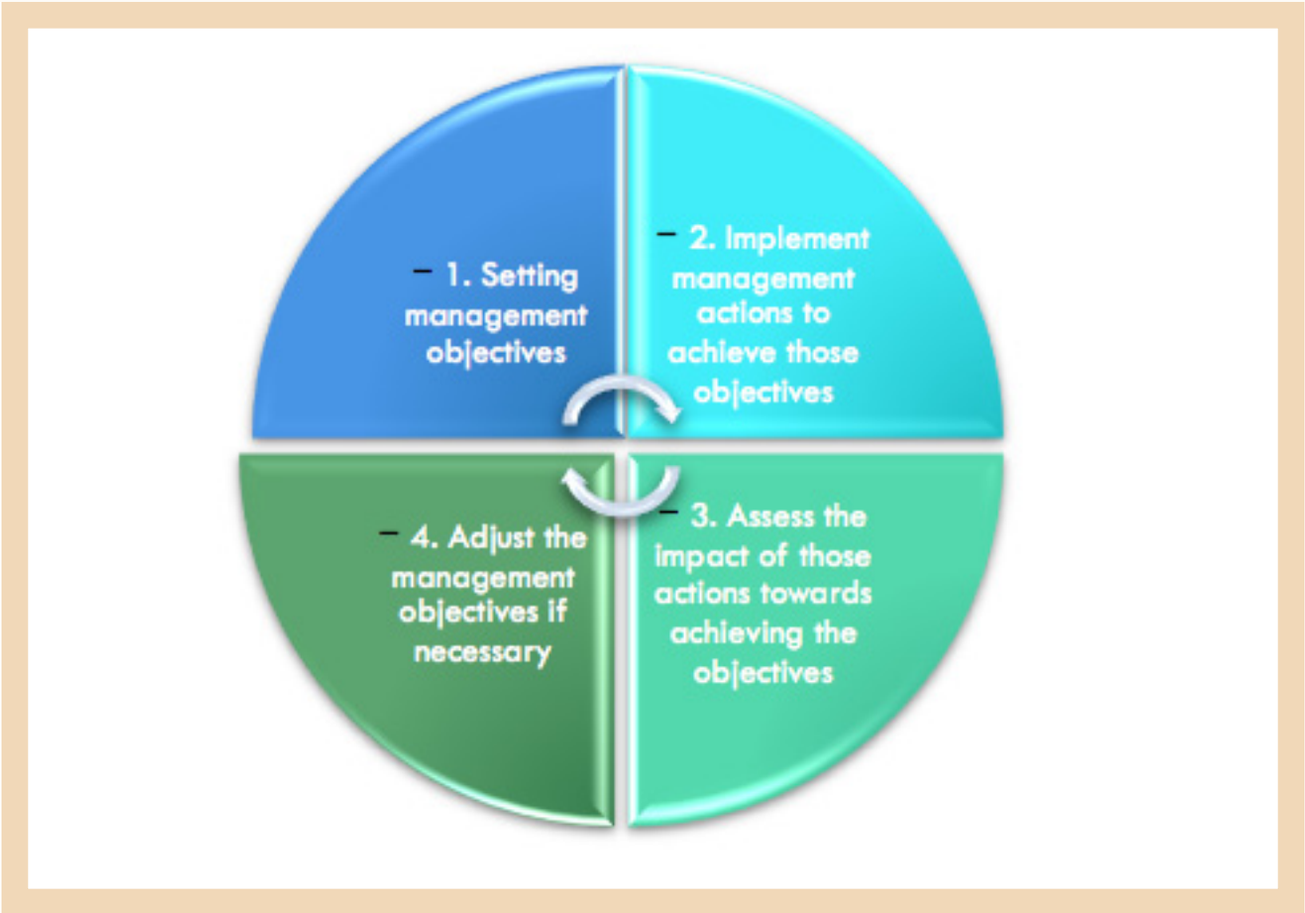


Figure 68 Diagram outlining the adaptive management process

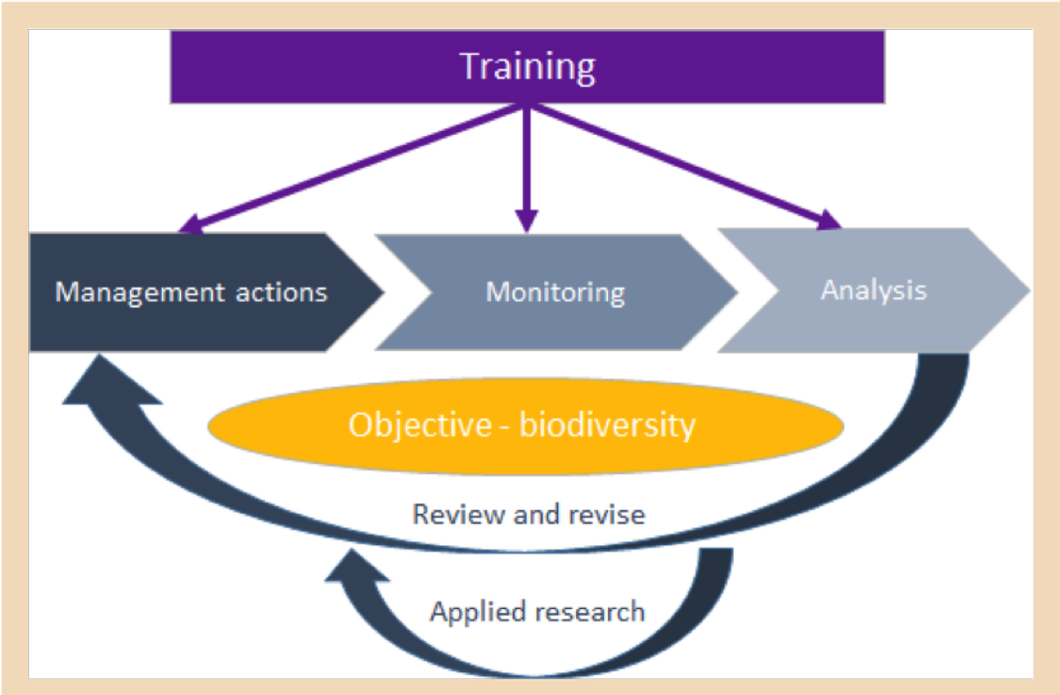


Figure 69 The relationship between adaptive management, training and research

Adaptive management is an essential framework for the management of wildlife populations which is one of the most important and challenging parts of a management plan for a park such as Tsau //Khaeb NP. The components are (as above but now more specific):

- Setting management objectives – in this case, population targets in the form of a minimum or maximum size or a range within which a population must be kept

- Implement management actions to achieve those objectives – in this case, the first step is to identify which management action/s is/are appropriate
- Assess the impact of those actions towards achieving the objectives – specify the monitoring parameter needed to be measured to indicate if the management action/s has/have been effective
- Adjust the management objectives if necessary – large mammal populations will not necessarily respond within one annual cycle, thus consult relevant experts
- Repeat the cycle

6.2 Monitoring

Monitoring relates both to natural resources as well as to management effectiveness. Regular monitoring and data collection will feed into adaptive management and decision-making for the Park and inform all relevant management decisions. Without access to relevant and current data to inform management decisions, adaptive management becomes less effective. MEFT is developing a standard guideline for monitoring in protected areas which will need to be read in conjunction with this section.

The Tsau//Khaeb NP is the first protected area in Namibia for which a formal biodiversity monitoring framework was adopted[40]. This framework should be applied as a partnership or shared responsibility of Park management staff, other MEFT components with a responsibility for monitoring and other institutions such as the National Botanical Research Institute (NBRI) of MAWF. The principal components of this monitoring framework are shown in Figure 70 and Figure 71.

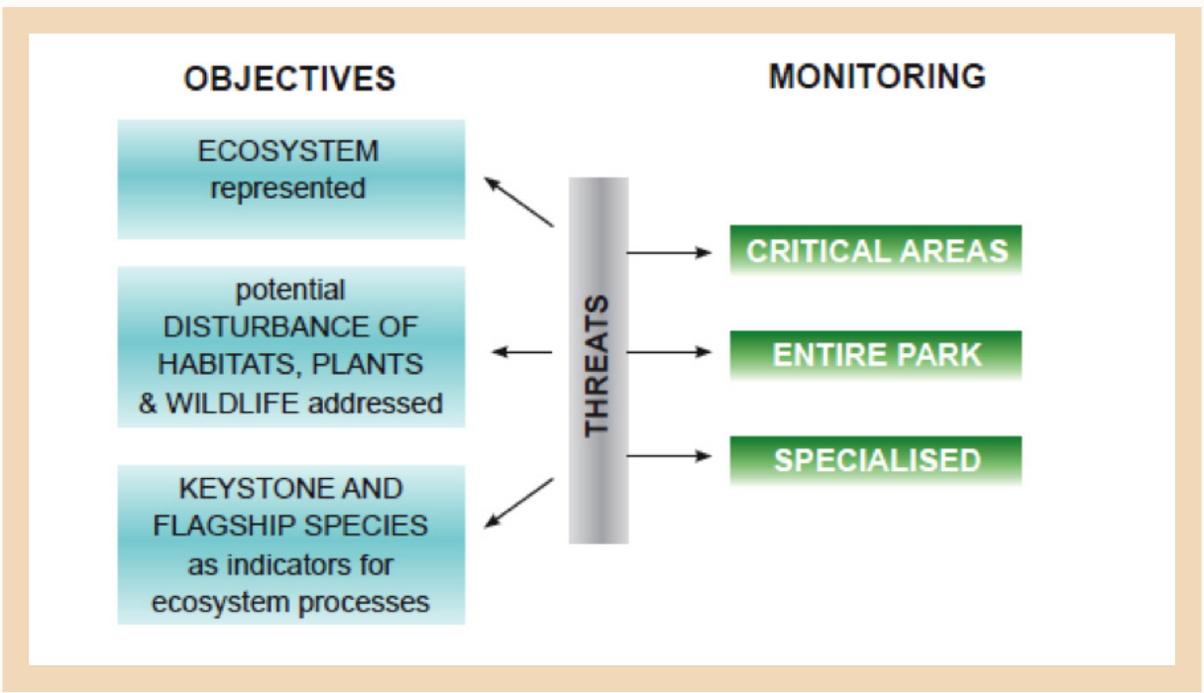


Figure 70 Objectives of the biodiversity monitoring framework and the scale of monitoring required

40 Ministry of Environment and Tourism, 2018. Biodiversity monitoring framework for the Tsau//Khaeb (Sperrgebiet) National Park

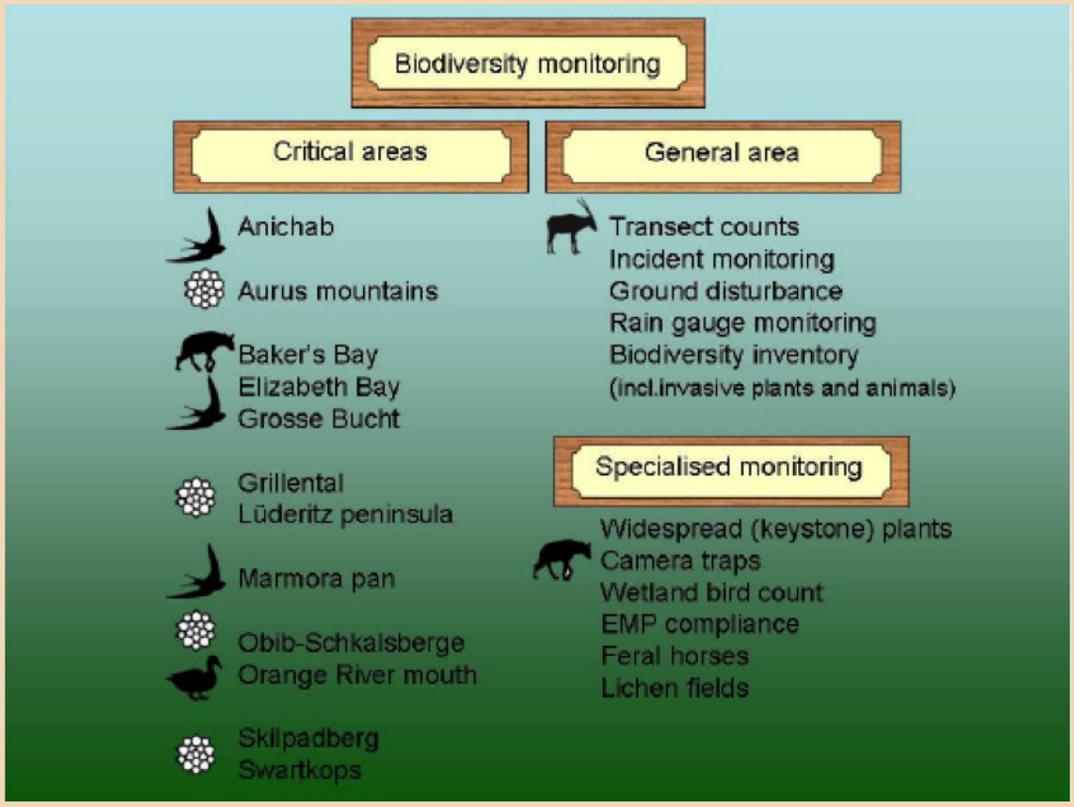


Figure 71 Core monitoring priorities of the biodiversity monitoring framework

Figure 72 *Othonna furcata*, a keystone species in the biodiversity monitoring framework

Figure 73 Healthy-looking *Lithops optica* near Grillental, one of the indicator species in the Biodiversity Monitoring Framework.

Figure 74 Remnant of two ancient *Lithops optica* specimens on the Lüderitz peninsula showing many years of accumulated growth

In light of concern over proximate effects of climate change or extreme climatic variation and the

importance of improving landscape connectivity, greater use of remote sensing should be made to get a better landscape scale overview of certain parameters. One such parameter is the high degree of annual variation in rainfall and primary productivity occurs in southwestern Namibia as illustrated by the NDVI for the region. NDVI or the normalized difference vegetation index is a "greenness" indicator that can be derived from satellite imagery and measures the live green vegetation. The website www.namibiarangelands.com uses this technology to provide regular updated maps of Namibia during the rainy season, and presents the Vegetation Index Deviation from the long-term mean, the four year mean, the previous year and the previous 10-day period. The images are those of the Vegetation Index Deviation compared to the long-term mean, with the colour gradient indicating from green (above normal) through to red (below normal) (Figure 75 and 76).

It should be kept in mind that NDVI measures the new growth of herbaceous biomass and is therefore not a good indicator of the amount of dry grass biomass remaining from previous years.

Therefore, the year following a very good rainy season may show average or below average deviation, whilst still having substantial dry biomass present. The growth of grass is directly correlated to rainfall received and the amount of standing herbaceous biomass at the end of the rainy season (as well as other parameters such as the species composition, litter, soil compaction) are important parameters in the assessment of rangeland condition. These images provide a good proxy for rangeland condition and herbaceous biomass available and also provide information regarding likely wildlife concentrations, or food stress. On the website it is possible to zoom in to look at particular areas in more detail.

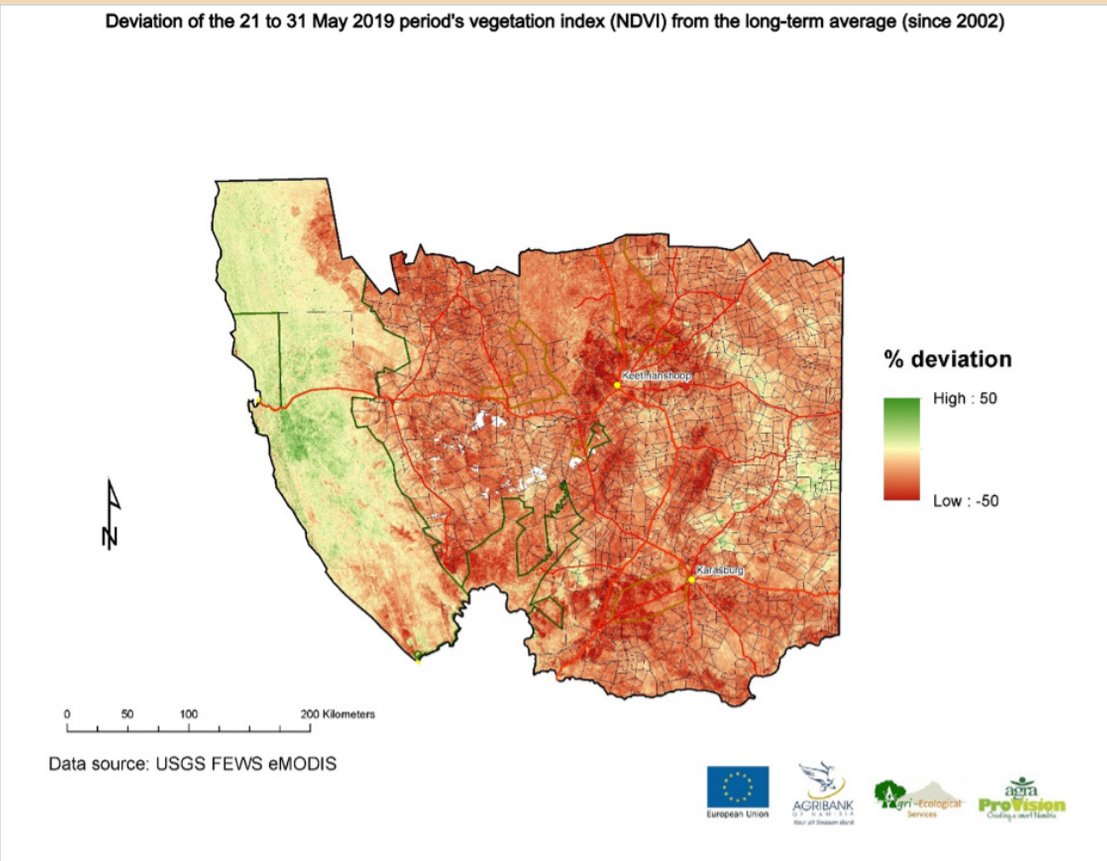
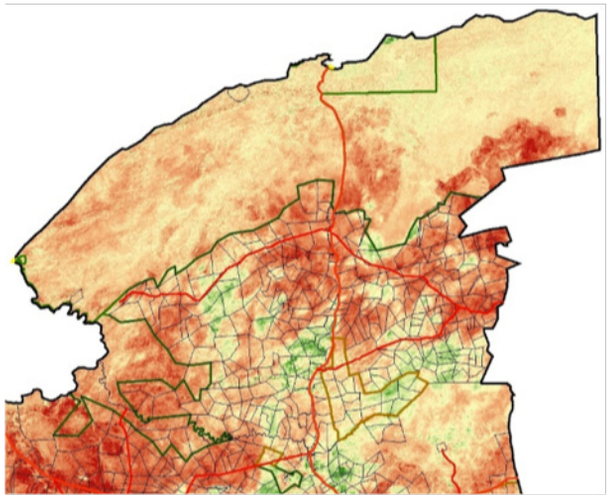
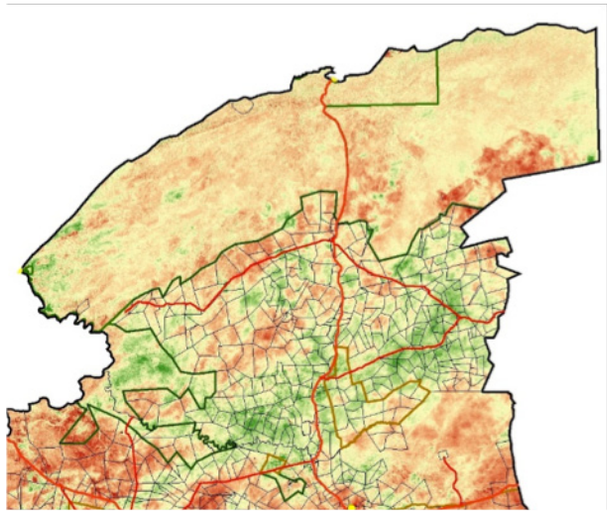
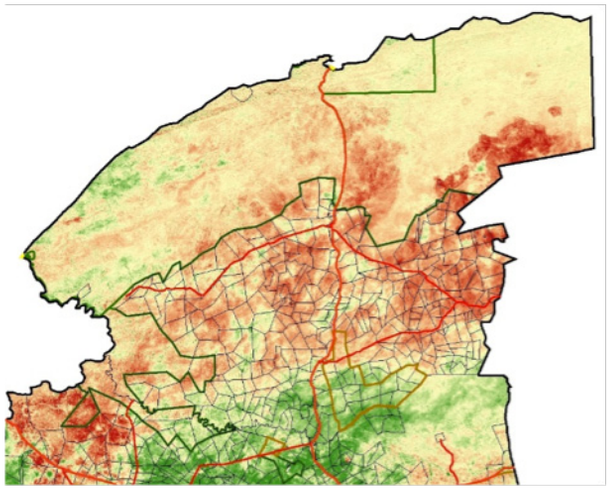
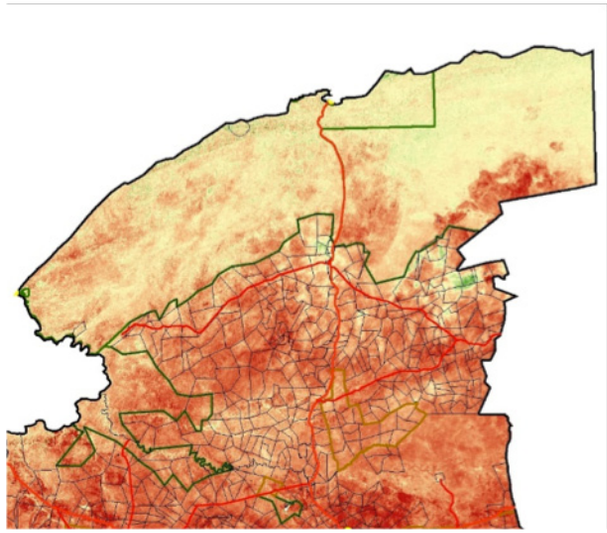
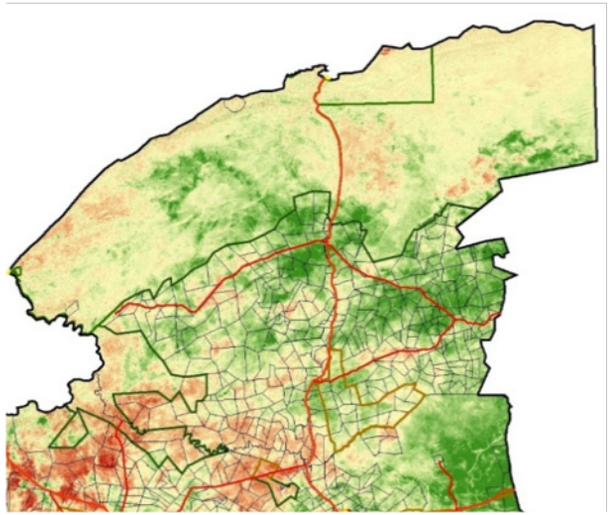
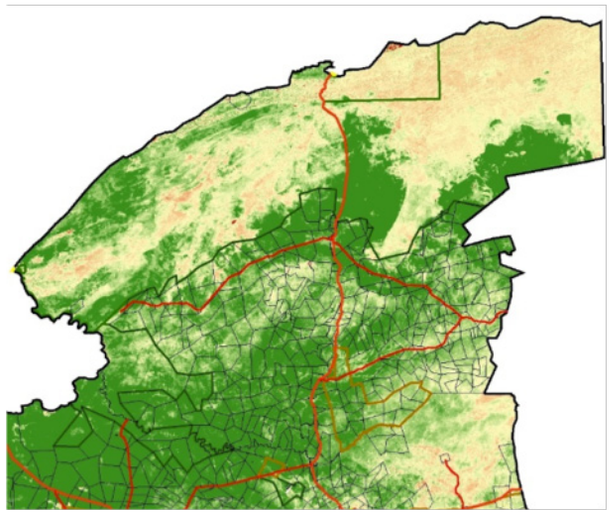
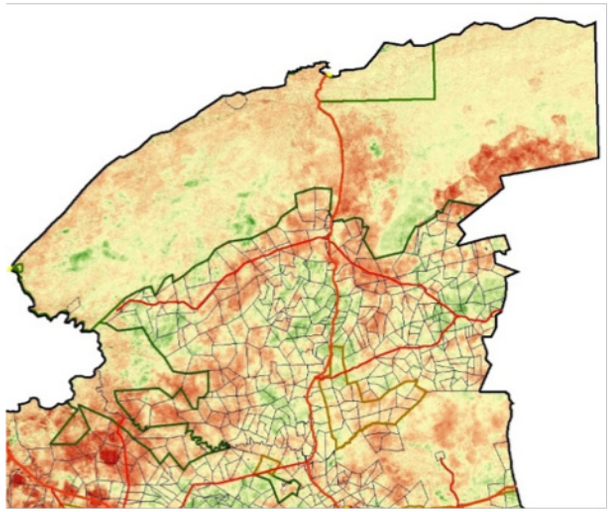
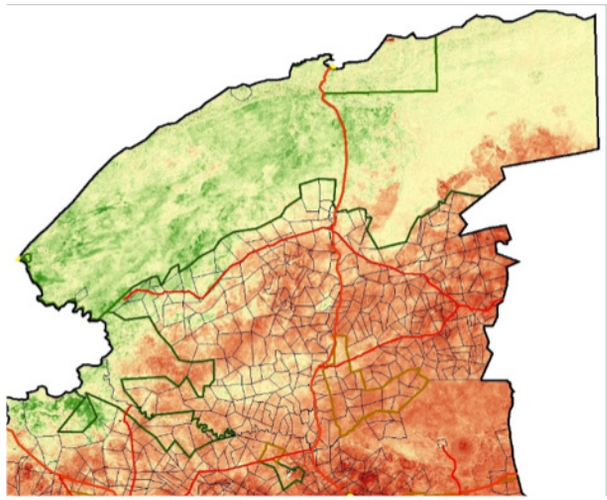
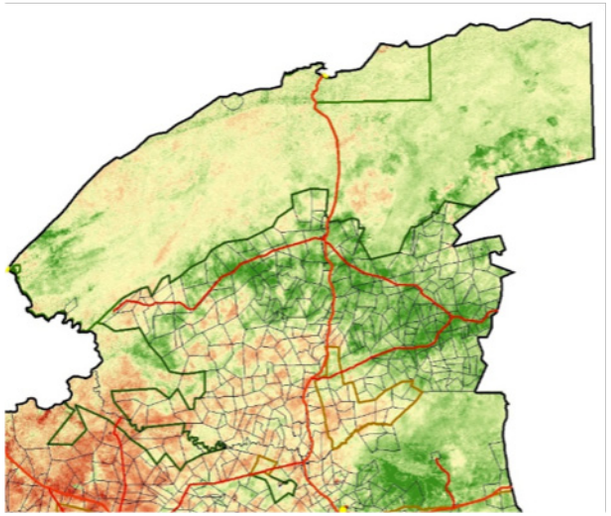
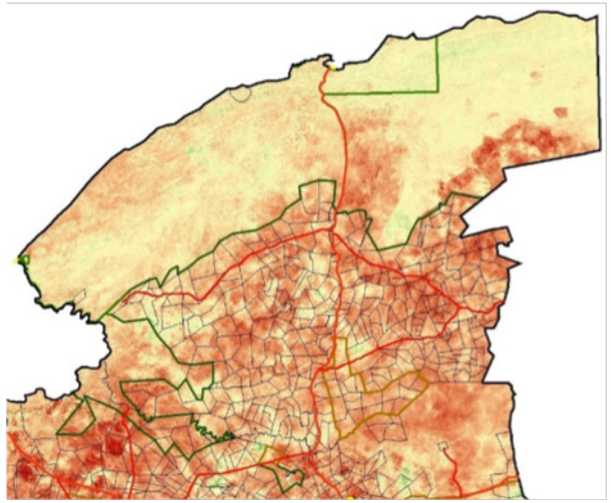
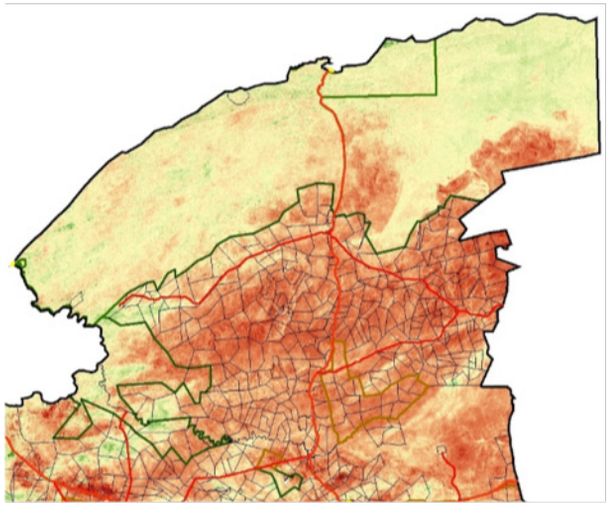
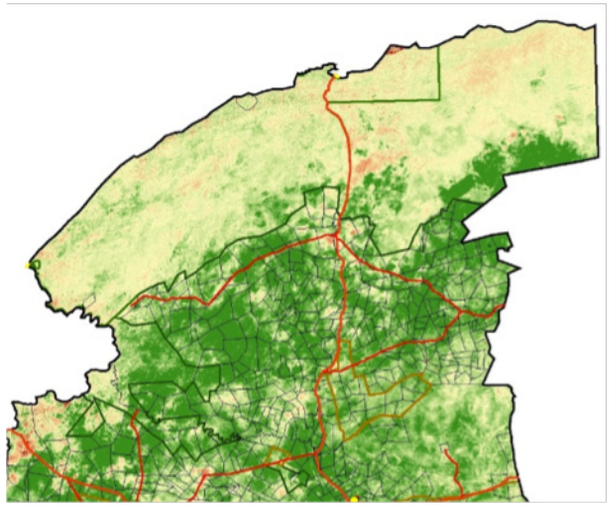
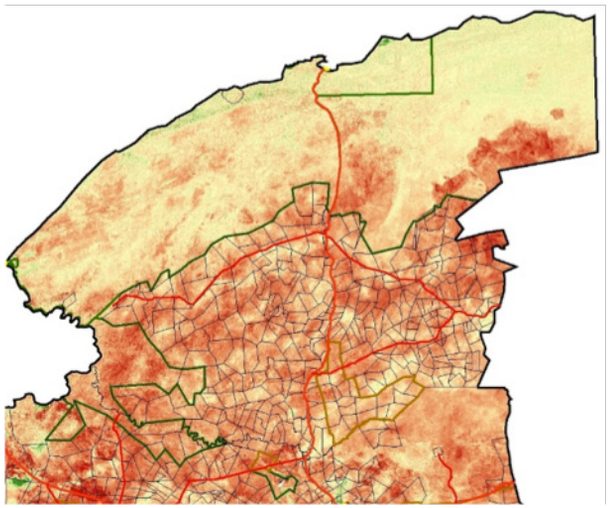
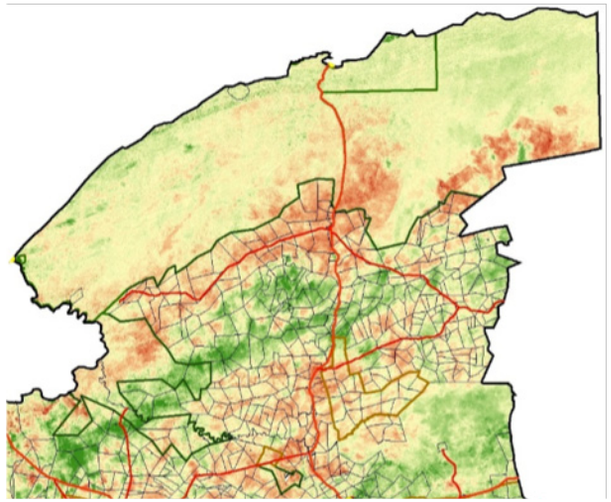
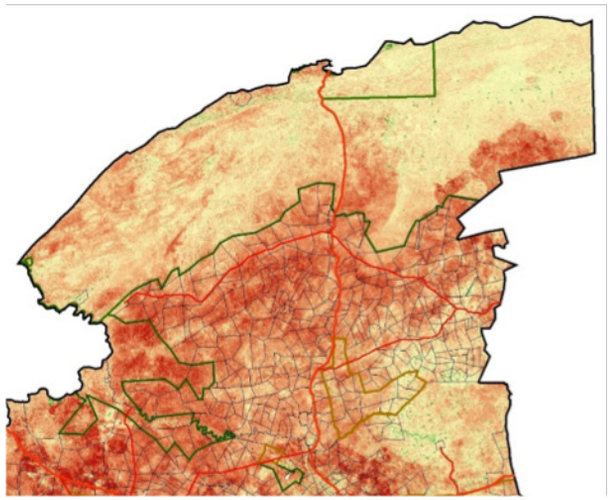
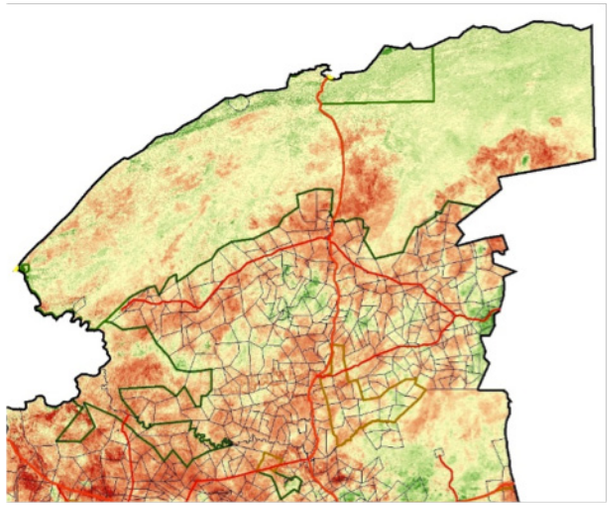


Figure 75 Annual variation in NDVI expressed as the deviation from the long-term average. Such variation may be highly relevant in understanding ecological conditions in the Park as well as wildlife movements and the different roles that different parts of the landscape play in this regard.

2004	2002
	
2005	**2003**
	

2008	2006
	
2009	**2007**
	

2012	2010
	
2013	**2011**
	

2016	2014
	
2017	**2015**
	

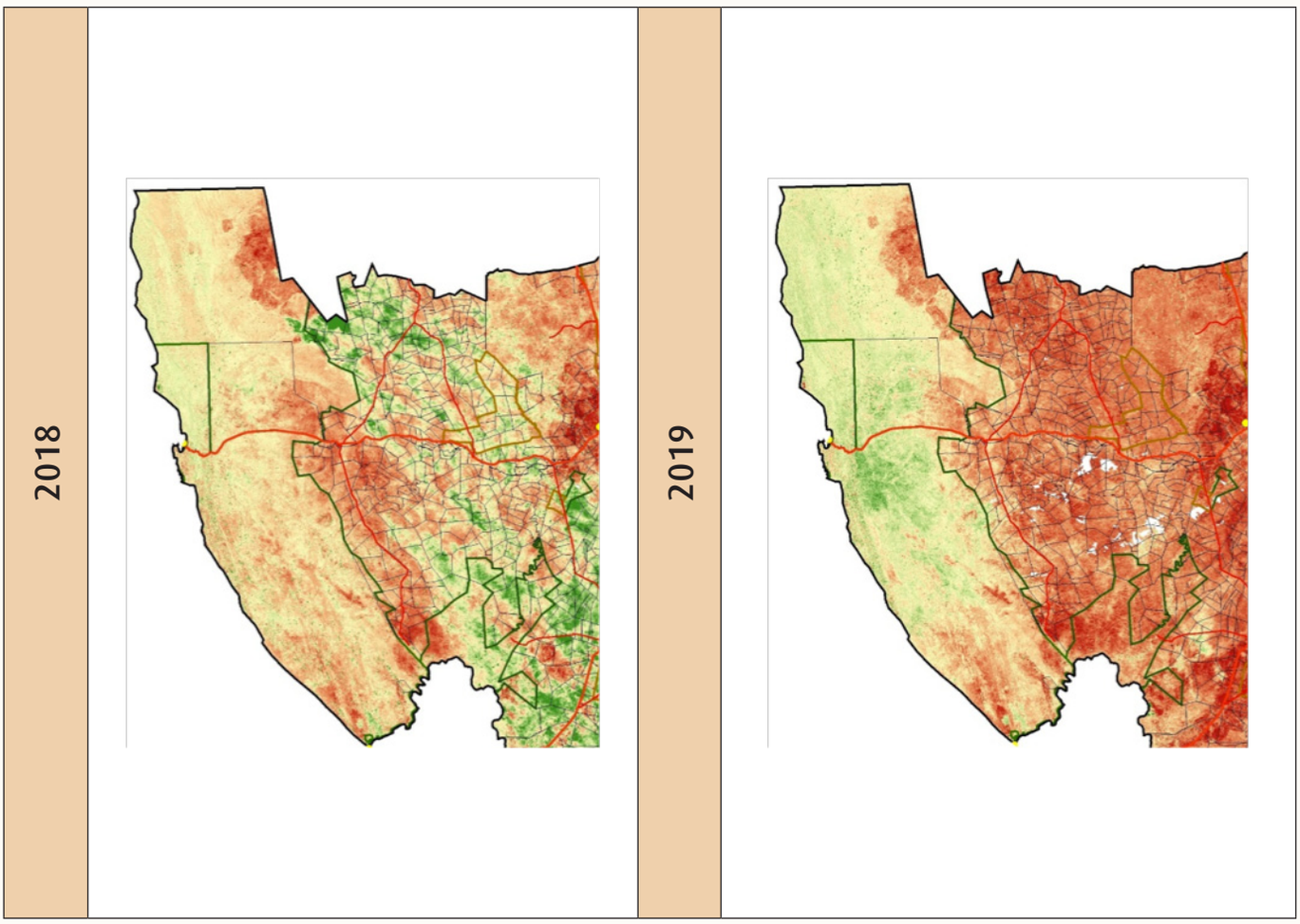


Figure 76 These images show the potential of using remote sensing to monitor important parameters on time and spatial scales that would otherwise be virtually impossible to measure

Figure 77 Relatively high standing grass biomass in the plains area in the east of the Park, an important grazing area for oryx

Monitoring aims to answer the following questions:

- Did we do what we said we would do?
- Did it have the desired / expected result?
- Did it go as planned?
- Are we having the desired impact?

In identifying monitoring actions, it is important to distinguish between outputs and outcomes:

- Outputs are generated from management actions, and are a measure of achievements in this regard
- Outcomes measure the state of various parameters as a way of determining whether the impact of management actions is moving the park towards its desired state.
- There is also a third level of monitoring which focusses on administrative compliance, which is covered under Chapter 13.

Principle

- Minimum, regular monitoring of wildlife and plant resources, climatic variables and impacts of human activities must be undertaken to determine and track environmental changes. The information produced from the monitoring systems will feed into adaptive management decision-making
- Natural resource monitoring will focus on key indicator processes, impacts, habitats and species, with an emphasis on ensuring regular data collection at appropriate intervals, cost efficiency and sustainability

- Monitoring will also assess the effectiveness of management using standardised operating systems and procedures (park inspection sheets and performance assessment)
- Monitoring systems shall apply approved tools already being widely used and shall also continue with systems already established and running within the Park
- Monitoring systems will be balanced to ensure that the entire range of critical information needs is covered
- Information will be made available in accessible format to feed into adaptive management decision-making

Greatest threats to Tsau //Khaeb NP	Key conservation and management outcomes for Tsau // Khaeb NP
Enabling Objectives	
Inadequate monitoring of the implementation of the management plan and ecological changes in the park	• All priority parameters are effectively implemented to enable timely intervention and corrective measures • The management team for the Park has reviewed the implementation of the management plan at quarterly review meetings

Objective

- To monitor a limited number of carefully selected indicators of ecosystem integrity (in general) and wildlife population dynamics to allow for timely and judicious adaptive management; to monitor the efficiency of management systems and procedures

Strategies

- Natural resource monitoring will focus on key indicator processes, impacts, habitats and species, with an emphasis on ensuring regular data collection at appropriate intervals, cost efficiency and sustainability
- Monitoring will also assess the effectiveness of management of Tsau //Khaeb NP, using standardised park inspection sheets and performance assessment, as well as the METT assessment
- Monitoring systems shall apply approved tools already being widely used and shall also continue with systems already established and running within the Park
- Monitoring systems will be balanced to ensure that the entire range of critical information needs is covered.
- Information will be made widely and freely available, in accessible format to all stakeholders to feed into adaptive management decision-making

The monitoring priorities for the park should cover the following core areas:

- **Biodiversity monitoring** – species (fauna and flora), population sizes and geographic distribution, movements, behaviour, rangeland, transboundary movements and cross border management:
  - park management to conduct bi-annual road counts with support from other regional parks officials, stakeholders and park neighbours. Counts to include game counts of wildlife in Oranjemund town
  - Bird counts at the Orange River Mouth RAMSAR site should be championed by MEFT officials in collaboration with specialised bird counters and Namdeb Environmental department. There is a need for park staff to be involved in the bird counts as this would improve capacity. All bird count data and analysis should be shared with the park management

- **Ecosystem monitoring** – rainfall, fire ecology, woodland and wetland systems, ecosystem services, alien invasive species, transboundary management including animal health

- **Resource economy monitoring** – extent of utilization of wildlife, indigenous natural products and forest products; maximizing the value of resources, ensuring their sustainability, determining the contribution of natural resources to livelihoods or neighbouring communities and residents, natural resource-based business development as well as planning and co-ordination of landscape management

- **Resource utilization** - The activities and impacts of different approaches to resource utilization should be monitored to inform the process of enhancing the value of tourism activities. No other forms of resource utilization are foreseen for the Park

- **Transboundary management of resources** should be monitored and especially the movement of herds of large herbivores across borders with a focus on animal health issues and wildlife crime

- **Development impacts** within the Tsau //Khaeb NP and along it's periphery should be monitored. This would include the construction and maintenance of roads, the effects of erection of fencing, the increasing numbers of livestock.

For the purpose of adaptive management in Tsau //Khaeb NP, Table 4 lists the key parameters that must be monitored, with an indication of methodologies that should be used.

Figure 78 A camera trap being programmed by Park staff at a waterhole. Waterholes present ideal opportunities to monitor predators in particular.

More extensive monitoring is important in the longer term than is currently provided for in the Biodiversity monitoring framework, as outlined below. This more extensive monitoring needs not all be done by the Park staff; other institutions could be enlisted to take responsibility for some aspects of monitoring.

Table 4 Parameters that will require monitoring in the context of the Tsau //Khaeb NP management plan

	Monitoring approach	Measures
Biodiversity monitoring		
Key species of fauna: oryx, springbok, ostrich, Hartmann's zebra	• Repeatable aerial survey for large mammals undertaken once every five years	Numbers, distribution
	• Bi-annual road counts undertaken (wet and dry season)	Numbers, distribution
	• All large predator sightings (including predators or their tracks) to indicate group sizes breeding patterns and the distribution of predators in the park throughout the year	Abundance, distribution, group size and structure, breeding sites
	• Long-term ground survey (e.g. camera trapping) of cryptic species and predators	Distribution, abundance
Key bird species	• Suitable periodic status survey of the red list bird species (partner institution)	Abundance, distribution, breeding sites
	• Annual wetland bird species count undertaken of Ramsar site (DSS to coordinate)	Numbers
Rare species	• Incidental recording of all rare species	Date, locality, group size, group composition (age, sex)
Mortalities	• All mortalities to be recorded on standard mortality register forms	Age, sex, dates and locality of all deaths, offtakes and removals must be recorded
Key species of flora:	• Fixed photo points • Population structure surveys	Density, age/size classes, time series to see changes over time
Domestic animals:	• All livestock occurring in all zones of the park must be recorded • Any other domestic animals (e.g. dogs, cats)	Date, locality, type, group size, group composition, tags/brand marks
Key environmental parameters		
Rainfall	• Rain gauges at stations and in field. Rain measured and recorded daily at field stations, and annually at end of each rainy season from field gauges	Locality, daily rainfall at stations, annual rainfall from field gauges
Rangeland condition	• NDVI deviation maps at end of rainy season, obtained from **www.namibiarangelands.com**	Overview of relative rangeland condition compared to historic time frames

	Monitoring approach	Measures
Key habitats		
Alien species	• Recording of alien plant species, especially along Orange River	Date, locality, species, quantification
Development impacts	• The impact of various developments within the Tsau //Khaeb NP and along its periphery should be monitored. This can be done using satellite imagery or aerial photograph *This would include the construction and maintenance of roads, the effects of erection of fencing, tourism activities in the park.* • Biodiversity recovery on rehabilitated sites	Spatial record of developments to superimpose with other information such as wildlife movements Biodiversity surveys of rehabilitated sites.
Resource economy monitoring		
Non-consumptive utilisation	• Record park entrance statistics	Number of people, nationality, vehicles, reason for entrance, revenue generated
	• Tourism Concessions – compliance monitoring (patrols) and tourism statistics (concessionaire reports)	Visitor statistics, compliance with concession agreements
Effectiveness of key management interventions		
Wildlife crime	• All incidents of wildlife crime for all species should be monitored	Number of incidents and species involved
Plant protection	• Annual status of all marked specimens in spatial database (including description of protection measure used)	Record of trend over time

Information to record when natural mortalities occur

- Date
- Locality
- Species
- Observer
- Potential cause of death
  - Is there any evidence of predation by leopard, hyaenas, or cheetahs i.e. bite marks on the head or neck?
  - Is there any evidence of death by starvation – i.e. was the animal severely emaciated, ribs and hips showing prominently)? Is there any evidence of death from old age (teeth worn down severely)?
  - Is there any evidence of disease?
  - Is there evidence of poisoning? It is mostly predators that are targeted with poison, and there is often vomit on the scene of death. Vultures may also ingest poisoned bait and all vulture deaths must be recorded and reported to MEFT Head Office. Head Office may ask that certain samples are collected from poisoned animals for laboratory analysis.

Material to be collected if natural mortalities occur:

- Skulls of predators, antelopes, zebras for age determination

  Note: These materials should be kept at the park station in a safe place (designated storage area) and should be marked when the mortality was recorded.

6.3 Spatial Monitoring and Reporting Tool (SMART)

Notwithstanding the pioneering application (App) used for monitoring in the Park as the Biodiversity Monitoring Framework for the Tsau //Khaeb NP, the Ministry of Environment, Forestry and Tourism is developing a standard guideline for monitoring in protected areas which potentially will include the adoption of a standard platform for data collection. Mudumu NP has been identified to pilot the SMART tool for its monitoring programme amongst the protected areas of Namibia but it is likely that it will be introduced in Tsau //Khaeb NP as well.

The Spatial Monitoring and Reporting Tool (SMART) is a software package that makes it possible to collect, store, communicate and analyse field-collected data, and can greatly enhance any protected area monitoring programme. Originally developed for wildlife law enforcement efforts, it's flexibility for other monitoring applications has already been well established (Figure 79). The SMART Tool is open source, non-proprietary, and freely available, and therefore is affordable, with the proviso that the necessary computer and smartphone equipment is required, as well as somebody with the skills to customize the system to the specific needs, and to manage the data. As it can be used off-line, it is also not constrained by limited connectivity, as long as there is some degree of cell phone connectivity at base.

SMART mobile data collection from a GPS enabled mobile device (e.g., smartphone or PDA) makes it possible to collect both observation and GPS data in a single unit. After a patrol returns to the office, the observation and GPS data are transferred to directly into the SMART database in a semi-automated process. Features of the system include:

- Quickly record georeferenced — field data without the need for additional data entry steps
- Standardized and streamlined data capture across site(s), eliminating the need for additional data processing after completion of field work
- Instantaneously georeferenced database of field data
- Capture of georeferenced photos — to validate field observations. Photos are extremely useful for documenting wildlife, trends, and for providing evidence of wildlife crime for law enforcement activities
- Capture of important observations in photos while on patrol and save them with coordinates and important metadata

SMART thus makes it possible to collect, store, communicate, and evaluate ranger-based data on patrol efforts, patrol routes, patrol results, observations, images, threat levels, illegal activities, wildlife, and management actions to understand where efforts should focus. It comes with a mobile data collection application combined with a powerful analysis and mapping interface designed for, and customizable by the local users[23]. SMART helps ensure data accountability and reliability and optimizes data entry to improve field data collection and subsequent analysis. It avoids the need to transpose data from hard to digital format, saving time and reducing the chance for errors. The system can organize, map, and summarize data, but in addition the data is readily available and can be easily exported for external analysis. It is anticipated that soon the system will include extensive data analysis capabilities with an interface to the R statistical package with an inbuilt and extensible SMART library of analytical functions.

23 For more information, please refer to the official SMART website: **http://smartconservationtools.org/**

Figure 79 An overview of the application of SMART – showing the range of applications

Figure 80 The SMART system will facilitate the recording of information such as the presence of brown hyaena through its georeferenced photographic record which can be verified by an expert and other information that can be captured

Figure 81 *Euphorbia dregeana* in the Orange River valley part of the Tsau //Khaeb NP

6.4 Research

Park management activities should be based on accurate available information, and therefore this section should specify strategies and activities for the acquisition of such data, including the commissioning of research. An assessment of the state of research of different taxonomic groups is provided in Figure 83. Research on the potential impact of climate change and the loss of the winter rainfall season should be encouraged, as well as research on the ecology of endemic species within the context of climate change.

Principle

- Management and development of Tsau //Khaeb NP should be information-based, drawing on good quality research and monitoring. To ensure that good data are available, the Park should implement a research-friendly and supportive philosophy and encourage the non-invasive use of the park
- Park management will be based on good scientific information. Two levels of research are recognized:
  - Applied research in support of priority park information and management needs, and
  - Basic or interest research identified by outside researchers
- Preferential support will be given to the former, while the latter will be supported when feasible
- All forms of research are encouraged, including biological, hydrological, geological, paleontological, archaeological, historical, climatological, social, economic, etc

Objective

To base Park management on pertinent available information and data to support an adaptive management approach and to create a research-friendly environment that encourages relevant and focussed research

Strategies

- Research priorities will be identified based on management needs and gaps of information required to make adaptive management decisions
- A coordinated approach to research will be created between park staff and other research agents, such as the MEFT Directorate responsible for research and the other relevant research bodies
- A prioritised and open-ended list of key research topics will be developed for the Park and disseminated to appropriate research institutions
- A supportive environment will be created for national and visiting scientists, including the facilitation of research permits, with preferential support given to applied research projects in support of priority Park information or management needs
- Research will be supported, primarily through collaboration
- Appropriate mechanisms will be developed to ensure that optimum feedback and other values from national and visiting researchers are obtained to inform Park management decisions on all levels

Priority research topics

- Potential impact of climate change and the loss of the winter rainfall season
- Ecology of endemic species, also within the context of climate change
- Demography of key endemic species
- Potential impacts of a geographic shift
- Pollination, seed dispersal and recruitment in key endemic plant species
- Reptile, small mammal and invertebrate fauna of the Park
- Oryx movements in response to rainfall and the availability of grazing
- Plant and animal community structures on rehabilitated mined areas and the rate of community recovery in response to rehabilitation

Figure 82 *Cheiridopsis* sp. and *Cephallophylum ebracteatum*, adapted to hyper-arid conditions in Tsau //Khaeb NP

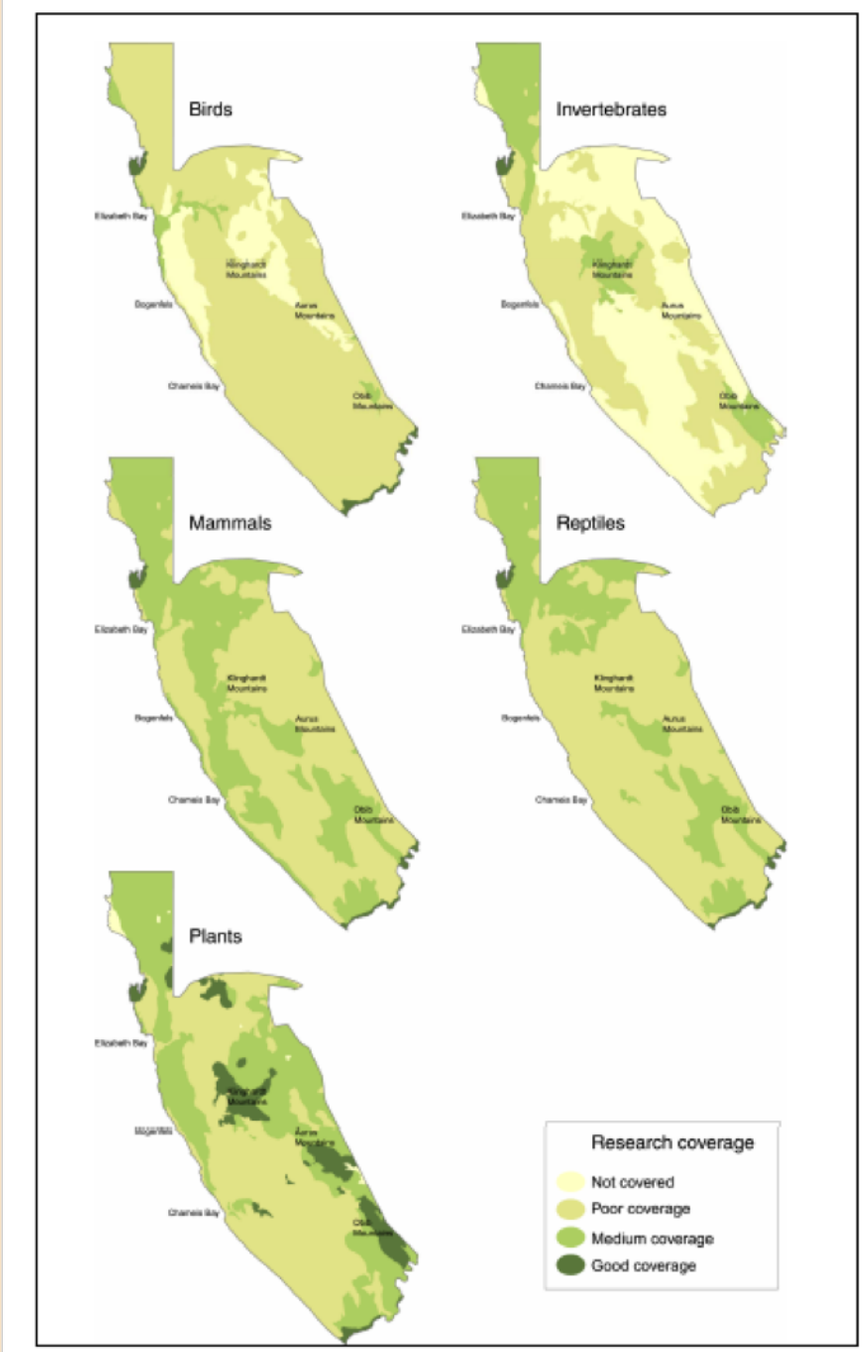


Figure 83 Geographic coverage of research on taxonomic groups (from Burke 2006).

Chapter 7 Management of Historical Sites

Figure 84 To save or not to save?

The Tsau //Khaeb NP is unique in Namibia not only because of its exceptionally high biodiversity but also the extraordinary historical legacy in the form of more than a century of mining and associated historical artefacts[42]. A recent discovery of a remarkably well-preserved ancient Portuguese shipwreck added considerably to the historical wealth of the Park. Further, the Park hosts remarkable geological and paleontological treasures such as the Roter Kamm, one of the best-preserved meteor craters in the world and the Arrisdrift and other fossil sites. These natural sites are covered in Chapter 5.1 and this section deals with the historical sites.

These historical sites are a considerable responsibility for MEFT which does not have the specialized technical capacity for curating historical sites. MEFT therefore needs to develop partnerships with other appropriate organizations, such as the National Heritage Council and other relevant bodies.

The first step towards an objective approach for dealing with literally hundreds of historical buildings and structures has been to commission the establishment of an inventory of historical sites through a detailed photographic survey to be followed by a classification of structures into three categories, i.e. structures that have a high historical, cultural and architectural value and which should be curated to prevent further decay; structures which although they have historical value are nevertheless not unique and can be left as is and allowed to gradually decay; and structures that are primarily industrial with no cultural or architectural merit and which needs to be removed.

42 Excellent histories are provided in Corbett, A. 1989. Diamond beaches. A history of Oranjemund. NAMDEB Diamond Corporation; Schneider, G. 2008. Treasures of the Diamond Coast. A century of diamond mining in Namibia. Macmillan Education Namibia, Windhoek; and Williamson, G. & Williamson F. 2016. The Sperrgebiet. Nature's parched masterpiece. Oshana, Clubview, South Africa

It is suspected that certain historical infrastructure may contain asbestos. Such structures must all be treated or removed through approved protocols of dealing with this harmful substance.

Historical structures hold considerable cultural–historical value as well as touristic value. Tourism nevertheless holds important risks and it is essential that tourism access to sensitive historical areas be tightly regulated and monitored. The extensive landscape makes it impossible to police all tour groups, thus a strategy must be developed that relies on effective cooperation from tour guides and concessionaires as well as technology such as radio infrastructure that will provide the ability to track all tour operators/ concessionaires inside the Park.

Principle

- Historical structures and artefacts with a high historical, cultural and architectural value will be protected in Tsau //Khaeb NP
- The bulk of historical infrastructure will be left in situ with no management applied except to prevent any deliberate or accidental damage
- Where possible, some historic buildings or structures can be restored and incorporated in tourism products
- Buildings or structures with no cultural–historical value or architectural merit must be removed, and the sites rehabilitated (including all buildings containing asbestos)
- Until there is an approved plan, no historical site may be altered
- Tourism use of historical sites must be strictly controlled by concession agreement, monitoring, surveillance and active law enforcement

Objectives

- Preservation of historical structures and artefacts in collaboration with specialized organizations and based on an agreed strategy
- Controlled access to historical structures and artefacts will be provided for tourists

Greatest threats to Tsau //Khaeb NP	Key conservation and management outcomes for Tsau //Khaeb NP
Strategic Objective: To protect and maintain cultural and historic assets	
Risk of degradation of historical sites without appropriate management	• An inventory of historical sites is established • Historical sites are classified into categories of management (preservation, no interference, removal) • A protocol or manual for the management of sites in these categories has been developed in collaboration with specialist organizations • A list of priorities for sites requiring attention in the ten-year period of the management plan has been developed in collaboration with specialist organizations • The impact of tourism on sensitive high value sites (e.g. Kolmanskop, other historic mining villages) is being monitored • Archaeological sites are registered and excluded from disturbance

Strategies

- Establish an inventory of historical sites
- Classify historical sites into categories of management (preservation, no interference, removal)
- Develop in collaboration with specialist organizations a protocol or manual for the management of sites in these categories (noting that the mapping and documentation of historical sites and buildings in the Park will provide further information in this regard)
- Develop in collaboration with specialist organizations a list of priorities for sites requiring attention in the five-year period of the management plan
- Monitor the impact of tourism on sensitive high value sites (e.g. Kolmanskop, other historic mining villages)

Figure 85 Century old diamond sieves at Charlottental

Figure 86 Advanced weathering of a historical mining building

Figure 87 Diamond ore processing plant at Charlottental

Figure 88 Volunteer organizations can be approached to contribute to the protection of historical sites, in this instance, an organization that works to protect historical graves

Chapter 8 Co-management with Namdeb

For more than 100 years the area of the Park was managed exclusively by a succession of mining companies. After Independence the company Namdeb Ltd was established as a joint venture between the Namibian Government and De Beers PLC. In this era the concept of a national park emerged through discussion between MEFT, MME and Namdeb, leading to the proclamation of the second largest protected area in Namibia in 2008, 111 years after the discovery of diamonds in what is now the northern part of the Park.

The mining companies, but especially Namdeb have left the greatest part of the Park virtually intact, and the exclusion of people has resulted in a near pristine desert environment extraordinarily rich in biodiversity. Namdeb has also rehabilitated significant parts of the Park after mining and has in numerous ways contributed to sound environmental management of the Park through its environmental leadership and rigorous implementation of its Environmental Management Plans. In many ways, the state of the Park is the outcome of the environmental stewardship of Namdeb.

While diamond mining is increasingly shifting to offshore areas, it is anticipated that Namdeb's on- land and processing operations will continue to be a major component of the Park for decades to come. Namdeb has furthermore expressed strong commitment to enable alternative forms of land use especially tourism and mariculture to replace onshore mining activities and serve as the economic engine for adjacent towns. This includes tourism within the mining licence areas of Namdeb for which practical arrangements need to be established within the context of the tight security controls needed over diamond mining operations.

It will thus be beneficial for MEFT to develop a cooperation agreement with Namdeb that will inter alia cover the following:

- Rights and responsibilities on both sides
- Control of access by tourists
- Maintenance of important infrastructure such as the Chameis Road
- Cooperative security arrangements
- Waiver of liabilities for tourists in the mining licence areas
- Joint environmental monitoring
- Priorities for rehabilitation and sharing of expertise on rehabilitation
- Curation of historical buildings and the sharing of expertise
- Information sharing in support of the sustainable management of the biodiversity of the Park and its natural and historical monuments and assets
- Liaison and communication.

Principle

- The management of the Park will be strengthened by establishing a formal agreement between MEFT and Namdeb

Objective

- Develop a cooperation agreement between MEFT and Namdeb

Strategy

- Develop a potential scope of issues to be included in the agreement and enter into negotiations with Namdeb
- The same approach can be followed with other private sector operators such as those in the energy sector

Figure 89 *Crassula mesembrianthemopsis*

Chapter 9 Regional conservation and park-neighbour relations

Greatest threats to Tsau //Khaeb NP	Key conservation and management outcomes for Tsau //Khaeb NP
Strategic Objective: To secure and increase landscape connectivity	
Loss of landscape connectivity	• Landscape level conservation has been promoted through the expansion of the Ai-Ais Richtersveld Transfrontier Conservation Area to include the Park • East-west wildlife movement corridors have been re-established to mitigate against habitat fragmentation and climate change by negotiating agreements with cooperative park neighbours • Priority land units to be acquired to establish an effective permanent land link with the future Fish River NP have been identified, and acquisitions negotiated. • The management of the Orange River mouth Ramsar Site has been integrated with the management of the Park • The management of the southern part of the Namib Naukluft Park has been integrated with the management of TKNP • The boundaries of the Park are adequately demarcated
Strategic Objective: To develop, implement and maintain regional conservation synergy through effective interaction with all park neighbours	
Management of the park in isolation of its geographic and social context	• Encourage cooperation with MFMR regarding the management of the Marine Protected Area (MPA) and the management and monitoring of species that use both the Park and the MPA • The operations of the Ontanda Environmental Education Centre as a repository of knowledge on the park and surrounding areas has been revitalised • Operationalize the Park Advisory Committee to serve as an advisory body for the Park comprising all major stakeholders
Unclear park boundaries may compromise law enforcement	• The Park boundary description and demarcation have been harmonized • The boundary description and legal status of the Orange River Ramsar site have been improved
Conflict over the future of the feral horses	• The new plan of the Ministry regarding the horses is implemented and applied
Strategic Objective: To maximise regional economic development, based on the principles of sustainable utilisation	
The park is not contributing to sustainable economic development	• The tourism development plan is implemented
Given the hyperaridity and sensitive landscapes of the park, tourism results in negative impacts	• The effectiveness of the tourism development plan to ensure sustainable tourism is being monitored • Compliance by concessionaires with concession contracts is being monitored • The impact of tourism concessions on the Park is being monitored, and in consultation with Head Office remedial actions are taken before impacts become aggravated
Private land ownership in the park	• Encourage the voluntary transfer of private land in the Park to the Ministry • Apply the provisions of the Protected Areas and Wildlife Management Bill once enacted

9.1 Transfrontier conservation

Principle

The Tsau //Khaeb NP contributes significantly to large landscape scale conservation both in terms of the entire coastline and Namib Desert that is contained in protected areas in Namibia and southern Angola but also by connecting to the future Fish River NP and Richtersveld NP and the complex of private and communal land units that make up the /Ai-Ais / Richtersveld Transfrontier Area

The Park is, however, not directly part of any transfrontier conservation initiative. It is anticipated that the current /Ai-Ais / Richtersveld TFCA which may be expanded to become the Lower Orange River TFCA that could include the Tsau //Khaeb NP and the Orange River Mouth Ramsar Sites. The TFCA currently includes the current /Ai-Ais / Richtersveld Transfrontier Area as well as the adjacent land indicated in Figure 5

A future TFCA that could include the Tsau //Khaeb NP would comprise a cluster of resource management areas including the formally proclaimed protected areas, areas designated by international Convention such as the Ramsar Site, areas designated through international conservation initiatives such as the Succulent Karoo Biome biodiversity hotspot and Important Bird Areas, as well as communal and private land used for wildlife conservation and tourism in both Namibia and South Africa

The advantages of an expanded TFCA include the establishment of a collective vision and mechanisms towards improved landscape connectivity, harmonized management and economic development (mainly through tourism). The TFCA will be headed by a Joint Management consisting of representatives from each participating management unit

Objective

To ensure that the Tsau //Khaeb NP will contribute to and be managed within the context of a regionally integrated conservation area that encompasses Namibia, South Africa and Angola

Strategies

- Management of the Tsau //Khaeb NP should be aligned with management approaches used for conservation areas in neighbouring South Africa
- TFCA institutions will be used for purposes of collaboration and dialogue with conservation managers in South Africa
- Collaboration will take place at the highest level possible through the TFCA structures to ensure that the objectives of this plan are aligned with the plans and objectives of neighbouring conservation areas in South Africa
- Encourage and support knowledge and information exchange programmes between conservation managers in Namibia and South Africa
- The integrity of the Namibian natural resources will not be compromised by activities or requirements of neighbouring South Africa
- Investigate possibilities of integrating the Tsau //Khaeb NP under existing TFCA arrangement, in year two
- Encourage and support knowledge and information exchange programmes between conservation managers in Namibia and neighbouring countries

9.2 Regional land use planning and landscape level management

A number of ministries are responsible for various planning programmes around the Park. It is important that key provisions of this management plan and other MEFT plans be accommodated within these planning initiatives. There is considerable interest on the wind resources of the Park for electricity generation. Growth of Lüderitz and Oranjemund may create pressure on the Park for the expansion of townlands. All these interests need to be dealt with in the framework of the zonation of the Park and environmental impact assessment and management.

Principles

- Strengthen links with the Fish River NP through the acquisition of key land units and by harmonizing the management of the Park with other conservation management units in Namibia and South Africa
- Encourage cooperation with neighbouring landowners to facilitate east west movements of oryx and other large mammals
- Development planning in the western //Karas Region needs to accommodate the Park and the essential landscape connectivity that future climate change necessitates.

Objective

- To engage with relevant Ministries and other authorities and stakeholders involved in regional land use planning, to ensure that requirements for the management of the Park are incorporated into regional land-use plans where appropriate
- The integrity of the east-west migration system for oryx and other large mammals should be restored through cooperation agreements with Park neighbours

Strategies

- MEFT should cooperate with relevant authorities in the regional planning process to ensure that the conservation of biodiversity is recognised as a vital use of land and a component of the regional landscape
- Land-use planning outside the Park should, wherever appropriate, be aligned and fully integrated with zoning plans for the Park as well as TFCA plans
- MEFT management must keep abreast of all regional government initiatives and ensure that Park plans are brought to the attention of relevant authorities

9.3 Park neighbours

In line with the National Policy on Protected Area's Neighbours and Resident Communities (MEFT 2013), the principle roles of the Park towards communities adjacent to the Park, which include private landowners and the urban communities of Lüderitz, Oranjemund, Aus and Rosh Pinah are e.g.:

- The Park serves as a core protected area for wildlife that is partly shared with neighbouring land, i.e. wildlife has home ranges that extend across park boundaries
- Wildlife from the Park disperses into neighbouring areas, i.e. wildlife from the park will under the right conditions populate or repopulate vacant habitat outside the Park
- Wildlife from the Park may also cause damage to crops or livestock and park management should help to mitigate such through establishing and implementing a local human wildlife conflict management plan when warranted.

- The Park creates opportunities for socioeconomic development and the financing of conservancy operations and conservation programmes through the allocation of tourism concessions to park neighbours.
- The Park is a source of expertise, knowledge and information on wildlife conservation and should share that freely with park neighbours.

The public should be informed that the principle responsibilities of park neighbours towards the Park are to e.g.:

- Respect the park boundaries and access control measures
- Respect the prohibition on settlement in the park and the presence of livestock
- Refrain from illegal killing and report any suspicious activities to the Park managers

The principle mechanisms for interaction with park neighbours are e.g.:

- The Tsau // Khaeb NP Advisory Committee, which include neighbouring community representatives as members
- The Park's membership and participation in the Lower Orange River TFCA
- Attendance by Park staff of Conservancy annual general meetings
- Joint monitoring of wildlife through ground routes on land adjacent to the Park within the TFCA
- Joint wildlife protection patrolling
- Other joint activities that can be considered such as joint clean-up campaigns, public information days, joint campaigns to remove alien vegetation etc.

Tsau // Khaeb NP can continue to contribute the wellbeing of neighbouring communities through the establishment of viable businesses based on tourism and mariculture. Communities around the Park therefore have much to gain, especially if it is managed as a core area from which economic benefits extend to beyond the Park's borders but noting the extreme aridity of the Park and its fragile natural and historical landscapes which places a limit on the type and volume of tourism that can be sustained.

However, such a scenario is only possible if relations between park management and communities are constructive and based on an integrated approach. The interactions must be based on trust so that the wider landscape of the Park and community areas can be managed and developed for mutual benefit.

The need to encourage, support and use established collaborative management structures is critical for engagement between the Park and its neighbours. Simplicity, operational efficiency and the achievement of common goals are vital to the success of these structures. Following this, the obligations of park managers and community members should also guide the process.

Objectives

- To establish and maintain Park neighbour relations between Park staff and existing and new collaborative management structures for the mutual benefit of communities and the objectives of the Park

Strategies

- Engage with communities through appropriate structures and according to the MEFT's National Policy on Protected Areas, Neighbouring and Resident Communities to:
  - agree on areas and activities for collaborative management
  - agree on working arrangements to achieve shared visions and goals
  - leverage benefits from the Park, and optimise economic benefits from natural resources
  - achieve regional conservation priorities

- Use existing collaborative management structures and community institutions such as the Tsau // Khaeb NP north and south stakeholder fora to fully engage with all Park neighbours
- The rights and obligations of the various parties should be defined and secured in collaborative management agreements between appropriate institutions
- The communities must be partners in the formulation of ongoing collaborative management policies and procedures, which should be binding to both park managers and communities
- The MEFT will be guided by the National Policy on Tourism and Wildlife Concessions on State Land (2007) when awarding any rights to communities. In addition, the MEFT will:
  - give priority to concessions that add security to the Park, promote corridors between conservation areas and those that improve conservation in areas that surround the Park
  - reach agreement on the management of the broader landscape and the benefits that may be achieved through wider planning, often beyond the park boundaries
  - support the development and long term economic and environmental sustainability of conservancies and community forests
- Consider the proclamation of the land east of the Park up to the Huib Hoch Plateau as a landscape of special conservation importance if the east west movements of large mammals can be restored

Figure 90 Unknown *Crassula* sp. The Park holds one of the highest diversities of species in the family Crassulacea anywhere, with four genera represented. An astonishing 36 species of *Crassula* have been recorded in the Park (Burke & Mannheimer 2004).

9.4 Private partnerships

The private sector, either through small local enterprises or large businesses can contribute in various ways to the achievement of the vision and objectives of the Park. Private partnerships with tourism concessionaires form the basis for tourism development in Tsau//Khaeb NP.

Principles

- Partnerships with the private sector and NGOs must achieve one or more of the following outcomes:
  - add value to the product, including conservation and biological diversity
  - reduce the risk to government of some activities and investments
  - bring investment and skills development
  - provide employment and other economic benefits
- Partnerships must be driven by needs and initiated by the MEFT and may not detract from the core function of the Park
- Certain functions and activities may be outsourced, but ultimate control and responsibility will vest with the MEFT
- All partnerships must be restricted to parties that understand and contribute to the achievement of the vision, goals and policies of the MEFT and this management plan, and must:
  - be regulated by formal contractual agreements that define the roles, responsibilities, term and other conditions of operation
  - comply with relevant policies and procedures, in particular the concessions policy
  - be cost-effective to the MEFT

Objectives

- To develop the tourism product within the Tsau//Khaeb NP in line with the specific park objectives:
  - Develop Tsau//Khaeb NP as a low-density tourism use area
  - Tourism character/brand to be developed along the following characteristics: Untamed / wild / natural / close to nature / isolation / wilderness

Strategies

- Identify the tourism development concessions, beneficiary communities, and manage concessions

9.5 Environmental education

Education plays an important role in building strong environmental awareness among people, especially the youth. This is important around Tsau //Khaeb NP where surrounding communities need to understand the regional, national and international importance of conservation areas and their biodiversity. The MEFT should identify and implement mechanisms to ensure that local people have access to the Park. Particular attention should be paid to school children, leaders and business people.

Strategies

- Ensure that the Park becomes more easily accessible to local people (subject to statutory Park entry requirements), including schools and environmental groups

- Interact with other public service agencies or donors to support environmental education
- Engage with custodians of indigenous knowledge to use this information for environmental education
- Actively pursue an environmental education programme through directed outreach activities
- Revitalize the operations of the Ontanda Environmental Education Centre as a repository of knowledge on the park and surrounding areas
- Expand the environmental education programme to include issues such as life skills development, leadership and teambuilding to increase the social relevance of the programme. Identify former mining buildings that can be used as a base camp for such a revised programme

Figure 91 *Didelta carnosa* subsp. *tomentosa*, a Succulent Karoo Biome endemic at Ontanda Environmental Education Centre

Chapter 10 Prospecting and mining

Diamonds (and zinc more recently) have been mined in the Park for more than a century but resources are said to be largely depleted leading to the closure of individual mines. Mine closure is an important part of the life cycle of a mine and is covered in the Environmental Management Plan (EMP) that each mining operation must have. Park managers need to familiarize themselves with these EMPs to help the environmental inspection staff of the Office of the Environmental Commissioner monitor compliance.

New prospecting and mining will only be allowed according to the National Policy on Prospecting and Mining in Protected Areas, according to which Prospecting and Mining in the Tsau //Khaeb NP would be restricted to specific parts of the park as indicated in Figure 94.

Figure 95 gives the current mining license areas in Tsau //Khaeb NP and Figure 96 the exclusive prospecting licenses (EPLs) (noting that EPLs have expiry dates and that new EPLs can be awarded, thus the current state of EPLs should be verified on the web site of the Ministry of Mines and Energy. Similarly, mining licenses can be renewed).

Figure 92 Cryptic *Crassula membrianthemopsis* plants, one with a dry inflorescence, hidden in similarly coloured rubble

Figure 93 Wind scoured marble pavement in a former diamondiferous high wind energy channel that carried diamonds kilometres inland from the coast

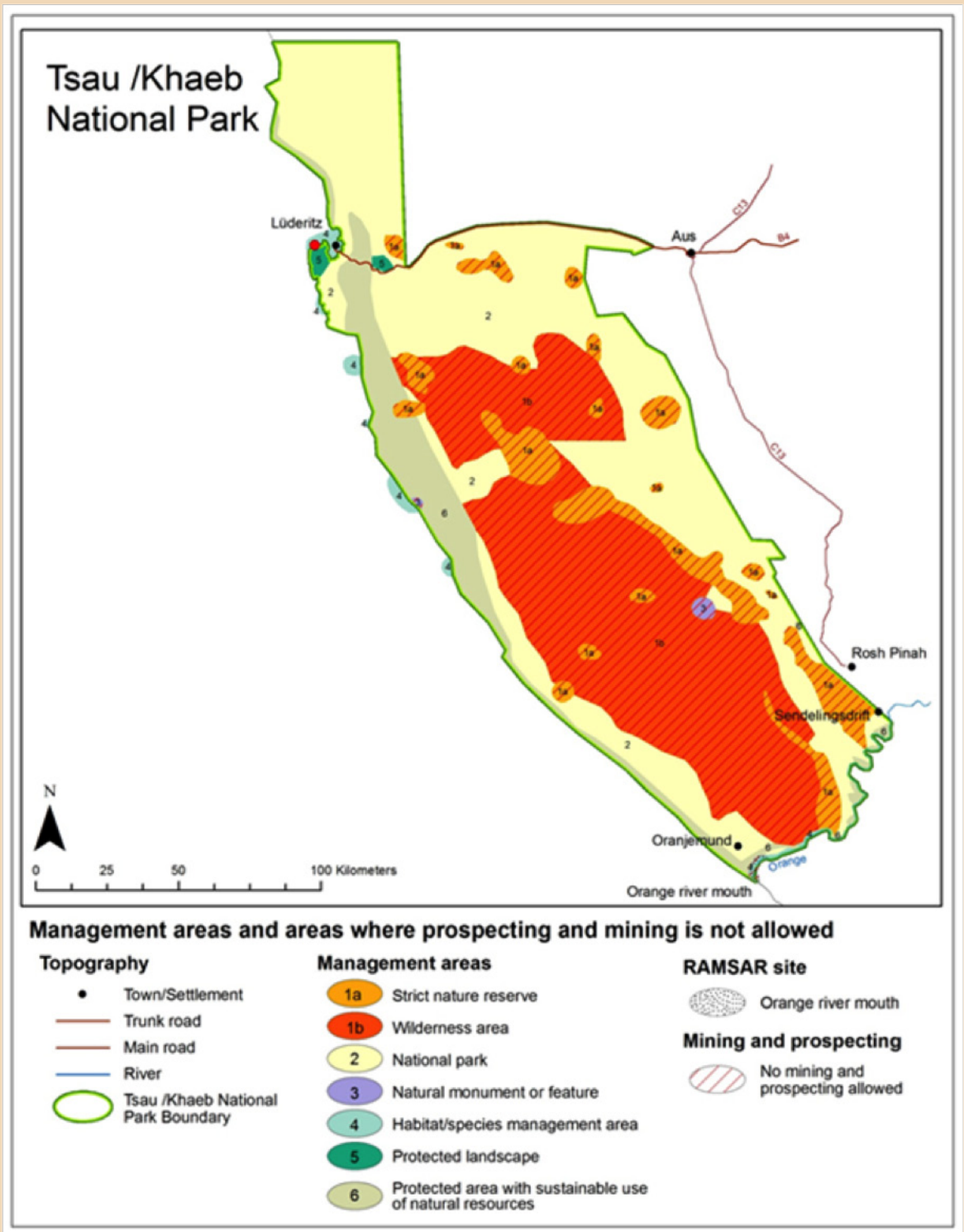


Figure 94 Areas demarcated in the Policy on Prospecting and Mining in Protected Areas for Tsau //Khaeb NP. Note that the designation of zones in this Policy has subsequently been amended.

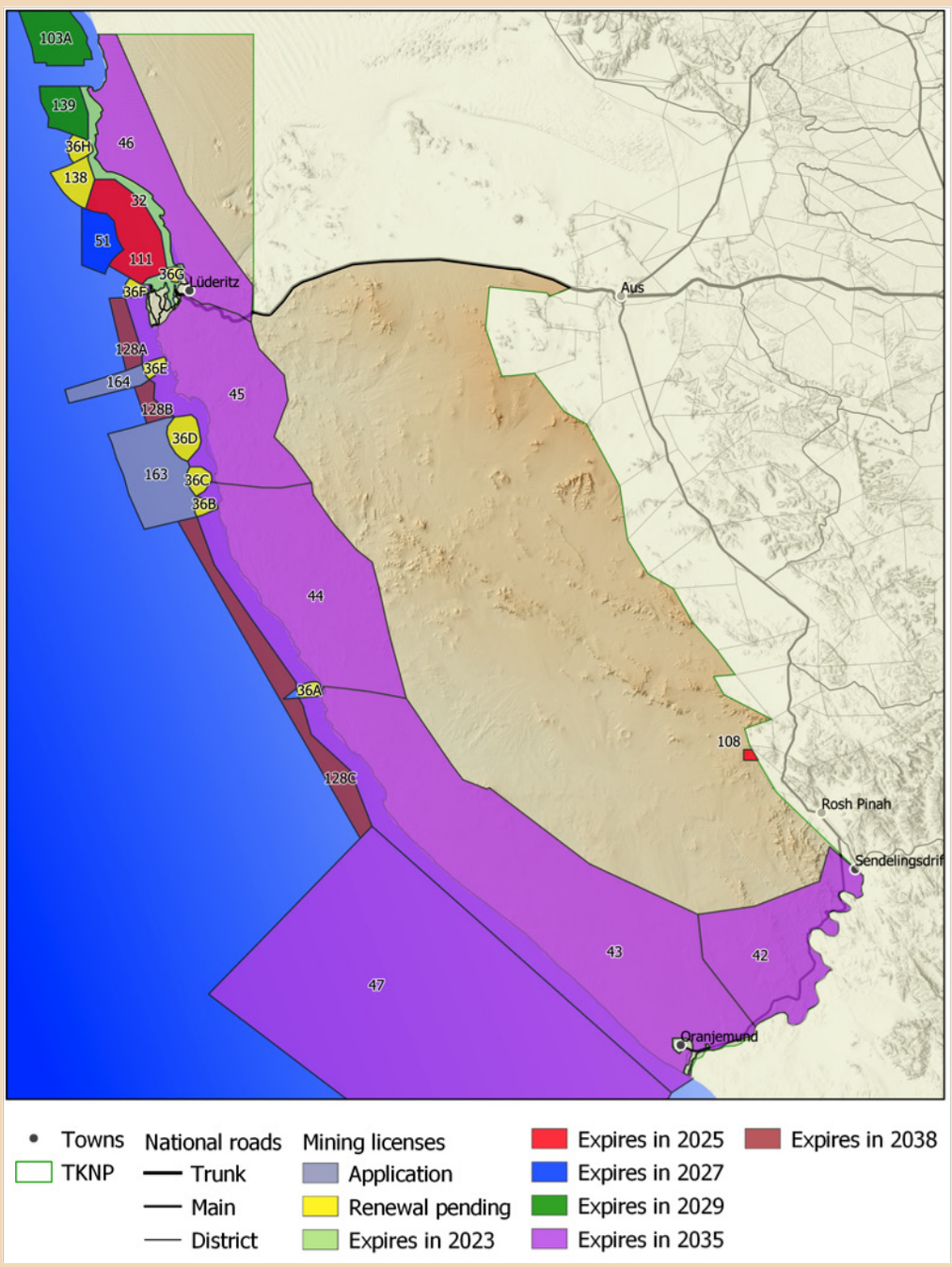


Figure 95 Current mining licenses in Tsau //Khaeb NP and their current expiry dates

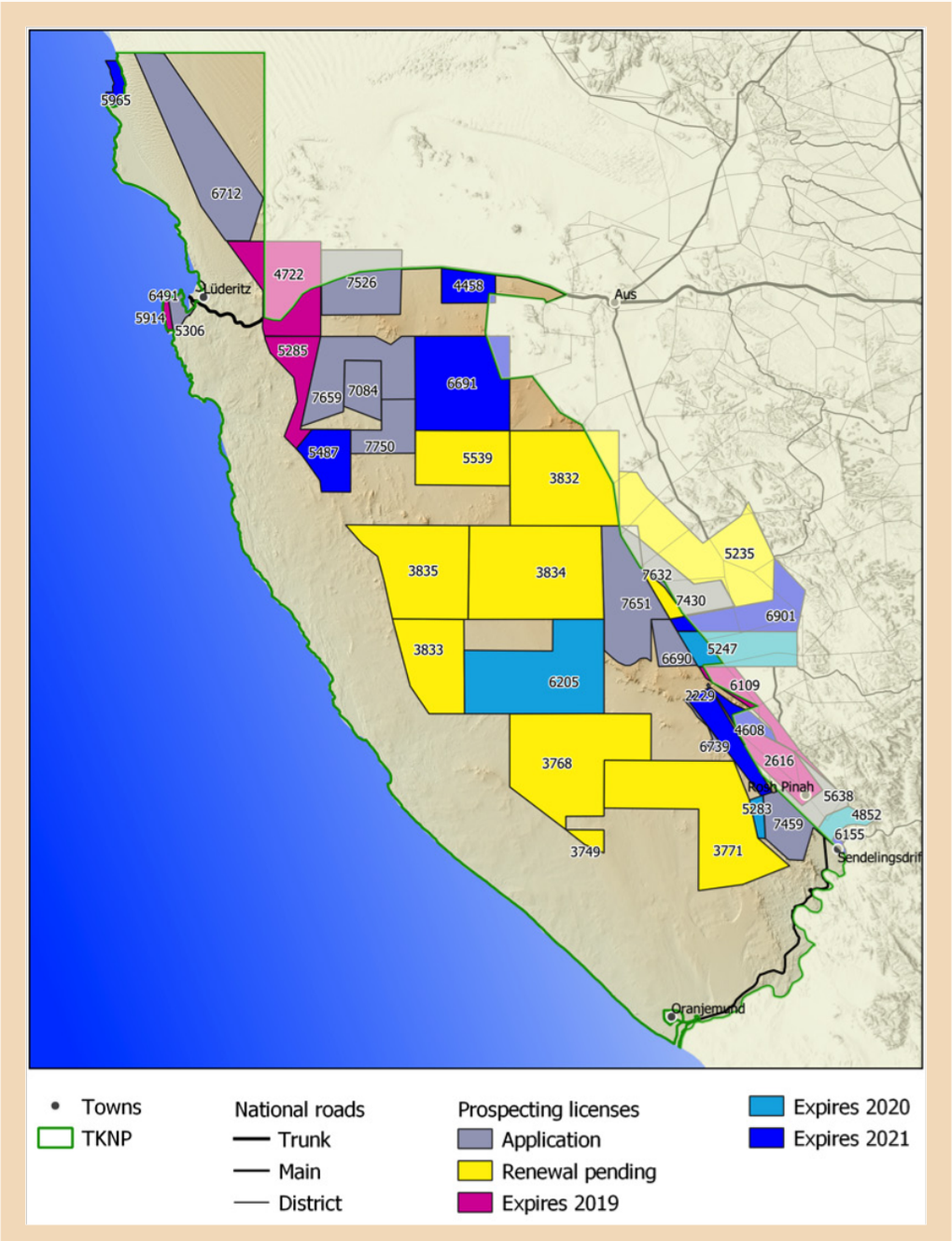


Figure 96 Exclusive prospecting licenses in the Tsau //Khaeb NP and their current expiry dates

Prospecting and mining within parks should comply with the conservation, environmental and economic regulatory framework and that mineral development only commences in parks when rehabilitation is guaranteed. Any future prospecting should comply with the relevant conservation, environmental and economic regulatory framework. The potential economic value of prospecting and mining for Namibia is acknowledged, but both environmental and other socio-economic costs should be taken into consideration before commencing any activities.

Principles

- Prospecting and mining in protected areas can only be undertaken within the framework of Section 28 of the Wildlife and Protected Areas Management Bill

Objectives

To ensure that any future prospecting and mining activities are controlled, and that rehabilitation and restoration will take place. In addition, to attempt to prevent any prospecting and mining activities in very sensitive areas in order to avoid any negative impacts to the character, ecology and tourism potential of the Park

Greatest threats to Tsau //Khaeb NP	Key conservation and management outcomes for Tsau //Khaeb NP
Strategic Objective: To protect and maintain biodiversity	
Destruction of wildlife or wildlife habitat through mining, infrastructure development and tourism	• The Policy on Prospective and Mining in Protected Areas is strictly adhered • The implementation of Environmental Management Plans established in terms of the Environmental Management Act for mining and infrastructure development are monitored and enforced. • DPWM staff are appointed as Environmental Inspectors • Long-term research on the flight paths of seabirds are established considering potential energy generation and transmission projects
Failure to restore and rehabilitate disturbed areas	• Priority habitats and landscape features to be rehabilitated have been identified and rehabilitation is taking place • A long-term rehabilitation plan for the Park has been established • The ongoing rehabilitation of disturbed areas by Namdeb or any other future mining operator/s is encouraged • A monitoring system for the rehabilitation programme is established and functional

Figure 97 *Euphorbia namibensis*, a southern Namib endemic

Chapter 11 Tourism development and management

In the context of this chapter, tourism refers to any activity within the park boundary which is based on providing visitors/clients with an experience, and includes but is not restricted to accommodation, guided or unguided activities.

As tourist destinations, parks can be viewed as natural resource-based attractions that are economically and environmentally sustainable, that optimize benefits to local communities and the nation. Tourism should be promoted so that the socio-economic objectives of the parks are achieved without compromising the conservation and integrity of natural resources.

Tourism in the Park has potential to bring socio-economic benefits to the neighbouring communities, the region and the State as a whole. This may be achieved by generating income from entry and concession fees, creating jobs and business opportunities and attracting investment. Furthermore, tourists derive information, and aesthetic and recreational enjoyment from their visits to the Park.

Greatest threats to Tsau //Khaeb NP	Key conservation and management outcomes for Tsau //Khaeb NP
Strategic Objective: To maximise regional economic development, based on the principles of sustainable utilisation	
The park is not contributing to sustainable economic development	• The tourism development plan is implemented
Given the hyperaridity and sensitive landscapes of the park, tourism results in negative impacts	• The effectiveness of the tourism development plan to ensure sustainable tourism is being monitored • Compliance by concessionaires with concession contracts is being monitored • The impact of tourism concessions on the Park is being monitored, and in consultation with Head Office remedial actions are taken before impacts become aggravated
Strategic Objective: To protect and maintain cultural and historic assets	
Risk of degradation of historical sites without appropriate management	• An inventory of historical sites is established • Historical sites are classified into categories of management (preservation, no interference, removal) • A protocol or manual for the management of sites in these categories has been developed in collaboration with specialist organizations • A list of priorities for sites requiring attention in the ten-year period of the management plan has been developed in collaboration with specialist organizations • The impact of tourism on sensitive high value sites (e.g. Kolmanskop, others historic mining villages) is being monitored • Archaeological sites are registered and excluded from disturbance

Principles

- Tourism development will be undertaken according to the tourism development plan for the Tsau // Khaeb NP

Objectives

- To promote tourism in the Park in order to help address the socio-economic needs of the region (particularly adjacent communities), while also providing access to 'wilderness' experiences for local, regional and overseas tourists, without compromising the conservation and integrity of the natural resources

Strategies

- Tourism developments or activities may be undertaken by MEFT, or by external partners such as communities or the private sector. Tourism developments or activities undertaken by communities or the private sector must be done in accordance with the concessions policy and regulated through written agreements
- MEFT should establish forums with relevant stakeholders such as conservancies, other line ministries and private sector, to ensure effective cooperation and liaison, and create synergy in the management of tourism in and around the Park
- MEFT will engage with the ARTP and any other cross-border or regional conservation initiative to ensure strategic interventions are implemented that will increase the viability of tourism in the Park
- Feasibility studies should precede any tourism developments or concessions inside the Park. Such studies should include, among other components, a cost/benefit analysis whereby objectives are stated, and where financial, economic, environmental and social costs and benefits are evaluated. This would include costs and benefits to all relevant parties, such as MEFT, communities, and the private sector
- Tourism developments in the Park should (a) cover the full cost to the MEFT of managing and developing the products and related infrastructure, and/or (b) meet defined socio-economic goals, and/or (c) meet defined access goals in terms of attracting local, regional and overseas tourists into the Park
- MEFT will plan and develop tourism in the Park to take account of different source markets, product types and affordability, and the experience required by the respective markets
- Tourism zonation may be periodically reviewed in line with changing demands and environmental considerations, while being mindful of the possible impacts on any existing products
- High levels of exclusivity should only be considered where the economic returns are also high, or where potential environmental impact is high if there are too many different users
- The maintenance of accommodation facilities and support infrastructure (water, sewerage, electricity, etc.) will be the responsibility of the operator of the facilities. The standards for these must be agreed to, monitored and controlled by the MEFT
- The density of visitors can affect enjoyment or experience of an area. If densities increase to unacceptable levels, MEFT may impose temporary or permanent limits on the number of users or use other mechanisms to ensure that tourism experiences are commensurate with the type of product offered

11.1 Tourism development plan

MEFT has developed a separate Tourism Development Plan for the Park[43] which identifies the tourism development areas and tourism concessions and will therefore guide tourism services, activities and developments through good planning, zonation, park signage, management, retaining the tourism experience, and collaboration between the Park and tourism private sector.

The extensive landscape makes it impossible to police all tour groups, thus a strategy must be developed that relies on effective cooperation from tour guides and concessionaires as well as technology such as radio infrastructure that will provide the ability to track all tour operators/concessionaires inside the Park.

The tourism development plan should be read as an integral part of the park management plan.
Some of the principles outlined in the tourism development plan are summarized as follows:

- **buildings and infrastructure**, it is an acceptable principle that buildings have to be close to existing service infrastructure and major access routes, should consider long-term management costs and responsibilities and be ideally near existing services. This dictates that any substantial tourism infrastructure development such as lodges and resorts should be peripheral to the park and preferably near or in towns or villages that have support infrastructure and services for operations and staff
- **shared management** - all tourism activities must be managed according to an agreement between MEFT and the specific service provider, and such agreement should be based on principles of shared management responsibilities, which must be clearly defined. The Tourism Development Plan incorporates the principles for such agreements. In addition, agreements must include environmental guidelines and cleanup clauses
- **waste management** - no solid waste disposal should take place in the park. Since all tourism will be guided, no waste disposal facilities should be provided at tourist lookout or picnic sites, but signs should indicate that all waste must be removed from the Park. This arrangement also needs to be included in tourism concessions agreements
- **design and interpretation** - it is important to ensure that all infrastructure designs and interpretation designs should follow specific infrastructure and interpretation design criteria so that there is a consistency in design and interpretation. Hence the need for the establishment of a Designs and Interpretations Committee to develop guidelines and screen all building and infrastructure designs before construction can commence
- **guide accreditation** – a guide accreditation committee must be established to develop a Guiding Manual / Guidelines, induction material and courses and do accreditation of field guides on guiding protocols, group management and interpretation of natural, cultural and historic heritage of TKSNP

Table 5 outlines the concession processes adopted by MEFT and managed by the Concession Unit of the Directorate of Scientific Services. Of importance for the Park management team is that environmental guidelines need to be developed by the Concession unit with input from Park management for each concession, which will be included in the tender documents. Further, before the orientation visit takes place, the Park management team should do an initial clean-up of the concession area to 1) have a record of the state of each concession area before operations start and 2) to make the concession area as attractive as possible.

43 Ministry of Environment, Forestry and Tourism, 2019. Tsau //Khaeb (Sperrgebiet) National Park, Tourism Development Plan

Table 5 Indicative timetable for the proposal preparation and approvals process from awarding a head concession to signing a contract with an operator is as follows (normally 180 days would be realistic)

Event	Date
Tender announcement & start of Bidder registration	Announcement day
End of Bidder registration	18 days later
Bidder's briefing session	23 days later
Bidder's site orientation visit	26 days later
Question & Answer period	60 days later
Proposal submission date	67 days later
Proposal Opening date	67 days later
Evaluation of Proposals	77 days later
Inform bidders of provisional outcome	84 days later
Finalise Operator Concession Contract with Preferred Bidder	89 days later
Finalise Concession Operator Contract	95 days later
Obtain "no-objection" from Minister	102 days later
Official announcement of the award of tender	105 days later
Sign Concession Operator Contract	To be agreed by the Parties

Figure 98 Roter Kamm meteor crater, one of the best preserved in the world, in the distance seen from the Aurus mountain viewpoint

Figure 99 Iconic but very fragile "Africa Rock" at the Aurus Mountain viewpoint. Measures are being developed to prevent human contact with this erosion relic and other impacts at the viewpoint.

Figure 100 *Aloe erinacea* at the Aurus Mountain viewpoint

Figure 101 Abandoned and partially vandalized railway siding building at Garub which potentially can be converted to a gateway facility to the Tsau //Khaeb NP where information can be provided, and crafts and refreshments sold

Figure 102 The iconic natural monument Bogenfels is one of the most important tourist attractions of the Tsau //Khaeb NP. Note the multiple paths in the vicinity of the site which detract from the scenic value of the site

11.2 Tourism concessions

It is an accepted best planning process to divide a protected area into smaller spatial units called Tourism Development Planning Areas (TDAs) for tourism planning purposes. Tourism resources and attractions are those entities that attract tourists to the TDA. The nature and quality of these resources and attractions influence significantly the demand by tourists to visit and experience them. Each TDA is planned for one or more preferred and defined tourist market segments based on the range of tourism-based input criteria. The Tsau //Khaeb (Sperrgebiet) National Park was zoned into Tourism Development Areas based on the following criteria:

- Tourism gateways
- Tourism flows
- Natural tourism resources and tourist attractions
- Existing infrastructure
- Limited access and "no go" areas
- Existing and potential user market segments

Using these criteria, the Tsau //Khaeb (Sperrgebiet) National Park was zoned into six Tourism Development Areas (TDAs) (Figure 103), as follows:

- The Northern Dunes TDA
- Aus – Lüderitz Link TDA
- Eastern TDA
- Coastal and Mining History TDA
- Oranjemund Coastal / Orange River TDA
- Southern TDA

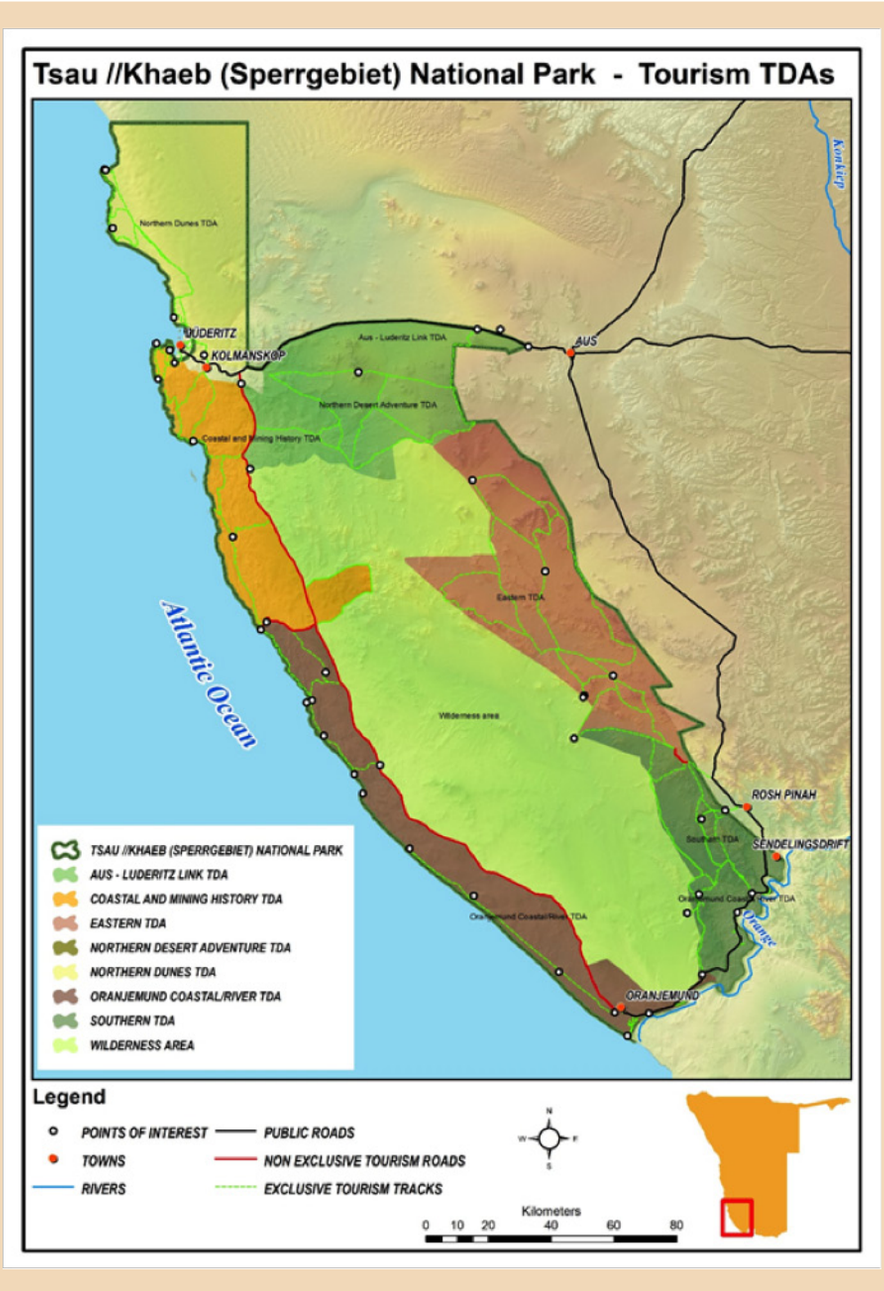


Figure 103 Tourism development areas for the Tsau //Khaeb (Sperrgebiet) National Park

The following nine concession opportunities are identified in the Tourism Development Plan within the Tsau //Khaeb (Sperrgebiet) National Park TDAs, which are described in detail in the plan:

Northern Dunes TDA

1. Northern Sand and Sea

Coastal and Mining History TDA

2. Lüderitz Peninsula
3. Kolmanskop (potentially including Elizabeth Bay)
4. Lüderitz Coast and Mining

Aus-Lüderitz Link TDA

5. Old Wagon Trail

Eastern TDA

6. Game Viewing and Roter Kamm

Southern TDA

7. Red Dunes, Roter Kamm and Orange River

Oranjemund Coastal / Orange River TDA

8. Oranjemund Coast and Mining
9. Orange River Mouth

Figure 104 One of many unspoilt beaches in Tsau //Khaeb NP

Figure 105 Very attractive *Crassula pseudohemisphaerica* at the Aurus mountain viewpoint

11.3 Tourism infrastructure

For the purpose of this plan tourism infrastructure includes accommodation and all its associated support infrastructure (which should be constructed and maintained by concessionaires), as well as facilities provided by MEFT specifically for visitors, such as park entry facilities, access roads and tracks, signage, viewpoints, hides, etc. Such infrastructure should adhere to the relevant strategies and principles specified within this chapter.

Principle

- Tourism infrastructure and facilities should be established to promote the environmental and outdoor assets of the Park, without compromising alternative and future use of the resources
- Tourism infrastructure should be aligned to the park brand values of untamed/wild/natural

Objective

- To ensure that tourism and recreation facilities in the park are aligned with the area's sense of place, sustainable use of the resources, and respect for wishes of other visitors to the Park

Strategies

- All structures (including non-permanent ones) must be designed and constructed to create least visual impacts
- Apply Namibia's Eco-Awards guidelines and criteria to the development and management of all tourism initiatives and developments
- Tourism infrastructure should be commensurate with the needs of the dominant markets visiting the Park and their specific needs
- Tourism infrastructure should be located in accordance with a cost-benefit analysis to maximise tourism appeal and value, while complying with zonation parameters and other conditions, which may be applicable
- Infrastructure should be located as close to existing services and major access routes as the product will allow
- Environmental guidelines for tourism infrastructure should be prepared and included as part of all concession agreements and works contracts

Chapter 12 Infrastructure

This section only covers recent buildings, fences, artificial water points and roads and tracks. Historic infrastructure is covered in Chapter 7.

No new infrastructure is foreseen to be constructed by MEFT in the Park for the duration of this plan, except improvements to access control facilities, viewpoints and picnic sites.

Infrastructure requires maintenance if it is to function properly. Annual budget allocations for maintenance can be kept low if these fixed improvements are properly designed, appropriately located, constructed by skilled contractors using materials of good quality, staff are properly trained, quarterly inspections are carried out on time and small maintenance tasks are carried out immediately.

MEFT has developed a Master Maintenance Plan - A Strategy to sustain the Ministry's Infrastructure and maintenance manuals that should be used to guide how maintenance is to be undertaken.

Objectives

To keep infrastructure to a minimum; to properly design, build and maintain all infrastructure that contributes to the overall purpose of the Park

Principles

- Decisions about building park management infrastructure will be based on strategic planning and feasibility studies
- Where appropriate, infrastructure planning should be done in consultation with neighbouring communities to optimise conservation and economic objectives
- Infrastructure design should take cognisance of the Park's major ecological drivers
- All infrastructure must be planned in appropriate zones and be approved in terms of MEFT procedures and development policies
- Before any new fixed infrastructure is developed, annual maintenance costs must be estimated and provided for in annual budgets
- All developments in the Park must comply with the Environmental Management Act (2007), and have environmental clearances issued by the appropriate authority
- Developments should have access to support services, such as reliable sources of water, telecommunications, and electricity (unless solar is used) and road access
- Water, electricity and communication lines should be visually unobtrusive, for example by being buried and/or aligned along roads
- All national infrastructure standards must be followed, for example those on water extraction and discharge, engineering and design standards, etc

Greatest threats to Tsau //Khaeb NP	Key conservation and management outcomes for Tsau //Khaeb NP
Enabling Objectives	
Degradation of infrastructure and equipment due to a lack of maintenance	• Maintenance schedules for plant and equipment are adhered to resulting in well maintained facilities

12.1 Fencing

Principles

- Open systems should be maintained for the largest possible landscape integrity, both within and beyond the Park. Fencing is therefore to be discouraged but may be strategically used to reduce human-wildlife conflict
- Where neighbouring land use and/or security is a threat to the parks' integrity, or where secure fencing is essential for good neighbourliness, boundary fences will be secured and well maintained.
- No new fencing will be erected (except possibly a fenced area near Garub to exclude spotted hyaenas from an area of land set aside for the desert horses, see Chapter 5.15)
- Boundary fences where security is of concern and where neighbours practise incompatible land uses will be strengthened, monitored and maintained
- Where agreements can be entered into with park neighbours practicing compatible land use, fences

Objectives

- To remove all internal fences excepting those fences that have strategic value (e.g. security fencing).
- To secure boundary fences where neighbouring land use and/or security is a threat to the Park's integrity, or where secure fencing is essential for good neighbourliness (e.g. small stock farmers and predators)
- To increase landscape connectivity by breaching existing fences where cooperation agreements exist with neighbours.

Strategies

- Develop a template cooperation agreement for park neighbours that would inter alia provide for controlled breaching of fences and related issues such as the provisioning of water, joint monitoring, hunting etc. The test of the value of such agreements is that the wildlife of the Park should be better off than previously
- In cooperation with Namdeb, remove redundant security fencing to prevent negative impacts on wildlife

44 Breaching implies that the existing fence line remains in place but openings are made at regular intervals to encourage movements, see Chapter 4.

Figure 106 Fence between the Skorpion mine and the rest of the Park

12.2 Artificial water points

Principle

- No additional watering points should be established other than the existing boreholes 1 to 4[45] in the eastern part of the Park and those in operation should be maintained

Objectives

- The provision of water for wildlife will be undertaken strategically in the interests of maintaining biological diversity in a semi-fenced ecosystem. Emphasis will be placed on securing open systems and corridors to facilitate natural ecological processes and supporting natural movement patterns
- The provision of water for wildlife is undertaken only under exceptional circumstances, in the interests of maintaining biological diversity and good rangeland management

45 More attractive names reflective of the Park, its history or natural attributes should be identified given that these watering points will be on tourism routes

Figure 107 A new standard for game watering points developed by the Park staff at Borehole 4

Figure 108 Game watering points require frequent maintenance

Figure 109 Kaukausib spring

Figure 110 Location of boreholes available for game watering. Boreholes 1,2,3 and 4 can be developed into game watering points. Note that Borehole 5 is not suitable for redevelopment and that the known boreholes along the Chameis Road are not shown.

Strategies

- To maintain all artificial water installations in good working order throughout the year, with special emphasis on the dry periods
- To upgrade the watering points to blend in with the natural environment and to remove unnecessary structures.
- Attractive names that suit the character of the Park should be proposed for the four game watering points.
- A minimalist, ecologically appropriate and tourism friendly water plan is implemented, taking into account neighbouring land use and water provision
- The National Policy on Protected Areas Neighbours and Resident Communities and strategy will be energetically pursued to explore partnerships to east, and the opening up of west-east corridors with landowners that share compatible values and land-uses with those of the park
- All natural water points will be carefully managed to avoid disturbance and degradation, and an appropriate monitoring system will be established
- Abstraction of groundwater from the park other than the existing boreholes, and in adjacent areas that would impact on groundwater, should be avoided. In the event of this being essential, a full EIA must be undertaken
- Use of water for tourism, mining and other purposes must be judicious, minimized, demand managed and monitored. Sustainable sources of water must be used. No unsustainable extraction will take place or any extraction that may have negative biodiversity impacts
- Conduct risk analyses for all artificial water points in year three
- Establish a baseline monitoring system to assess negative impacts on vegetation and key animal species
- Maintain a register of all artificial water points; this must include the purpose of each point and its associated monitoring data every year

12.3 Access and roads

There are numerous tracks and roads in the Tsau //Khaeb NP. The process of mapping out roads and tracks as the basis for making a determination of which roads and tracks should be maintained for management and tourism use which should be closed and rehabilitated, needs to be done in the lifespan of this plan.

Given its former status as a mining area, and the ongoing mining operations in some areas, it is very important to establish and reinforce the status of the Park as a National Park by creating proper access control infrastructure, signage and procedures.

New access control facilities in the form of symbolic (unmanned) gates have been erected at Swartkop Gate, Sendelingsdrift Gate, Obib Gate, Aus cattle grid Gate, Garub Gate, Rotkuppe and Kolmanskop Gate.

Principle

- Only guided tourism will be allowed in the Park on the basis of concessions allocated, meaning that access points do not have to be staffed provided that information on access and other park regulations are provided at these points
- A minimal, practical, ecologically and aesthetically appropriate road network will be maintained to help achieve the objectives of the Tsau //Khaeb NP

Figure 111 New signposting in the Park

Objectives

- To monitor and control entry into the Tsau //Khaeb NP
- To rationalize and maintain a road or track network to serve the management (including monitoring and research) and tourism needs of the Tsau //Khaeb NP
- To reinforce the image of the Park by creating proper access control infrastructure, signage and procedures

Strategies

- A carefully selected network of roads will be maintained for the effective management of the park and it's approved recreational, tourism and business activities
- No road or track shall be graded except the Chameis and Rotkuppe Roads, noting that consideration is being given to declaring the Chameis Road as a public road in which instance it will be maintained by the Roads Authority
- Existing roads, tracks and borrow pits not forming part of the network will be closed and rehabilitated
- Any new roads and associated infrastructures (e.g. borrow pits) will be subject to an EIA
- No billboards (that advertise products or services) will be allowed anywhere in the park
- Official entry points will be kept to a minimum, they must be signposted, be constructed in a manner that fits in with the status of national park and the desert environment and the entry control measures must be commensurate with their costs and benefits
- MEFT will engage with relevant authorities to reduce the impacts of public roads, road network extension around the park periphery and within the Park including use of signage and enforcing speed reductions in strategic areas

- The impacts of roads and tracks on biodiversity and tourism must continually be assessed and options explored to minimise the impacts.
- Environmental clearance, an EMP and approval by MEFT are required before any road-building material is collected in the Park. Where necessary, the reclamation of the site of extraction must be secured with a performance bond.
- Park roads should be kept to a minimum and be designed to be cost-effective so that development and maintenance costs (financial and environmental) are commensurate with the benefits of the roads.
- Existing road networks are to be reviewed and recommendations made regarding any changes including the realignment of roads to improve tourism, to reduce environmental impact and to improve management efficiency.
- Where possible, road construction needs to be done with minimal use of local material and disturbance of soil, to ensure minimal environmental and visual impact. The grading of unsurfaced park roads is not allowed.
- The park road network must be provided with appropriate branded park signage.
- Accidental or incidental off-road driving may occur, but new tracks created must immediately be closed manually with rake and broom to avoid that other vehicles use the same track. A rake and a broom should be standard equipment on all Park vehicles.
- A speed limit needs to be established and guidance provided at entry points on tyre pressure to reduce impact on roads.

Figure 112 Road sign erected by Namdeb on the Chameis Road. In future, such signs need to be standardized in line with the agreed branding of the Park, and should show the speed limit for the Park as will be specified in the Park Regulation

12.4 Buildings

No development of any new buildings (other than access control facilities, see Chapter 12.3) is foreseen in the timespan of the park management plan, because the proximity of nearby towns makes it possible to locate all building requirements in such towns. Nonetheless, the following objectives and strategies should apply to all future developments.

The maintenance of office facilities and staff accommodation in Oranjemund, Lüderitz, Rosh Pinah and Aus which although located outside the Park itself needs to be incorporated in the activity planning for the Park according to the master maintenance plan developed for MEFT.
In the event that Elizabeth Bay becomes available for tourism, a new lodge can be constructed.

Objective

- To ensure that buildings are kept to a minimum, and are designed to be visually attractive, energy efficient and in keeping with the sense of place of the surrounding area

Strategies

- Where buildings are required by any arm of Government other than MEFT in the Park, they should be located as close to existing services and roads as possible and may require the rezoning of the Park as no infrastructure development zone has been designated in this plan
- All structures (including non-permanent ones) must be designed and constructed to create minimal visual impacts
- Planning for buildings must consider the long-term management costs and servicing and maintenance responsibilities
- Conservation staff should be concentrated near areas where management and control demands are highest, and ideally near to services
- Use building materials produced in an energy-efficient manner, including local and recycled materials, provided they are cost effective
- Use water and energy efficient fittings in all facilities. Use cross ventilation, high ceilings, cavity walls and other passive cooling methods as far as is practical
- Position buildings to maximise cooling in summer and heating in winter
- Design compact development sites to minimize disturbance footprints
- Standardise materials, fittings and fixtures for easy maintenance
- Ensure that structures containing fuels meet national requirements, and erect containment structures to minimise the effects of leakage and spillages
- The location of staff accommodation should be determined to optimise:
  - management efficiency;
  - proximity to entrance gates;
  - proximity to visitor areas;
  - proximity to services such as schools, clinics, shops, etc.;

12.5 Patrol camps

Management of the Park will be enhanced through the use of fixed patrol camps where basic shelter and facilities are provided in light of the harsh environment of the Park and distances away from park stations. Seven patrol camps comprising prefabricated metal huts have already been established at Obib, Aurus, Boegoeberg, Gabusib, Tsaus, Tsirub and Kaukausib and will be maintained. An additional three patrol camps will be constructed during the lifespan of this plan and will consist of prefabricated containerized units placed on concrete slabs, with the concrete slabs being the only permanent component. Patrol camps will be established at locations to be determined in the course of this plan.

Objective

- Existing patrol camps will be maintained
- Patrol camps will be established to facilitate the management of the Park

Strategies

- Maintain existing patrol camps
- Establishment of patrol camps
- Chemical ablution only is provided with no wastewater dumping
- No solid waste may be accumulated at the patrol camps
- A maintenance schedule for each patrol camp should be developed

Figure 113 Extreme weather conditions make it difficult for Park staff to be effective without the use of fixed patrol camps

12.6 Airstrips and aircraft

Principles

- No airstrips may be constructed in the Park

Strategies

- A 'no flying' restriction below 1,000 metres will generally apply, and no low-level aerial sightseeing will be permitted without written approval of MEFT
- Mining Companies who operate helicopters for the purpose of crew transportation, emergencies and the movement of productions may apply for an exemption

12.7 Waste management

This section refers to consumer waste rather than construction or industrial waste which are covered in Chapter 5.3.

The disposal of waste is often problematic in remote areas, and the volume of waste will grow as the use of the Park increases. Solid waste should not be disposed in a park, and it should be transported to a managed waste management facility in any of the nearby towns.

Plastic pollution of the oceans is a major global problem. It is expected that large volumes of plastic waste and other items derived from the fishing and shipping industries will wash up continuously on the beaches of the Park. Such plastic waste must be removed as soon as possible from the beaches to prevent that the plastic decays into microbeads which enter all food chains or get washed back into the sea.

Cooperation is needed with Namdeb, Skorpion or any other company operating in the Park regarding waste management in areas under their control, as waste management form part of the Environmental Management Plans for their operations.

Objective

- To ensure that environmental pollution does not arise from poor waste management in the Tsau //Khaeb NP
- Littering and pollution from waste is discouraged by strategies, encouraging proper disposal and enforcing compliance with vigilance and strong penalties. The principle of taking out what was brought in must apply to tourists and MEFT staff alike

Principles for solid waste

- No solid waste disposal should take place in the park. What is taken in must be taken out. Since all tourism will be guided, no waste disposal facilities should be provided at tourist lookout or picnic sites, but signs should indicate that all waste must be removed from the Park. This arrangement also needs to be included in tourism concessions agreements

- Tourism providers and employers of staff living in the Park are responsible for the removal of their own household waste, or that generated by tourists and staff, to approved waste disposal sites
- Regular clean-up campaigns need to be undertaken of the beaches of the Park. Since the intertidal zone is an area of responsibility shared with MFMR, such campaigns should be done in consultation with MFMR
- Waste storage facilities must be properly enclosed to prevent access by wildlife and pollution by wind-blown litter. These facilities must be approved by the MEFT and may hold waste for a maximum of 28 days; shorter periods will apply if high volumes accumulate and health issues arise
- Where practical, waste must be sorted for recycling
- Transport of waste to storage or dumpsites must be in properly constructed vehicles or containers to ensure that no littering occurs

Principles for liquid waste

- Liquid waste must be processed according to the most appropriate system, considering the practicalities, volumes of waste, availability of water, costs of disposal and environmental impact
- The MEFT and other relevant ministries must approve all liquid waste handling systems, which should comply with national standards and legislation
- The pollution of groundwater is to be avoided, but also monitored, if necessary, by enlisting the help of relevant government departments
- Any toxic substances and the disposal of the empty containers must comply with national regulations and the use of all cleaning and other potentially toxic substances must be approved by MEFT

Strategies

- Pro-actively undertake routine clean-ups so that people in the park see clean, litter-free surroundings.
- Ensure staff areas such as patrol camps are maintained free of litter
- All visitors and operators of whatever activities in the Park should practice the principle of 'take in – take out,' and the prohibition of littering should be strictly enforced by Park officials and Honorary Conservation Officers
- All visitors and operators (including MEFT) in the Park should encourage and practice the 3-R principles of waste Reduction, Re-use and Recycling wherever possible
- Enforce the Regulation that no single use plastic shopping bags may enter the Park
- Inspect seal harvesting sites to ensure that no waste of any kind is left behind

Figure 114 How not to do it. This site is an important archaeological site with rock engravings that should be completely rehabilitated. As it is in a mining license area it is also an example of a case where if rehabilitation is not done, a compliance order can be issued in terms of Section 20 of the Environmental Management Act, Act 7 of 2007

12.8 Human safety

Wildlife may potentially pose threats to tourist safety within the Tsau //Khaeb NP. Park management must monitor those instances and areas where this is likely to happen. Proactive action can often prevent or minimise these problems and therefore strategies and activities for human safety need to be set and implemented.

Objective

- To avoid threats to human safety

Strategies

- Proactive and adaptive management principles should be applied to human safety in the Park, particularly if new threats have been identified or incidents occurred
- Notices and warning signs must be displayed in appropriate places and in several languages
- Access to the Park is conditional on a waiver of liability for visitors and families of staff
- Actions, which will increase the likelihood of injury or death must be prohibited and drawn to the attention of all park users. These may include feeding animals, and straying from vehicles, etc
- Facilities must be designed and developed to ensure risk to life or property is minimised, while allowing visitors to still enjoy the wildlife viewing and tourism experience
- The liability of any mining operator for a road operated or maintained by such mining operator towards the Park management staff or any tourist should be specified in the proposed co-management agreement between MEFT and Namdeb or similarly with any other mining operator in future

Chapter 13 Administration and management

Greatest threats to Tsau //Khaeb NP	Key conservation and management outcomes for Tsau //Khaeb NP
Enabling Objectives	
Insufficient operating budget	• Sustainable financing is secured for all priority activities in the management plan
Degradation of infrastructure and equipment due to a lack of maintenance	• Maintenance schedules for plant and equipment are adhered to resulting in well maintained facilities
Inadequate monitoring of the implementation of the management plan and ecological changes in the park	• All priority parameters are effectively implemented to enable timely intervention and corrective measures • The management team for the Park has reviewed the implementation of the management plan at quarterly review meetings
Park management is compromised by the lack of staff due to excessive vacancies or unmotivated staff	• Key positions are filled by well-trained staff members who are willing to learn all there is to learn about park management and teach the same to newcomers • Adherence to national policies on human resource management and capacity development to ensure that the Park staff is motivated

Enabling objectives

The following two enabling objectives apply to all protected areas:

- To develop, implement and maintain an efficient and functioning management system - this captures all management strategies related to the design, review, revision and implementation of the Park's operational plans (annual work plan, monthly work plans, development plans, and financial planning systems) and enhancing the management structure for the Park. It also includes the monitoring of effectiveness of planning systems, in terms of both the biodiversity resource and the achievement of annual targets.
- To develop, implement and maintain effective and efficient systems, infrastructure and equipment that can support core functions - this captures all management strategies related to the non-human resources that the Park management staff can use in his/her management activities (infrastructure, equipment and the management system itself), as well as an outreach programme, and the imperative of preventative maintenance.

13.1 Administration and compliance

Since management and administration underpin all operations, an efficient administrative structure is required to support financing, procurement, human resources, stores and supplies, and maintenance of the Park. Many of these aspects are controlled by public service and/or MEFT policy, procedures or legislation. These measures limit the autonomy of park administrators and managers. Innovative operating procedures could nonetheless be implemented to address issues specific to local conditions.

Objective

- To ensure compliance with public service policies and procedures within which an efficient operating system is implemented for the conservation and economic development of Tsau //Khaeb NP

Strategies

- **MANAGEMENT PLAN:** The current document represents Tsau //Khaeb NP's management plan that includes: the purpose and objectives of the Park; a summary of core ecological, social, and economic principles and drivers
- **OPERATIONAL PLAN AND ANNUAL WORK PLAN:** The management plan includes a 5-year operational plan that summarises and guides all the key priority activities and developments that are required to implement the park management plan
- **LAW ENFORCEMENT:** Illegal hunting remains a major management issue for MEFT since illegal killing poses a major risk to wildlife and tourism products. Vigilance against wildlife crime is therefore a very high management priority
- **COMMUNITY INVOLVEMENT:** Since communities have close links to the Park and its natural resources, mechanisms must be found that improve management efficiency by employing or outsourcing work to local people, and through joint implementation of key activities such as monitoring, coastal clean-ups etc
- **RESEARCH AND MONITORING:** An active monitoring system of carefully selected and agreed indicators, both bio-physical and socio-economic, is essential if management effectiveness is to be improved and adapted as conditions change. Monitoring systems must therefore provide key information, especially regarding threats or opportunities. Monitoring on an operational level is not limited to the natural resource base, but also includes management efficiency. Research will be supported, primarily through collaboration, and will focus on the following:
  - Potential impact of climate change and the loss of the winter rainfall season
  - Ecology of endemic species, also within the context of climate change
- **HUMAN RESOURCES:** These play a critical role in the management of the Park, and therefore training and continuous staff development are essential. The MEFT policy on HIV/AIDS must be implemented. Procedures should be implemented to redress past gender imbalances in line with national policies
- **FINANCIAL CONTROL AND FUNDING:** Financial controls as required under MEFT and other policies and legislation must be complied with. However, a broader, proactive business approach that continually resets targets of performance must be adopted. Resource and cost estimates must be monitored to ensure that targets for specific deliverables are met and improvements made. Alternative sources of funding should continually be explored to improve the management and operating efficiency of the Park
- **GENERAL ADMINISTRATION:** Mechanisms, which improve effectiveness of delivery, must always be explored. All assets must be accounted for, maintained and applied to their intended uses. Where appropriate, new technologies, equipment and fixed infrastructure must be explored and introduced.
- **REVIEW OF IMPLEMENTATION:** The management team for the Park should review the implementation of the management plan at quarterly review meetings
- **MANAGEMENT EFFECTIVENESS TRACKING TOOL (METT):** Contribute to the METT assessment that is carried out by headquarter staff members from the division Wildlife Support Services to check the level of management effectiveness for the Park

Figure 115 Stakeholder consultation meeting taking place at Ontanda EEC

13.2 Management Structure

The personnel structure for Tsau //Khaeb NP is provided in Table 6. Tsau //Khaeb NP is managed from staff based at Rosh Pinah, Lüderitz, Oranjemund and Aus.

Table 6 Personnel structure and reporting lines for Tsau // Khaeb National Park, showing positions filled as at September 2019.

Tsau //Khaeb National Park Deputy Director Control Warden										
	Total		Oranjemund		Luderitz		Rosh Pinah		Aus	
Position	Total	Filled	Number of posts	Filled	Number of posts	Filled	Number of posts	Filled	Number of posts	Filled
Chief Warden	1	0					1			
Senior Warden	1	0	1							
Conservation Scientist	1	0					1	0		
Warden	4	3	1	1	2	1	1	1		
Ranger	5	4	1	1	2	2	1		1	1
Administrative officer	4	1	1		1		1	1	1	
Operator driver	1	1					1	1		
Assistant ranger	8	3	1		2		3	2	2	1
Watchman	8	6	1	1	2	2	3	1	2	2
Cleaners	2	2			2	2				
	35	20	6	3	11	7	12	6	6	4

13.4 Annual planning cycle

An annual adaptive review and planning process must be formalized as part of the Annual Operational Plan to evaluate the implementation achievements and gaps and prepare the annual work plan and budget for the following year.

The planning cycle involves the following steps:

Review the previous annual plan

- Before starting a planning process, it is necessary to reflect the previous cycle, what was achieved, what were the challenges. This needs to happen at two levels: the implementation of planned activities (inputs) and whether these activities are achieving the desired impact/outcome (Figure 116).
- Essentially, the effectiveness of management direction needs to be measured to determine whether the direction was successful in achieving what it was intended to achieve (i.e., was it effective?).
- If any parameter is not in line with the desired state or trend, then the effectiveness of management direction must be evaluated.

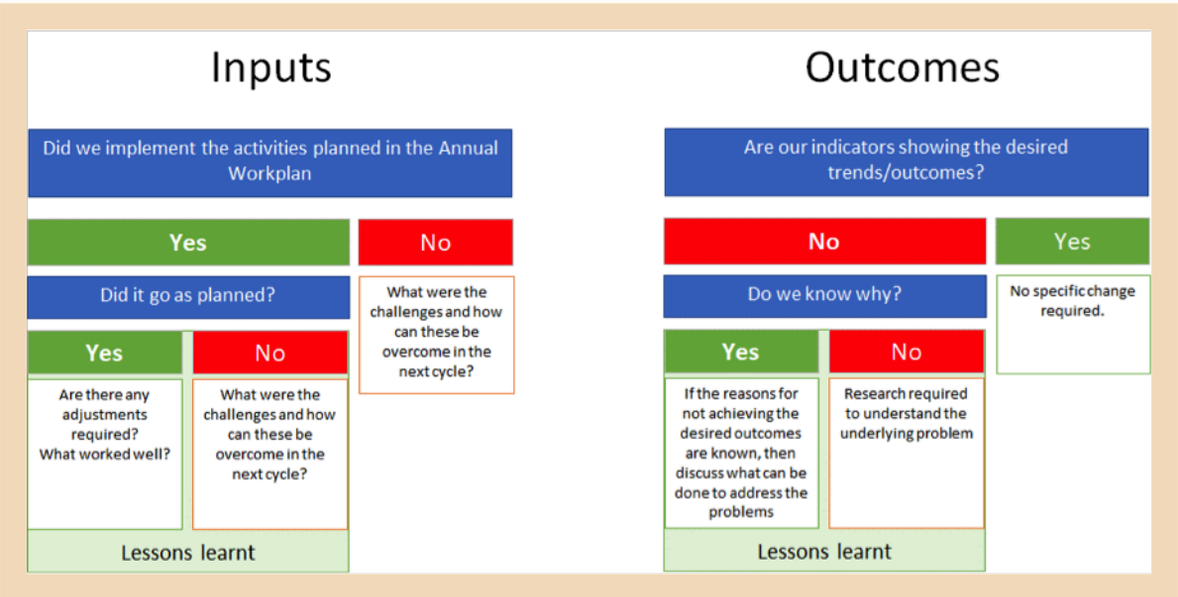


Figure 116 Guide for reviewing management and action plans

Adjust targets for the year ahead

Based on the results of the review process, consider the targets that need to be achieved in the year ahead, in relation to the overall 5-year operational plan, and achievements to date.

Develop annual work plan and budget

Formulate annual work plans with outputs and budget allocations (this task falls to park managers) that are agreed to by senior staff. Plans should address major challenges and should ensure that important opportunities are optimised, for example:

- activities must be resourced with appropriate staff, equipment and funding;
- mechanisms should be provided to overcome challenges;
- opportunities to review and modify work plans must be created, and adaptive management applied as circumstances change;
- work plans with expected deliverables and dates should always be communicated to people responsible for these functions.

Implementation

Implement the annual work plan and review implementation on a regular basis to ensure that progress is achieved according to plan, or challenges addressed in a timely manner, through:

- Monthly meetings at park level, to monitor achievements against planned activities, and to plan the month ahead;
- Park quarterly meetings: at park level, to prepare for the quarterly report back to the quarterly regional level meeting, and preparation of quarterly report;
- Regional level quarterly meetings: convened by the Deputy Director, to share and discuss progress from the various units, and to compile the regional quarterly report.

At all times it is important to:

- Ensure that all MEFT assets are accounted for, protected and maintained in working order and deployed to contribute towards this plan.
- Monitor any changes in legislation and advise on their impact on the Park and associated operations.
- Identify gaps in knowledge relating to management and where appropriate, through collaboration, find solutions to improve the understanding of the natural system and the socio-economic benefits from the Park.
- Develop a respectful and efficient working relationship with staff and other stakeholders and neighbouring communities.

Implementation Monitoring

Establish a system of monitoring and recording all aspects of plan implementation, so that control can be exercised, and management improved, especially with respect to:

- the socio-economic benefits which result from the Park;
- the development and responsible operation of tourism products;
- compliance with all collaboration agreements;
- adherence to budgets, and accountability for finances.

Decision makers at all relevant levels should support park managers in their endeavours to implement this plan.

13.4 Reporting

Quarterly reports

The person assigned to take responsibility for the implementation of the park management plan will be required to report back on the implementation of the Annual Work Plan on a quarterly basis to the Director responsible for park management.

Annual reports

The Director responsible for park management will be required to produce (or cause to be produced) an annual report for each protected area, based on the park's Annual Work Plan. This report will feed into an annual state of protected areas report.

13.5 Amendments

Any amendment to an approved park management plan must be approved by the Minister. If in the review process it is felt that an amendment to the park management plan is required, a recommendation must be submitted, with a full justification, to the Director responsible for park management, who, after consultation and if in agreement, will submit to the Minister for approval.

13.6 Key supporting documents

Legislation

- Nature Conservation Ordinance, Ordinance 4 of 1975
- Nature Conservation Amendment Act, Act 5 of 1996
- Nature Conservation Amendment Act, Act 3 of 2017
- Controlled Wildlife Products and Trade Act, Act 9 of 2008
- Controlled Wildlife Products and Trade Amendment Act, Act 6 of 2017
- Environmental Management Act, Act 7 of 2007
- Diamond Act, Act 13 of 1999
- Inland Fisheries Resources Act, Act 1 of 2003
- Marine Resources Act, Act 27 of 2000
- Aquaculture Act, Act 18 of 2002
- Regulations made in terms of Nature Conservation Ordinance 4 of 1975
- Environmental Impact Assessment Regulations[46] made in terms of the Environmental Management Act
- List of activities that may not be undertaken without Environmental Clearance Certificate[47]: Environmental Management Act
- Ministry of Environment and Tourism, 2019. Draft Wildlife and Protected Areas Management Bill
- Regulations made in terms of Marine Resources Act, Act 27 of 2000 relating to Namibian Islands' Marine Protected Area

Policies and Strategies

- Ministry of Environment and Tourism, 2007. Policy on Tourism and Wildlife Concessions on State Land
- Ministry of Environment and Tourism, 2009. Strategic Management Plan for Namibia's North-East Parks
- Ministry of Environment and Tourism, 2013. National Policy on Community Based Natural Resource Management
- Ministry of Environment and Tourism, 2013. National Policy on Protected Areas' Neighbours and Resident Communities
- Ministry of Environment and Tourism, 2016. Fire Management Strategy for Namibia's Protected Areas
- Ministry of Environment and Tourism, 2017. National Solid Waste Management Strategy
- Ministry of Environment and Tourism, 2018. Revised National Policy on Human Wildlife Conflict Management
- Ministry of Environment and Tourism & Ministry of Mines and Energy, 2018. National Policy on Prospecting and Mining in Protected Areas
- Ministry of Environment and Tourism, 2018. Master Maintenance Plan - A Strategy to sustain the Ministry's Infrastructure

46 Government Notice 28 of 2012
47 Government Notice 29 of 2012

Plans and Guidelines

- Ministry of Environment and Tourism, 2018. Framework and Guidelines for Development of Park Management Plans.
- Tourism Development Plan for Tsau //Khaeb NP. Ministry of Environment and Tourism. 2019.
- Ministry of Environment and Tourism, 2019. Guidelines for the Zoning of Protected Areas
- Biodiversity monitoring framework for the Tsau //Khaeb (Sperrgebiet) National Park. Ministry of Environment and Tourism, 2019 (to be read together with the Training manual for the Biodiversity monitoring framework for the Tsau //Khaeb (Sperrgebiet) National Park.
- Ministry of Environment, Forestry and Tourism, (in prep.). Guidelines for Monitoring in Protected Areas
- Management Plan for The Garub Horses of the Namib. Namib Naukluft Park and the Tsau //Khaeb (Sperrgebiet) National Park 2019 – 2029 (Draft). Ministry of Environment and Tourism, 2019.

Figure 117 *Euphorbia dregeana* at Kaukausib spring

Chapter 14 Five-year operational plan

14.1 Five-year operational plan

The first five-year operational plan is presented in the following table and provided in an accompanying supporting Excel spreadsheet.

14.2 First year annual work plan

The first-year annual work plan and associated budget is contained in an accompanying standalone Excel spreadsheet.

A

B

Figure 118 *Conophytum klinghardtense*, largely dormant in A; in better condition in B

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Chapter 17 Glossary

ALIEN SPECIES: Any plant or organism that has been introduced by humans into habitats far outside their native range, either directly or indirectly and intentionally or unintentionally. These species have the potential to cause significant ecological damage, often out-competing native species or changing the environment to such an extent that entire indigenous ecosystems may become threatened. Not all alien species are invasive, however, the chances of an invasive species being introduced increases rapidly with the number of alien introductions.

CONSERVATION: The management of the human use of the biosphere so that it will yield the greatest sustainable benefit to present generations, while maintaining its potential to meet the needs and aspirations of future generations. It includes preservation, maintenance, sustainable use, restoration and enhancement of the natural environment.

HABITAT: The natural home of a plant or animal species. Generally, those environmental features or characteristics of an area which are essential to the survival of an animal or a plant.

MESEMB OR MESEM: Species of the plant family Mesembryanthemaceae, all of which are succulent.

MINISTRY: Ministry of Environment, Forestry and Tourism

SUSTAINABLE: SUSTAINABLE USE / UTILIZATION: Using a resource so that the resource is not depleted or permanently damaged or harvesting of a given species of plant or animal in such a way that their stocks do not decline in number over time.

WILDLIFE: All the indigenous biota, which occur within the area.

Figure 119 *Tylecodon wallichii*

Figure 120 *Astridia velutina*

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