

# Management Plan

Namib Sand Sea World Heritage Site

2013 - 2018



**Ministry of Environment and Tourism**  
Directorate of Regional Services and Parks Management



Republic of Namibia











Republic of Namibia

## ACKNOWLEDGEMENT

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## FOREWORD

The Namib Sand Sea boasts gigantic dunes and, while it may forever be disputed where the highest active dunes in the world occur, the Namib dunes are without doubt the largest most accessible dunes on earth.

The spectacular desert scenery and incomparable natural beauty of the large dunes of the Namib Sand Sea provide for extraordinary desert panoramas, complemented by the aesthetic charm of its striking colours and fascinating animal life. The interplay of shadow and light in a variety of shapes from the detail of individual sand grains and bizarre life forms to the plethora of dune types and vast picturesque views of majestic dunes, is an endless source of fascination as the time of day, the season, the weather conditions, and the perspective of the observer compel ever changing spectacles. The natural beauty is further enhanced by the remarkable clarity of landscapes features by day and the dazzling Southern Hemisphere sky at night.

Astonishing vistas, profusely crystallised in silhouetted forms with fascinating kaleidoscopic sceneries continually transformed with time, make the landscape of the Namib Sand Sea a sight to behold. Its striking colours range from black to garnet to red to deep orange to light yellow in interplay of contrasting shadow and light. The colours together with diverse, fascinating plant and animal life, bestow a distinct natural beauty and aesthetic charm. The visual splendour of the Namib Sand Sea is enhanced by the sinuous curves and shapes constantly being remodelled by wind.

The occasional floods of the Kuiseb River following on high rainfall inland, far from the Namib Sand Sea, forever thwart the dunes from crossing its course and penetrating the Namib gravel plains beyond. The Namib Sand Sea is not limited to magnificent dunes, where winds continually drift and mould the loose sand into dunes of innumerable scales and forms. Another manifestation of its stark beauty is in the startling contrast of habitats that can be found directly adjacent to each other within the Namib Sand Sea. These create an extraordinary position of natural living environments with the associated multitudes of life forms on its sand dunes, dry riverbeds, interdune valleys and inselbergs.

The Management Plan is a practical tool to guide activity and operational planning by all managers and stakeholders. It is essential that all existing staff and future appointees responsible for the Namib Sand Sea should familiarize themselves with its contents. It should furthermore be freely available to other stakeholders, and shall be specifically distributed to immediate neighbours and concessionaires. Appointed staff members have specific responsibilities and duties, but everyone is encouraged to assist with implementation and improvement of the Management Plan as a team effort. Encouraging joint implementation shall ensure that the extraordinary integrity of the Namib Sand Sea will continue as an international flagship of effective desert conservation.

Uahekua Herunga, MP  
Minister



Uahekua Herunga, MP  
MINISTER



## PREFACE

The Namib Naukluft Park lies on the south-western coast of Africa, in Namibia, approximately 250 km south of the capital Windhoek. The Namib Sand Sea is located within the Namib Naukluft Park.

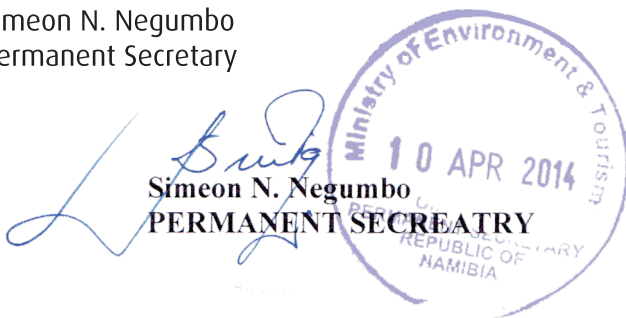
It is a site of outstanding natural beauty, active geological processes of global significance and has on-going natural ecological dynamics that drives the evolution and interaction between the Namib Sand Sea residents. It is an area of extraordinary diversity of endemic species of special significance to science and environmental understanding.

The Management Plan sets out the vision, aim, objectives and underlying principles to ensure the maintenance of the outstanding values of the Namib Sand Sea. It also sets out the primary areas for actions to ensure effective and sustainable conservation management of those values and the attributes through which they are expressed. The mechanisms that sustain the geological, ecological and population dynamics that established and maintain the Namib Sand Sea are often at such a large scale that intervention is neither required nor possible, while other management activity is at such a small local scale that it is best implemented by on the spot decisions by conservation staff. Those minor activities are well known to management staff as routine procedures for which they have been trained and instructed through standard operating procedures. The Management Plan therefore does not address issues outside the scope of human abilities or those that are standard operational duties.

Effective implementation of the Namib Sand Sea Management Plan is only possible when all managers and conservation staff subscribe to its principles and strive to implement the identified actions. It can be expected that the plan has weaknesses that need to be identified and addressed in future revisions. All management and conservation staff is therefore encouraged to identify those shortcomings and the inevitable challenges that shall emerge from activities and pressures that are not yet adequately addressed. Innovative solutions to existing and new challenges require accurate observation of the effects and records of the condition of places before and after the problems became clear. That routine yet often underappreciated contribution of conservation staff at all levels have allowed the progressive evolution of the management approach, which are accepted and appreciated as the basis of this plan and a critical component of future revisions.

The Ministry of Environment and Tourism thank all its staff members, line Ministries, partners, stakeholders and individuals who participated in developing this management plan for the Namib Sand Sea in the Namib Naukluft Park.

Simeon N. Negumbo  
Permanent Secretary



**Simeon N. Negumbo**  
**PERMANENT SECRETARY**

Ministry of Environment & Tourism  
10 APR 2014  
PERMANENT SECRETARY  
REPUBLIC OF  
NAMIBIA



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## ABBREVIATIONS

CBNRM – Community Based Natural Resource Management  
CEO – Chief Executive Officer  
DEA – Department of Environmental Affairs (in MET)  
EIA – Environmental Impact Assessment  
EMP – Environmental Management Plan  
EPL – Exclusive Prospecting Licence  
HAN – Hospitality Association of Namibia  
HQ – Headquarters / Head Office  
IBA – Important Bird Area  
IPA – Important Plant Area  
IUCN – World Conservation Union  
KBMC – Kuiseb Basin Management Committee  
MAWF – Ministry of Agriculture, Water and Forestry  
MDP – Management and Development Plan  
MET – Ministry of Environment and Tourism  
MFMR – Ministry of Fisheries and Marine Resources  
MoF – Ministry of Finance  
MRLGHRD – Ministry of Regional and Local Government, Housing and Rural Development  
MYNSSC – Ministry of Youth, National Service, Sport & Culture  
MWTC – Ministry of Works, Transport and Communication  
NACOBTA – Namibia Community Based Tourism Association  
NATH – Namibian Academy for Tourism and Hospitality  
NGO – Non Governmental Organisation  
NHC – National Heritage Council  
NNF – Namibia Nature Foundation  
NNP – Namib-Naukluft Park  
NPC – National Planning Commission  
NTB – Namibia Tourism Board  
NWR – Namibia Wildlife Resorts  
ORV – Off-road Vehicle  
TORs – Terms of Reference  
SEA – Strategic Environmental Assessment  
SOE – State Owned Enterprises  
SSCSI – Sites of Special Conservation or Scientific Interest  
UNESCO – United Nations Educational, Scientific and Cultural Organization  
WHC – World Heritage Centre / World Heritage Committee



# INTRODUCTION

The Namib Sand Sea was nominated as a World Heritage Site in February 2012 under all four natural criteria. It was inscribed as a World Heritage Site in June 2013 at the 37th Session of the World Heritage Committee Meeting held in Phnom Penh, Kingdom of Cambodia. The Namib Sand Sea joins the group of only 22 World Heritage sites around the world that meets all four criteria, including such internationally renowned sites as the Great Barrier Reef (Australia), Galapagos Islands (Ecuador), Ngorongoro Conservation Area (Tanzania), Grand Canyon (USA), Yellowstone (USA) and the Kamchatka Peninsula (Russia) on the World Heritage list. It is the second African site that meets all four natural criteria for World Heritage. The Namib Sand Sea World Heritage Site encompasses the core of the Namib-Naukluft Park.

The boundaries of the Namib Sand Sea lie within the park south of the Kuiseb River in central Namibia. Starting from Sesriem in the centre of the eastern boundary, the site boundary extends southwards to a point where the boundary of the Namib Naukluft meets the border of farms Kanaan and Kamaland, then west-south-west to Gibraltar on the coast before following the coastline north to the Sandwich Harbour Ramsar Site. The northern boundary then heads inland (eastwards) to the Kuiseb River, skirting an area earmarked for bulk water production boreholes, from where it bends along the southern bank of the dry Kuiseb riverbed before turning south, encompassing a small extent of gramadullas with incomparable vistas over the sand sea, past the Gaub River tributary to Sesriem.

The Management Plan shall be reviewed every five years and revised where required through the input of all conservation staff and stakeholder consultation. Major interim changes or additions to the management plan, e.g. to address new conditions in the management framework or rapidly emerging threats, shall consist of amendments approved by the management authority. Such amendments shall be attached to the master plan for inclusion in the following review.

## VALUES AND ATTRIBUTES OF THE NAMIB SAND SEA

The integrity of the particular values and attributes that the Namib Sand Sea Management Plan shall endeavour to conserve are:

### **(i) Outstanding natural beauty**

- Large open spaces without visible scars or signs of human development, intrusive activity, or constructs
- Extraordinary clear visibility due to the absence of aerial pollution from dust, smoke, or industry
- Human impact and development footprint concentrated at specific point locations rather than in an unmanageable wider distribution all over the area
- Ready access for visitors to the visually most compelling and superlative sites
- Well-argued restrictions on activities that may detract from the visitor experience developed through adaptive management
- Continued application of the precautionary principle to limit activities with unknown consequences until adequate information on their impacts are available

### **(ii) Active geological processes of global significance**

- Unimpeded natural processes of washing sand onto beaches to be transported and deposited by wind to the interior
- Uninterrupted flows of air and water along rivers from the interior (eastern) margin into the sand sea that sculpts the geomorphology
- Sculpted and dissected deposits of sandstone and sediment that reflect the geological history
- Visual evidence of the effects of past climatic changes such as dead trees, river and pan sediments, coastal salt pans and isolated inselbergs



- Archaeological and historical remains that illustrates past human endeavour in the geological and geomorphological context
- Human activity restricted to those areas that can be rehabilitated by natural processes, e.g. inside river beds, on loose sand
- Closing, removal or relocating roads, infrastructure and tourist activities when they start to intrude and scar the landscape

**(iii) *On-going natural ecological dynamics that drives the evolution and interaction between the Namib Sand Sea residents***

- Extreme aridity and low net primary productivity punctuated by highly variable and unpredictable rainfall events recorded through regular monitoring
- Dominance of loose, unconsolidated sand with low clay and silt content
- Gradients of decreasing fog-induced moisture from west to east
- Persistent and reliable south-westerly coastal wind, punctuated by brief periods of variable strong winds from the east
- Contiguous open spaces without any barriers that allows natural expansion and contraction of populations and species ranges reacting to natural variability or human activity
- Secluded wildlife refuges for breeding not affected by human activity that allows repopulation of areas affected by people or natural disasters
- Periodic nutrient input through ephemeral rivers, wind or vegetation responding to unpredictable rainfall events
- Natural response systems of species to detect and exploit resource concentrations that is unpredictable in space and time
- Unimpeded integration of interactions between species complexes inhabiting different habitat types, defined by the kind of surfaces, that allows dynamic evolutionary processes and interaction between different communities
- Absence of any human activities that affects the large-scale population dynamics and interaction between typical species within the various habitats
- Reported local-scale changes in population sizes and behaviour of larger animals and birds that need to be monitored better

**(iv) *Extraordinary diversity of endemic species of special significance to science and environmental understanding***

- Unfragmented and pristine habitat availability along the whole range of climatic conditions that maintains the genetic diversity of species
- Absence of natural or human-induced influences on the breeding success, age and sex structure, and interactions between species
- Absence of alien species that can significantly change natural interactions between resident species
- Well documented results from on-going scientific research and long-term monitoring to explain the biodiversity, ecological relationships and fluctuations in species presence and population changes
- Long history of conservation management interventions to inform future decisions from past attempts to maintain ecosystem processes undermined by human exploitation, e.g. fencing to enforce hunting restrictions on herbivores and predators, artificial water supply for a more even distribution of large game, re-introduction of extinct species and management of tourism effects
- Effective and focused law enforcement that restrained unsustainable human impacts
- Effective intervention to limit the extent of natural disasters and human error, e.g. outbreaks of fire and the past eradication of alien species within the property
- Healthy populations of species habituated to human traffic and activities that contributes to the overall visitor experience that resulted from the past and present efforts of committed and hardworking staff

The success of the management plan will be measured against the current status of the natural environment of the Namib Sand Sea.

The Namib Sand Sea is characterized by:

• **Wholeness:**

Attributes that demonstrate the outstanding values deserving of world heritage status on all four natural criteria are encompassed and abundantly represented within the identified borders of the property, namely

- (i) superlative natural phenomena of outstanding beauty;
- (ii) unrestricted geological and geomorphological processes encompassing the full range of hyper-arid aeolian desert formations;
- (iii) uninterrupted ecological processes of global significance in understanding the evolution and maintenance of desert ecosystems and the distinct component communities of specially adapted organisms;
- (iv) extraordinary and well conserved biodiversity of endemic species proven to be of outstanding scientific and conservation significance

• **Intactness:**

More than 90% of the identified area is undisturbed wilderness almost totally devoid of human impact, which sets the standard for monitoring the degree of current and future usage. Well regulated and controlled tourism is the primary development likely to take place in the Namib Sand Sea through maximum sustainable utilization of identified areas rather than distributing impact throughout wilderness areas through exclusivity. Access to all parts of the area is only envisaged for the purpose of conservation and research.

• **Absence of threats:**

There are currently no threats that may impact on the integrity of the attributes used to explain the outstanding universal value of the Namib Sand Sea, though some emerging issues relate to the conservation status of subsidiary attributes of the area. All development, including tourism, may be expected to put some attributes under stress. The challenge is to ensure early identification of what kind of stress is applied to which attribute through continued development and utilization an identifying appropriate management responses. The precautionary principle, based upon an ecosystem management approach and minimal intervention, shall be used to test potential management solutions to likely impacts caused by human exploitation of the environment.

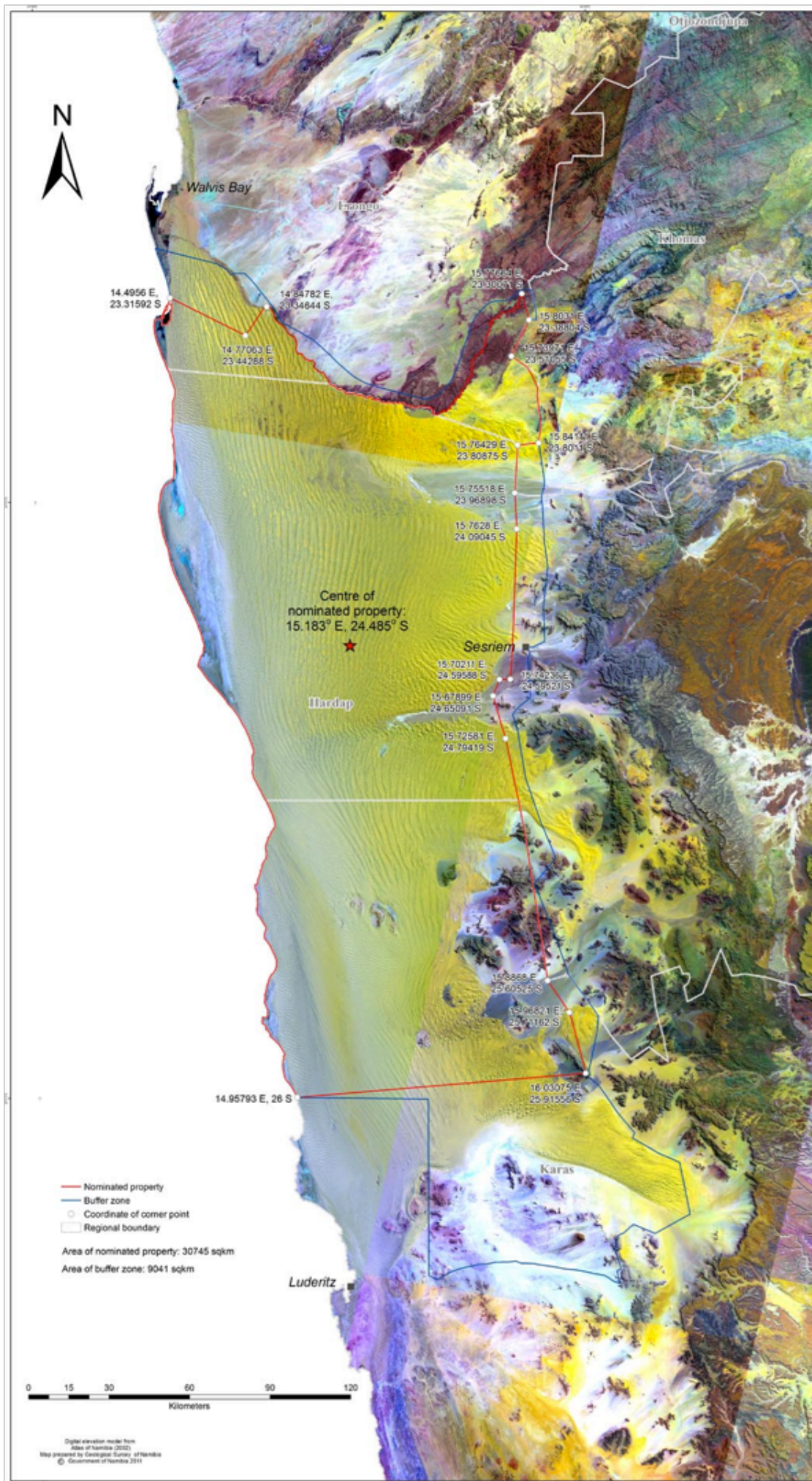


## ENVIRONMENTAL OVERVIEW

The whole area receives on average less than 100 mm annual rainfall and over 70% of the area of the park receives on average less than 50 mm rain per year. The extremely low annual rainfall it is also hugely variable with an annual coefficient of variation ranging typically from 80% to over 100%, which implies that most of the area is unlikely to receive any rain for most of the time, but when it rains it will be very heavy rainfall with floods in the rivers. The evaporation along the inland part of the area is also very high. The high evaporation rates and low rainfall results in an average water deficit of about 2 m per year, which makes it one of the most extreme deserts in the world. When rain falls, it is mainly in January to April in the eastern and northern part, while records show that the southern part may receive rain during any month of the year.

Temperatures are generally moderate and fog is frequent along the coast (about 125 days per year on the coast dropping to about 40 days per year 80 km inland). Wind is a dominant feature. The dominant winds are mainly from the south and carry sand from the shore into the interior. At any time of the year when cold temperatures occur in the interior (e.g. Windhoek), but especially in winter, very strong, hot and dry winds can blow from the east. These strong winds are generally of fairly short duration, often blowing only for a few days. The general absence of vegetation means that the area cools rapidly at night, and often cold in the morning, even during the middle of the summer. On rare occasions snow and frost has been reported on the dunes during winter.

It is important to understand why the Namib is a desert. First, the cold waters of the Benguela Current cool the air so much that little evaporation takes place over the South Atlantic Ocean close to Namibia. The evaporation that does take place does not rise up and develop into rain-bearing clouds, but remains trapped in a layer from the sea to about 600 m above sea level. Moisture from the sea is therefore only seen as low clouds and fog. Second, moist tropical air from the Indian Ocean to the east or the tropical South Atlantic Ocean in the Congo basin to the north has usually shed most of its moisture before reaching the Namib coastal areas. Even when moist air with rain-bearing clouds does approach, it is usually blocked by the ocean winds from the south which blow inland for some distance, often to the escarpment. Any moist tropical air approaching the desert also descends over the escarpment, warming and drying out as it sinks down. These factors all combine to make rainfall an unusual event. Water flowing into the desert, which may result in local evaporation, is also rare as all Namibia's interior rivers, e.g. the Kuiseb and Koichab rivers to the north and south of the Namib Sand Sea, only flow during exceptionally wet years. The two rivers that flow into and are stopped by the Namib Sand Sea, the Tsondab and Tsauchab, do not have large catchments and flow rarely. These rivers end at Tsondabvlei and Sossusvlei where they form pans surrounded by sand dunes.



Map of the World Heritage Area and its Buffer Zone

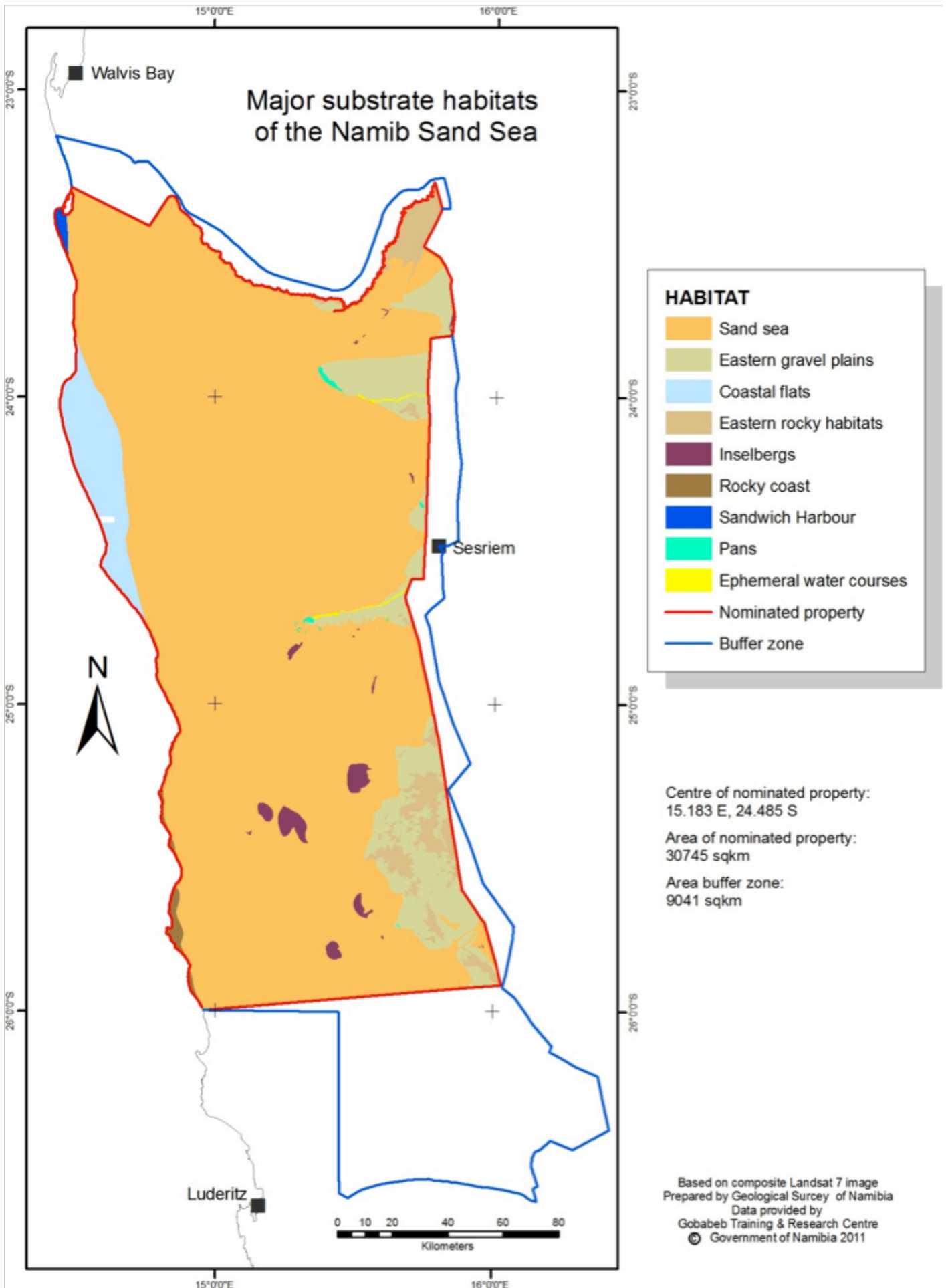


The most spectacular feature is the Namib Sand Sea, an area of some 4 million ha of continuous sand dunes with rich geological, paleontological, geomorphological, ecological, biodiversity, archaeological and historic values. The Namib Sand Sea is one of the major reasons why tourists come to Namibia, and specifically to the Namib Naukluft Park. The Namib Sand Sea is therefore the main drawing card that sustains the tourist industry throughout Namibia.

The Namib Sand Sea harbours a considerable number of endemic species, though the ecological processes are relatively simple due to the absence of vegetation. Conservation should therefore focus on soil (or substrate) types that are easy to recognize as is listed below.

### Habitats based on soil or substrate type within the Namib Sand Sea

Category	Habitat	Notes
<b>Coastal</b>	Sandy shore	Sandy shores on the southern side of bays where debris collects supports endemic species and are sensitive. Routes should be below the spring tide margin and avoid debris patches
	Rocky shore, coastal outcrops and bluffs	Rare and more sensitive than sandy shores with higher biodiversity. Vertical cliffs provide breeding habitat for cormorants and sometimes penguins. It often also has shell middens and other sensitive cultural heritage.
	Salt pans / flats	Sensitive to scarring and breeding grounds for Damara Terns. Traffic should be strictly controlled
<b>Terrestrial</b>	Sand sea dunes	Shifting dunes that are relatively resilient. Support highly endemic wildlife. Extensive views of unscarred dunes are the main attraction for tourists. The excitement caused by fear is the main attraction for adventure tourism
	Sandy plains and interdune valleys	Sensitive to scarring and important habitat for wildlife. Traffic should be strictly controlled
	Gravel plains	Gravel plains surround inselbergs and are extensive on the eastern boundary. They are sensitive to scarring and traffic should be strictly controlled.
	Ephemeral river courses	Ephemeral rivers support diverse plant and animal life that do not usually occur in the desert. It is important breeding and nesting areas. They are prone to alien invasives.
	Endorrheic pans and 'vleis'	End points of ephemeral rivers in the dunes, providing high scenic and biodiversity values. Sossusvlei is the main tourist attraction. Tsondabvlei is less scenic and spectacular and has important vulture breeding areas and archaeological sites.
	Inselbergs (Isolated Mountains)	Important relict (highly isolated) species and archaeological sites only occur there. Provide spectacular scenery from far away. Surrounding gravel plains easily scarred.
	Gramadulla areas and eastern rocky hills	Less sensitive than inselbergs, but important for biodiversity and as refugia and breeding areas for plants and animals





# PART 1

## MANAGEMENT FRAMEWORK

The Namib Sand Sea Management Plan is intended to ensure that all Namibians and visitors, regardless of economic status, origin, or personal circumstance, may continue to enjoy and experience the special qualities of the diversity of landscapes, sights and species resulting from the geology, ecology and biodiversity of the Namib Sand Sea.

The area will conserve the geological, ecological, cultural, biodiversity values and attributes for the long term benefits of all.

### 1.1 VISION

***Namibia shall conserve the outstanding global values of the natural environment of the Namib Sand Sea in perpetuity for the enjoyment and edification of all people***

The management plan clarifies how the Namibian government through the Ministry of Environment & Tourism shall continue to conserve the outstanding values of the Namib Sand Sea by applying its tested systems of integrated management planning and operational implementation by testing conservation actions and outcomes against the qualities for which the Namib Sand Sea is renowned.

### 1.2 PURPOSE

- Aesthetic wilderness – To conserve the austere beauty and continuous expanses of majestic dunes of the Namib Sand Sea, together with their outstanding diversity of endemic species integrated into vibrant and resilient communities, within a setting virtually devoid of human constructs. It requires ensuring unimpeded vistas over and within the property with a low degree of modern visible human impact and careful evaluation of any proposed development to ensure that it does not affect these qualities.
- Geomorphological variety and Ecological continuity – To ensure the sense of place of the Namib Sand Sea, the diversity of landforms where natural forces continue to shape and renew the dune systems and the diversity of healthy ecosystems and their dynamic animal and plant populations are maintained. An area of sufficient size and continuity shall be conserved with adaptive management responses, informed by appropriate environmental monitoring, to mitigate the degree to which human activities and societal development initiatives may have an effect on the integrated geological and ecological networks and processes.
- Appreciation and Understanding – To promote and explain the dynamic processes that shapes and maintains the dunes, and the adaptations that allows life to flourish in an environment of limited resources, through universal access, continuous research and monitoring and distribution of information at all levels of society. Specific strategies need to be continuously developed for access to identified parts of the property to meet national and community aspirations for development, economic prosperity and entrepreneurial opportunities while still conserving the integrity of the system and maintaining appropriate levels of research and education.

- Human interaction – To manage challenges in maintaining the integrity of the Namib Sand Sea within the context of dynamic cultural and economic changes in our society that allows the Namibian people to learn and profit from its environment. Every component of the Namib Sand Sea has different challenges if the integrity and authenticity of aesthetic, ecological, prehistorical, historical and cultural traditions of all Namibians are to be maintained. Adaptation to their natural environments through innovation is a cultural achievement that is shared by most Namibian communities. Maintaining that tradition under the pressures of rapid globalization and new economic opportunities requires interactive management through continued consultation between stakeholders and the Ministry of Environment and Tourism.

Conservation of the essential qualities of the Namib Sand Sea is well-established through a long history of practical conservation experience. That showed minimal intervention from ‘hands-off’ approaches to be effective as the remoteness and sheer scale of the natural processes of the Namib Sand Sea has defied the degree to which humans could affect those qualities. The management plan shall continue to build on that experience in order to guide activities and to promote appreciation of the Namib Sand Sea, its natural processes, and the diversity of its species.

### **1.3 OBJECTIVES**

- To conserve and manage the landscapes, ecosystems, habitats and biological diversity of the Namib Sand Sea.
- To manage wildlife populations and habitats to maintain healthy biological diversity and ecosystem stability under natural climatic variability and current and emerging development demands and practices.
- To promote and support appropriate land and natural resource uses that are compatible with the values and attributes of the Namib Sand Sea with emphasis on well managed tourism, flagship species, environmental awareness and promotion of the property.
- To promote development opportunities through the management of appropriate enterprises and other relevant mechanisms to foster job creation, social and economic upliftment and rural development in the Karas, Hardap and Erongo regions.
- To encourage and support strategic and innovative new economic enterprises without compromising on sound conservation principles and practices.
- To establish strong partnerships and appropriate institutional mechanisms for managing the landscape and ecological processes together with neighbours, local communities and other stakeholders within the context of development and mutual benefit for all partners.

Effective management of the Namib Sand Sea within the Namib-Naukluft Park has always required close cooperation between the mandated management authority (the Ministry of Environment & Tourism) and other related government organizations, decentralized local and regional governments, traditional societies, local residents, bodies engaged in tourism, researchers and NGOs (hereinafter referred to collectively as “stakeholders”). The Management Plan addresses issues such as conservation, research, monitoring, enforcement, education, traditional practices, and cultural heritage resources within the context of aspirations for national and regional development.

### **1.4 MANAGEMENT SYSTEM**

The management approach to the Namib Sand Sea conforms to the policies and procedures of the Government of the Republic of Namibia as advised by the Office of the Prime Minister. It consists of an integrated system of strategic (long-term), operational (medium-term), and activity (annual) planning. The property is wholly on state land, thus is legally held in trust for the Namibian nation and subject to procedures for public asset management.



As a legally proclaimed protected area on land, management of the area is entrusted to the Ministry of Environment & Tourism (MET) and is subject to specific regulations regarding use. Vast areas of the Namib Sand Sea has been legally protected and restricted areas for a long time, some of which has been protected since 1907. The inaccessibility of large areas for a long time until off-road vehicle technology has sufficiently advanced to access almost the whole area in recent times has added an additional layer of protection.

Management approaches have evolved and adapted over this long period to ensure the best possible conservation outcomes despite a diversity of management challenges that appeared and disappeared again from emergent economic prospects, technological innovation, and socio-political imperatives. The nearly pristine condition of the nominated property is evidence of the success of past efforts to confront challenges which were often based on short-sighted and speculative economic opportunism. The Management Plan shall continue to evolve within the context of the management of surrounding public and private conservation areas, including participatory processes for the co-management of wilderness areas.

The principal conservation philosophy for the Namib Sand Sea is to follow an ecosystem approach of integrated management and sustainable utilisation of resources. All the habitats in the Namib Sand Sea have specific geological and ecological processes that are fundamental to the plants and animals inhabiting those areas, as well as interactions between species within and between habitats. There are no uniform solutions that can be applied in all situations; even where the habitat is the same, thus the experience and good sense of the conservation staff on the ground is important.

An ecosystem approach requires that implementation of multiple activities have to be coordinated for:

- Ecosystem level planning;
- Defining cross-jurisdictional management goals;
- Developing and testing co-management approaches;
- Adaptive management;
- Ecosystem zoning;
- Long-term observations, monitoring and research.

This current management plan shall be implemented in an efficient and systematic way through annual cycles of preparing an Annual Work Plan and Budget. Those annual projections will be based on the Management Plan and incorporating the Strategic Plan, Medium-term Planning and Rolling Budgetary System of the Directorate of Regional Services and Parks Management and MET. These work plans shall, as far as practical, implement the areas of work listed under Part 2 of this management plan. The work plan should cover:

- Routine management issues for conservation such as managing water points, law enforcement, extension work, in-service training, promotion, incident-book record keeping, etc.
- Development issues to improve the capacity for conservation such as infrastructure developments, wildlife reintroductions, priority research, etc.

- Monitoring activities to systematically and opportunistically collect, report and record information such as key biodiversity indicators, tourism activities, impacts, etc. for annual analysis and interpretation to inform adaptive management
- Research support to gather and report priority information and address knowledge gaps through implementing projects, monitoring, research permit system, etc.
- Administration including work plan & budget preparation, regular reporting and meetings.

Progress on the implementation of the annual work plan and expenditure reports against the approved budget should be presented quarterly to supervisors. At the end of each annual cycle, an internal Annual Report and Financial Report will be prepared to assist in drafting the work plan and budget for the following year. The Annual Report will use the format of the work plan, and include outcomes and outputs, achievements, challenges, and cumulative (time-series) information from the monitoring programme. The cumulative information, showing trends over time, will be used to assess ecological conditions.

Some immediate issues, e.g. from new exploration licenses, tourism concessions, innovative entrepreneurial activity to provide tourist services, or natural disasters can be expected to occur without advance notice. That would require an immediate response by staff on the grounds as well as supervisors. The Environmental Management Act (2007) and prior approval of Environmental Management Plans (EMP) needs to be strictly enforced. Where EIAs or EMPs have not been approved, the Permanent Secretary must be informed immediately in writing. The values and attributes for which the Namib Sand Sea shall be nominated need to be specifically addressed during EIAs and factually proven. Broad statements based on a lack of information or absence of research shall not be acceptable as the contractors are required by law to provide factual information that can be used to make informed decisions. Innovative approaches to enhance the experience of visitors should be allowed to limited extent so that the actual impact of such activities may be evaluated. Where feasible, such activities should be restricted to the buffer zone and by applying the precautionary principle to limit the potential impact.

## **1.5 GOVERNANCE**

The Namib Sand Sea and all of its buffer zone are within a legally proclaimed protected conservation area on state land. The Ministry of Environment and Tourism is mandated to manage the property on behalf of the Namibian nation. The management system is therefore subject to public oversight and transparent reporting to democratically elected national representatives, open to public scrutiny and debate. Such transparency assists in developing approaches and policies to address identified problem and emerging issues, often extensively criticized in public. For practical purposes the management system is designed to conform to the rules and regulations that ensures transparency and accountability, e.g. the Public Service Act, the State Finance Act, the National Planning Act, the Labour Act, and other relevant laws that governs how public officials manage state assets. The procedural components of the management system furthermore comply with legal instruments and policies designed specifically for environmental conservation, inter alia the Nature Conservation Ordinance, the Environmental Management Act, the Tourism Act, the Concessions Policy, and the Lands policy.

The buffer zone is also wholly under the management authority of the MET and shall be managed as if part of the identified property, though with the provision that more leeway is granted in that area for intrusive and experimental activities, with specific reference to accommodation facilities for visitors and staff, visitor support infrastructure (e.g. waste disposal, access roads, health and educational facilities, etc.), service infrastructure (shops, filling stations, etc.), adventure and intrusive recreational activities, and other essential components to a well-rounded experience.



The direct management authority for the nominated property is the Ministry of Environment and Tourism. In addition, the Ministry of Fisheries and Marine Resources (MFMR) and other national, regional and local government organizations have particular responsibilities within the context of national laws and their accompanying regulations.

The management plan represents the policies and intentions of the Ministry of Environment and Tourism (MET) as the responsible authority for the law under which the Namib-Naukluft Park has been declared. The integrated mechanism through which all conservation areas and wildlife resources are managed in Namibia are intended to make optimal use of limited manpower and financial assets. It is not envisaged that the nominated property shall be managed in isolation. Although the management system has some disadvantages as the Namib Sand Sea will not be being managed as a distinct entity, it does benefit from the flexibility of having access to a large potential resource base and being managed in accordance to a national system of a wider protected area network. All decisions, actions and activities in the Namib Sand Sea have to adhere to legal requirements and should endeavour to support the implementation of the management plan.

The Management Plan is a tool to implement legislation and regulations, as well as policies, research results, and with other relevant literature on the area. It was designed and structured to be priority focused and action orientated in order 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, budgets, reporting based upon the outputs of activities from previous years. Annual work plans ensures pro-active precautionary planning to deal with emerging issues and identified problems, environmental concerns predicted through monitoring, the results of new research, and priorities that are set in consultation with stakeholders. The plan is therefore "principles" based in sections that allows easy reference and that essentially serve as mini policy statements. Not all eventualities can be planned for, but if the basic principles are established, decisions can be readily made against these principles to meet the objectives and purpose of effective conservation.

## **1.6 MANAGEMENT RESPONSIBILITIES**

Senior staff appointed to run the park, i.e. the Chief Control Warden, Chief Warden and Wardens, and their counterparts in the MFMR, are ultimately responsible for ensuring that the management plan is implemented in effective and efficient ways and that legal regulations and policies are enforced. They are also responsible for ensuring effective day-to-day management as well as for dynamic, responsive and pro-active annual planning as well as contributing to longer-term planning. The rangers and scouts, together with their support staff, are responsible for carrying out the activities that are scheduled in the annual plans and to provide regular feedback and suggestions that would allow pro-active planning and early identification of emergency interventions that may be required.

A network of ranger stations and access control points are in place and are staffed by personnel that has been specifically trained through formal education networks or in-service training modules. This training is primarily based upon local knowledge and expertise in Namibian institutions. The stations and staff are equipped to carry out specific tasks according to identified priorities to meet management goals. Funds to ensure implementation of activities related to the management system and the development and maintenance of adequate infrastructure are primarily sourced from public funds. The allocation of funds is guided by target sums set five years in advance (known locally as the Medium Term Expenditure Framework) to allow forward planning towards strategic objectives with measurable outcomes, with reiterative annual budgeting procedures to implement planned activities within this overall framework. The funding system allows for additional public funding to be made available to meet unanticipated emergency priorities. The funding framework allows for forward planning and on-going consultation to meet identified performance targets. In addition, supplementary funds may be sourced through other mechanisms, e.g. opportunities for donor investment through National Development Planning strategies; development projects and programmes supported by international mechanisms such as the Global Environmental Fund and Namibian Wildlife Trust; and interagency cooperation with other public and non-governmental partners within Namibia. It is the responsibility of staff at all levels to understand the financial system in order to timeously plan their expenditures in order to ensure that the work plans can be implemented and that future needs are identified well in time.

## 1.7 MANAGEMENT PLAN REVIEWS

The Management Plan will be thoroughly reviewed and, where necessary, revised, every five years.

The iconic status of the Namib Sand Sea within the national context, the popularity of its well-known attractions to domestic and international tourists, and the uniqueness of its natural processes, also results in intense interest from other government agencies, public enterprises, non-governmental agencies, private enterprise, conservation focal groups, and neighbouring communities. These stakeholders contribute in varying degrees to the management system of the Namib Sand Sea, though the specific inputs if different stakeholders have never been systematically explained. Untangling and elucidating the relevancy of contributions from various stakeholders to the management of the Namib Sand Sea is one of the challenges that will be clarified and should be formally included in a future review of the management plan.

The Namib Sand Sea Management Plan must be viewed as a valuable and central document by all management and development staff and stakeholders that have activities or development initiatives related to the area. They should be familiar with its contents, and should make use of it to familiarize new staff with the vision, aims, objectives and policies relating to world heritage in general and the Namib Sand Sea in particular.





## PART 2

# MANAGEMENT ACTIVITIES

The management activities is intended to ensure that the values for which the Namib Sand Sea is nominated can be continued to be enjoyed and appreciated by the majority of people. All management staff should appreciate that change is an inevitable attribute of the Namib Sand Sea, whether it is natural in terms of the geomorphological, ecological and evolutionary processes of the area, or whether it is of human origin. Culture, technology, innovation and development are as dynamic as natural processes. Appreciating and understanding the dynamics of such changes is essential for adaptive property management and prerequisites for effective long-term management. Where clear guidance and information is unavailable, the following perspectives should guide on-the-spot decisions:

- **Continuity** – past management efforts and a long history of active research provides a basis of experience that should not be disregarded. Applying a different aspect of the precautionary principle suggest “If it is not broken, don’t try to fix it”.
- **Reactive intervention** – it is inevitable that new issues and threats will emerge that requires attention. Where possible EIAs and research should be used to regulate human activities and clarify how people may affect local diversity and the scenic beauty of the Namib Sand Sea
- **Evolutionary or reiterative protocols** – management decisions will be based on the knowledge, policies, attitudes, and legal instruments at the time. As these change it shall allow new protocols to be adopted and implemented that may either be more permissible or more restrictive. Adaptive management can be expected to generate controversy, though appropriate monitoring, transparency, consultation, and timely distribution of information to stakeholders may mitigate the degree of criticism.
- **Affordability** – it is a reality that resources shall never be adequate for all desired actions and that resources may vary over time. Prioritization and cumulative implementation of activities, based upon long-term objectives, may address the most pressing issues.
- **Implementation** – activities need to take into account the human and physical resources that are in place. Staff at all levels shall be encouraged to be innovative and to use their own initiative to achieve specific outcomes and to experiment with potential solutions, within limits, as are prescribed in the action plan.
- **Knowledge base** – stakeholder expectations are high due to the iconic status of the Namib Sand Sea and the desire from entrepreneurs to benefit from it. Stakeholders do not like ‘NO’. However, management actions should be decided upon available knowledge and within the means available for active intervention. As emerging issues often do not have clear solutions, it is envisaged that the precautionary principle shall most often be invoked until adequate knowledge and resources are available, though limited experimentation with new ideas should be encouraged as part of the process to find solutions.
- **Non- intervention** – the natural geological and ecological processes in the Namib Sand Sea will require little overt intervention, though the variable dominance of these processes in different parts of the property is still poorly understood. Regular monitoring and recording spot observations are valuable tools to clarify the different degrees of natural restoration processes in the system.

## 2.1 LANDSCAPE MANAGEMENT

Open, contiguous landscapes are essential to ecosystem functioning, unrestricted wildlife movement, and maintaining the essential value of outstanding natural beauty. Achieving the desired outcome largely rely on the effective implementation of existing policies and regulations achieved through consultation and communication between authorities with different areas of responsibility.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Re-activate and ensure regular meetings between the Strategic Management Forum established for the NNP	Bi-annual meetings	National planning will include specific reference to the property
2. Identification and engagement with additional strategic partners through information dissemination and targeted planning meetings	MET contributions to sectorial and local planning	Distinct sectorial and local development plans referring to the property
3. Develop and maintain a socio-economic development plan through established forums and communication channels that integrates landscape and biodiversity conservation	Documents and records of meetings that provides input from different stakeholders	Draft plan to be included within five years
4. Develop an appropriate and flexible institutional mechanism for local implementation	Consultative meetings with stakeholders	Established forums for consultation, e.g. Concessionaire Forum
5. Identify priorities and opportunities for new socio-economic initiatives	Mainly stakeholder driven	Suggestions and approval for new initiatives
6. Where necessary, establish formal agreements to facilitate consultation and decision-making between stakeholders	Implementation of Consultative Forum for NNP	Records of Consultative Forum meetings



## 2.2 PARK NEIGHBOURS AND RESIDENT RELATIONS

The Ministry of Environment & Tourism has embraced the exploration of park neighbour and resident relations approaches to landscapes and biodiversity conservation across different land tenure systems with different land owners or custodians. The envisaged outcomes include the establishment of collaborative management committees with neighbours to promote (a) conservation and sustainable natural resource management and (b) socio-economic development. Collaborative management approaches across contiguous landscapes shall promote more effective landscape and biodiversity conservation across a diversity of land uses, and thus enhance sustainable land management to promote economic development, improve livelihoods and combat rural poverty in sustainable ways.

A diversified approach to a shared vision, which is by definition, is inclusive and partnership based, will support the Ministry of Environment and Tourism to implement integrated ecosystem conservation and priority actions and programmes. It shall also help to mitigate and prepare for the impacts of climate change by opening up systems, working collaboratively, and diversifying production systems through collaborative mechanisms. Implementation and testing effective means of collaborative management shall be carried out through the donor-funded NamPlace programme, of which the Sossusvlei area of the Namib Sand Sea is one of the experimental test areas.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. A local Park Neighbour and resident relations Committee will be established in the Sossusvlei area to evaluate mechanisms for functional management between state conservation areas and neighbours	Park Neighbour collaboration committee meetings	Effective Collaborative management Committee by 2016
2. The partnership will develop best practices guidelines for expanding shared management to different areas	Suggestions and consultations on guidelines	Results of shared management approaches
3. Collaborative agreements on shared responsibilities for priority management issues	Park Neighbour collaboration committee meetings records about potential shared responsibilities	Success rate of agreed upon management outputs

## 2.3 ZONATION

Landscapes and ecosystems are optimally managed and used through zonation that accounts for the values and current uses of the area. A zonation map for the Namib Sand Sea has not yet been developed and will therefore be prioritized. Internationally recognized zonation categories shall be applied where feasible.

Zonation is based upon the concept of sensitivity. Documented research knowledge of the biodiversity, geological context, climate, and known ecological responses to various kinds of human intrusion or exploitation, is used to determine sensitivity. It is a mechanism to harmonize future partnerships that may unlock the economic potential of the area within the context of landscape and biodiversity conservation. An agreed zonation map shall minimize potential conflicts between activities and partners.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Prepare draft zonation map for discussion and proposed activities per zone	Zonation map drafts and inputs	Draft zonation map October 2014
2. Distribute proposed zonation map and associated regulations to all stakeholders for consultation	Distribution lists and proposed regulations	Zonation map approved by 2014
3. Distribute and implement approved zonation map	Maps at all relevant conservation offices, ranger stations, entry points, and tourist industry facilities	Zonation of activities
4. Formalize legal instruments through draft regulations for zonation	Draft regulations approved by cabinet	Legal regulations gazetted
5. Inform visitors about zonation and rationale		Visitor survey on attitudes to zonation

## 2.4 TOURISM MANAGEMENT AND DEVELOPMENT

Tourism management is a specialized activity that includes understanding of economic processes, information provision and customer uptake, marketing and promotional strategies, evaluation of visitor behaviour and desires, coordination between different service providers at national and regional level, etc. At the local level, uncontrolled tourism industry growth and the demand for exclusive access to undisturbed areas is potentially the biggest overall threat to the character, beauty, diversity and integrity of the Namib Sand Sea. Tourism growth has in the past caused other popular world heritage sites to be put on the World Heritage in Danger List.

In the Namib Sand Sea, the sheer size of popular destinations such as Sossusvlei, combined with good planning, zonation, management and collaboration between the conservation and tourism sectors, may still allow visitors to have a high quality eco-friendly experience that includes a sense of place, isolation and wilderness despite large numbers of visitors. However, that will not be the case if the demands and guidance of tourist operators and entrepreneurs are blindly accepted. The large number of visitors to popular destinations such as Sossusvlei is already causing problems by the amount of waste that has to be disposed of, while the growth curve of visitors indicate that it will continue to rise. Widely distributed tourism facilities exacerbate the problem with waste, while the rising cost of accommodation is effectively excluding Namibians from areas such as Sossusvlei. Tourism development planning would also promote benefit sharing, income generation and investment



opportunities for all Namibians through mechanisms such as the MET’s Concessions and Tourism policies, while greater focus on the values of the property may be achieved by introducing a joint branding scheme by various heritage and ecological authorities.

Practical activities by conservation personnel envisage managing those aspects that can be controlled by the wardens until a more comprehensive tourism development plan for the Namib Sand Sea has been developed. These activities shall include tourism impact monitoring in order to estimate carrying capacities, affordable access for Namibians, refurbishing an Information Centre at Sesriem, providing relevant information materials to improve visitor appreciation, improving waste disposal procedures, better regulation of aerial flying heights and introducing no-flying zones, and improved training and registration of guides.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Initiate the development of a detailed Tourism Development Plan	TORs developed and Responsible officer / Consultant appointed	Tourism Development Plan
2. Effective reporting of monthly and annual tourism numbers	Monthly tourism entry reports	Improved analysis of Namib Sand Sea as a tourism destination
3. Design and open Sesriem Information Centre and point location information boards	Operational information centres	Better knowledge about special qualities of the Namib Sand Sea
4. Continue to monitor and replace or improve signage and visitor information	Ad hoc through incident book system	Quarterly and annual reports on condition of signage and information boards
5. Monitor condition and tourism pressure at point locations through technology, e.g. monitoring cameras	Install and monitor trail cameras	Annual analysis of tourism impact and testing mitigation measures
6. Test and implement waste disposal mechanisms that would allow for a doubling of current visitor numbers	Evaluation report of available systems and capital project recommendation	Improved management of visitor waste
7. Promote the establishment of low-cost tourism accommodation to restrict the burgeoning traffic and waste disposal issues to specific point locations	Evaluation report and recommendation to cabinet	Improved accessibility to Namibians as well as improved waste management
8. Establish aerial tourism guidelines in consultation with operators and Civil Aviation	Guidelines by Civil Aviation	Improved sense of place and reduced wildlife disturbance
9. Develop and implement a Namib Tourism Charter to improve co-management between officials and operators	Tourism Charter Drafts and workshop records	Sharing of responsibilities and improved relationships in sector
10. Introduce joint branding and advertising of appropriate activities by the NTB, NHC, WHC and eco-awards Namibia	Guidelines on procedures and requirements for joint awards	Value-sensitive tourism activities and development
11. Develop Namib Sand Sea guide system and syllabus in consultation with NATH and the Gobabeb Centre	Syllabus by NATH and Gobabeb Centre	Training Course and guide registration implemented

## 2.5 PROSPECTING AND MINING

No prospecting and mining activities will be conducted in the Namib Sand Sea World Heritage Site.

## 2.6 TOPNAAR INDIGENOUS COMMUNITY

The indigenous Topnaar or  $\ne$ Aonin Nama community live along the Kuiseb River in about 18 farming settlements from Rooibank to Homeb under their traditional leader Chief Seth Kooitjie. Most of the permanent residents are pensioners and young children with youth and working age community members attending school or working in the coastal towns. The number of homesteads and settlements and total population along the river vary according to opportunities for income, environmental conditions, and other socio-economic factors.

The Topnaar community practice subsistence farming by raising livestock and limited garden horticulture along specific stretches of the Kuiseb River resulting in relatively intense utilization of vegetation and plant natural resources in the river and immediate adjacent areas. Livestock grazing are mainly restricted to the riverbed and riverbanks as the sand dunes to the south and the gravel plains to the north do not offer any significant amounts of fodder, though donkeys and horses may range several kilometres away from the river.

The primary source of fodder for livestock is pods and leaves from trees such as *Faidherbia albida* (Ana tree), *Acacia erioloba* (Camel thorn) and *Euclea undulata* (False Ebony) in the riverine forest along the Kuiseb. The Topnaar farmers experience problems when flood events wash the pods away and prevent animals from browsing in the river. Gardens are usually small except where approved development projects attempts more intensive production (e.g. at Homeb). The Topnaar also had a traditional cultural practice of seasonal harvesting of !Nara melons (*Acanthosicyos horridus*) where specific !nara plants or fields were traditionally owned by individual families that ensured sustainable harvesting. This has recently transformed into an open access system where everyone is in competition for the !nara fruits due to commercialization of the resource, a loss in traditional cultural values related to !nara and the wage and social benefit dependence of community members.

There are also no reliable statistics on the numbers of livestock belonging to the Topnaar, with the most recent estimate suggesting around 200 cattle, 2,500 goats, 120 donkeys and 50 sheep. Livestock is primarily kept for cultural purposes rather than to maximize production for marketing, thus livestock is only sold when there is an immediate need for money. The small stock is of indigenous breeds and large stock is commonly a mix of European breeds and indigenous Sanga cattle. Donkeys are kept for transport purposes. Water for the livestock and settlements were traditionally obtained from hand dug wells in Kuiseb riverbed, but more recently these have been replaced by boreholes and taps on the pipeline. These are provided by government and water users are expected to pay for the cost of access to water where NamWater provides water from its pipelines, or to maintain boreholes established by the Ministry of Agriculture, Water and Forestry through local Water Point Committees.

Community relations along the Kuiseb are a sensitive issue that is continuously evolving to balance conservation requirements with community aspirations. It also requires close co-operation with various other Ministries responsible for different aspects related to the community that includes agriculture, education, health and local government. Various agreements have been negotiated between the Ministry of Environment and the traditional authority such as access to tourism opportunities through the allocation of concessions, an annual wildlife utilization quota and accepting the need for the Topnaar community to continue their traditional subsistence and lifestyle practices within the context of national development. The Kuiseb Basin Management Committee (KBMC) shall establish an Agricultural Working Group consisting of members with appropriate expertise that will identify which knowledge and strategies are needed to manage those issues. Formal mechanisms for collaboration with other ministries still need to be developed to meet various aspects of development relating to the Topnaar community.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Establish a livestock census and monitoring system in collaboration with the MAWF and KBMC and local Water Point Committees	Approved livestock census and monitoring system	Accurate annual livestock estimates per settlement
2. Develop an inter-Ministerial Topnaar development forum through consultation with the traditional leadership	Consult Topnaar Community leadership and MRLGHRD	Improved community development coordination
3. Assist Topnaar Tourism Concession endeavour as appropriate	Concessions Unit reports	Opportunities for Topnaar to participate in tourism industry
4. Facilitate annual wildlife utilization quota to Topnaar Traditional Authority for distribution of wildlife products to community members	MoF exemptions of wildlife assets and community records of game product distribution	Wildlife resource benefits to community
5. Documenting and re- invigoration of traditional resource and cultural landscape management systems in consultation with Traditional Authority and Directorate of National Heritage	Traditional Authority resource management system	Potential inclusion of cultural values in World Heritage extension





## 2.7 LOCAL AND REGIONAL DEVELOPMENT

The large dunes and continuously shifting sands of the dune sea poses a major challenge to infrastructure and economic development. However, the municipal area of Walvis Bay with its port and an approximate population of 70,000 inhabitants are immediately to the north of the area, the much smaller Lüderitz port to the south, and the high growth tourism area along the eastern boundary. Walvis Bay is of specific significance as the age structure of its population suggests substantial migration into Walvis Bay due to socioeconomic development drivers. It is Namibia's primary port and a major gateway for landlocked countries in Southern Africa such as Botswana, Zimbabwe and Zambia through the Walvis Bay Corridor. It is actively promoted as a Hub Port for Southern Africa as it is the only major harbour between Angola and South Africa and has excellent infrastructure in terms of tarred roads, railways, airports, communications and electricity.

Strategic initiatives such as the Walvis Bay Export Processing Zone (EPZ), dry port allocations to neighbouring countries, the deepening and expansion of the port facilities, etc. indicate the relative importance of Walvis Bay. Apart from its deep sea port, Walvis Bay is also the centre of Namibia's fishing industry, has a growing tourism industry, a growing manufacturing industry and a variety of relatively small-scale mining concerns such as salt mining, guano harvesting, dimension stone, etc.

Revenue from fisheries is the second most important foreign exchange earner in Namibia after mining with annual fish catches averaging around 572,460 tonnes and employing around 13,400 people annually. Infrastructure for the fishing industry is shared between Lüderitz and Walvis Bay, though Lüderitz primarily caters for rock lobster whereas Walvis Bay has on-shore processing factories. Furthermore, most of the future diamond mining industry of Namibia, which is the largest foreign exchange earner for the country, will be located offshore and serviced through Lüderitz. Most of the imports and exports of other mines in Namibia flows through Walvis Bay. Local salt and dimension stone mining areas at Walvis Bay are relatively small but major local industries. However, In addition, around 30 tourism establishments are located in Walvis Bay that are mainly focused on Walvis Bay lagoon, Sandwich Harbour, adventure tourism in the Kuiseb Delta dunes and Walvis Bay-Swakopmund dune corridor and other local attractions.

The overview shows that Walvis Bay will remain an important economic development area. Accelerated economic development will introduce a variety of environmental risks and an increased demand for water. The Walvis Bay municipality has an environmental officer and environmental management plan to guide development, though the effects of development may pose new challenges to conservation. For example, many of the cultural sites close to Walvis Bay are threatened by uncontrolled tourism and recreational use of the dune fields, while expansion of commercial activities may destroy specific sites. Though larger developments in Namibia are generally guided by questions regarding sustainability and the precautionary principle, the immediate and cumulative impact of smaller local development are often not taken into account.

Special attention should therefore be given to all kinds of development initiatives within the Namib Sand Sea and its buffer zone to ensure the integrity of the values and attributes of the world heritage site is respected. Economic exploitation by entrepreneurs usually focus on short-term economic returns at point locations and interpret ecosystem and landscape conservation the same time and space manner, often reflected in the EIAs their consultants may carry out. Clarity on the values, ecological processes, case studies of sustainable practices, improved public knowledge and stringent application of the precautionary principle may assist towards a more sustainable development culture. All development should be carried out in an environmentally sensitive manner according to best available practices as required by national law, international standards and sound environmental management principles and ethics. However, threats and impacts from inappropriate development often appear much faster than the ability of official regulatory mechanisms to respond, thus oversight by management staff is critical to provide early information on perceived threats, monitoring impacts through the event book system, and to ensure that environmental sensitivity principles are adhered to.

The active collaboration and involvement of developers (other ministries and parastatals, entrepreneurs, local communities, business operators and visitors) should be encouraged to be innovative in order to create the lightest possible development "footprint" and to ensure ecosystem and landscape integrity (see 2.1 Landscape

Management above). That would require developing a list of priority issues related to development (e.g. road development, power line and pipeline routes, ICT, water, waste disposal, educational and health centres, tourism activities, disaster planning, etc.), identification of the essential stakeholders, proper presentation of the MET on various planning committees and the systematic development of specific guidelines or policies that are communicated and implemented by stakeholders. Those issues should be incorporated into a more comprehensive development approach by evolving appropriate procedures for environmental impact assessments (EIAs) and strategic assessments to support long-term development.

Actions	Monitoring	Output
1. Ensure all conservation staff are familiar with legal, best practice and oversight procedures on EIAs, EMPs and strategic assessments	Refresher EIA courses for management staff	Improved monitoring and compliance with EIA regulations
2. Record of any construction or development activity, management interventions, and observed environmental impact	Incident books and quarterly reports	Annual analysis of local development issues
3. Identify priority local development issues and develop specific guidelines and policies in consultation with stakeholders	Prioritised list of development issues	Best practice guidelines for small development issues
4. Implement specific procedures for EIAs appropriate to World Heritage sites	Environmental Management Act regulations pertaining to World Heritage	EIA practitioner attention to World Heritage site values and attributes



## 2.8 ECOSYSTEM CONSERVATION

The short and long-term variability common to hyper-arid deserts worldwide require large areas with open landscapes to facilitate movement. The comprehensive diversity of habitats, communities of plants and animals and keystone species ensures ecosystem functioning and associated evolutionary processes. Management intervention should therefore be minimal with a largely hands-off approach to active intervention, especially as “patchiness” and variability in ecosystem productivity shall result in variable carrying capacity over time that may be mistakenly considered to be the result of overutilization. Active management interventions should aim to ensure that specific components of the system such as areas close to water points are not over utilized, taking into account the ability of desert organisms to extend their ranges considerably in response to prevailing conditions. On-going monitoring of the ecology through estimates of the diversity and abundance of plants and animals through scheduled counts as well as the incident-book system is an essential component to inform annual planning. Sustained long-term monitoring of key indicators is as important as it reflects the effectiveness of the conservation effort and will guide reviews of management plans. Within the desert ecosystem, long-term monitoring is of additional significance as it also advise which short-term activities may be fruitless e.g. provision of emergency supplementary feed or re-introduction of species.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Provide a baseline ecosystem map to all relevant conservation offices and ranger stations as well as tourist information centres	Use of ecosystem terminology in incident books and quarterly reports	Improved understanding of ecosystem processes and the Namib Sand Sea environment
2. Progressive improvement of the ecosystem map by conservation staff through georeferencing key habitats, breeding areas and refuges, particularly in zones where utilization is allowed	Annual review of state of the environment	Regular updates of the ecosystem map to reflect improved knowledge
3. Record of natural disasters, management interventions, and environmental response	Incident books and quarterly reports	Site specific cumulative knowledge of the area
4. Installation of notice boards at ranger stations that reflects monitoring results	Quarterly and annual reports on monitoring results	Readily available information indicating medium term environmental trends
5. Ensure that key data from monitoring are compiled, interpreted and disseminated to inform adaptive management	Annual State of the Environment report	Understanding and appreciation of the purpose of monitoring



## 2.9 SITES OF SPECIAL CONSERVATION AND SCIENTIFIC INTEREST

The large expanses of relatively homogenous habitats comprising the Namib Sand Sea ecosystems are punctuated by sites that are of special significance to the ecological processes and qualities of the Namib Sand Sea. Considerable information about some of these sites are available in the scientific literature and research reports, but have not yet been compiled into a readily accessible information system. Examples include:

- **Outstanding Ecologically important sites** contribute significantly to the overall biodiversity and primary productivity in the area, consisting of distinct habitats such as concentrations of *Salvadora persica*, *!nara* copses, *Acacia erioloba* woodlands, natural springs, the reed beds at Sandwich Harbour, inselbergs, isolated rocky outcrops in the interior and along the coast, isolated *Acacia erioloba* trees and communal weaver nests.
- **Breeding sites or areas** where that maintains colonies of specific species that are of exceptional conservation importance such as vulture and raptor breeding sites, regular stopovers of migratory birds, Damara tern nesting areas, cormorant and penguin nesting areas, regularly used hyena den areas, etc.
- **Aesthetic sites that are** of exceptional beauty and embodies the special attributes for which the Namib sand Sea is nominated such as specific viewpoints and their vistas, e.g. Dune 45, Dead Vlei, Sossusvlei, inselbergs.
- **Exceptional outliers** that represents isolated patches of habitat which are unusual and rare in Namib Sand Sea and often inhabited by relict populations of species such as inselbergs surrounded by dunes, natural springs, isolated rocky outcrops near the coast, lichen fields.
- **Scientific Information sites** that allows reconstruction of the geological, ecological and cultural past of the area such as sediment remains from floods, pan edges, archaeological scatters and sites, fossil sites
- **Historical sites** that reflects past human endeavour where abandoned human infrastructure or constructs are found such as the Eduard Bohlen wreck, the Charlottenfelder, Fischersbrunn, Grillenberger and Holsatia abandoned mining and exploration camps as well as the industrial and transport debris scattered all over the abandoned mining areas.
- **Generically protected occurrences** that are legally protected regardless of where they occur such as any fossils, meteorites, archaeological artefacts and deposits, shipwrecks, rock art, etc.

All such sites are usually point locations that are easily disturbed or destroyed through ill-guided and inadvertent 'tourism' or overutilization as popular destinations. Adequate protection and management require exact locations that are not available at present and that would require considerable effort if developed through data mining. Such sites require better protection and focussed monitoring, but which first require proper recording of sites through georeferenced information and a photographic record. In general, most of these sites need to be closely monitored and in many cases excluded from close approach by any tourists or other users, except by recognized scientists with appropriate permits and conservation staff.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Progressively develop a georeferenced database of SSCSIs	Incident books and research reports, Gobabeb Centre database	Special maps showing categories of Sites of Special Conservation or Scientific Interest
2. Prioritize the evaluation and monitoring of the most popular SSCSIs through baseline surveys	State of Conservation reports on most important sites	Focussed monitoring of tourism exploitation of sites
3. Require research scientists to submit georeferenced site reports, including extracts from past research	Catalogues of sites georeferenced by scientists	Progressive data mining for SSCSIs
4. Application of the Incident Book system and participation by concession holders to improve and expand georeferenced SSCSI records	Incident books and concessionaire reports	Progressive data recording of SSCSIs
5. Ensure that georeferenced site information and classification is readily available for inclusion into GIS systems	Availability of GIS shape files	Greater awareness of concentrations and occurrences of sensitive sites
6. Develop and distribute public information about each category of site	Public information products such as posters, pamphlets and information boards	Public awareness of importance and sensitivity of particular sites and areas



## 2.10 WILDLIFE MANAGEMENT

The rich diversity of indigenous wildlife is a key attraction for visitors and enhances the beauty and starkness of the landscape, e.g. the iconic photographs of an oryx or gemsbok posing in front of a massive dune or zebra in the gramadulla landscapes. However, the variability of the environment from unpredictable rainfall has a considerable effect on the condition and numbers of wildlife. Game population numbers should be allowed to fluctuate naturally through migration and natural mortality adapting to appropriate biomass for particular species and for the total wildlife population under different rainfall and range conditions. Minor fluctuations in numbers and condition of species should be explained to visitors through information centres. Poor condition and mass mortalities of flagship species during drought conditions are natural phenomena, but undue criticism and concern by visitors about starving wildlife during droughts in high traffic areas such as the Sossusvlei corridor may occasionally require management intervention to reduce population numbers. Mass mortalities during droughts may be ameliorated to some degree by establishing open systems, particularly for west-east migration.

However, population numbers of a particular species will not be allowed to adversely affect the long-term population stability of other species. Active measures for consumptive utilization and to reduce population numbers, whether game capture or offtake to reduce populations or fulfil directives for community quotas, should be carried out in designated areas away from well-frequented tourist areas. Such management measures shall be informed through monitoring of population trends (age and sex structures and body condition) and distribution of populations related to rainfall and grazing conditions. An adaptive management approach of minimum intervention, managing water availability, and sustainable utilization is already practiced and will continue. \Where practically feasible, some species that were formally resident in the area will be re-introduced but not species that were likely to be relicts, migrants or vagrants.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Improve integration of monitoring of rainfall, veld condition and wildlife observations (numbers, age & sex classes and condition) into incident book system	Standardized monitoring record format	Annual wildlife status reports
2. Annual refresher training on Namib Sand Sea ecosystem functioning	Regular courses attended by NNP and senior management staff at Gobabeb Centre	Informed decision makers and conservation staff
3. Improving policies and procedures on consumptive utilization and emergency offtake	Wildlife utilization policy	Transparent procedures for wildlife population management
4. Development of a checklist of actions and likely ecological consequences as a practical 'legacy' conservation decision-making tool	List of possible actions and likely consequences of management action	'Legacy' management reference and decision-making tool
5. Focused monitoring of flagship species at point locations	Regular point location monitoring of wildlife	Point location monitoring data to compare to aerial census information
6. Data management and interpretation of monitoring and intervention results	Database on wildlife population numbers from aerial census, point location monitoring and incident books	Long-term wildlife population trend and fluctuation information



## 2.11 ALIEN (EXOTIC) SPECIES

The absence of viable populations of alien species within the Namib Sand Sea is an indicator of the pristine condition of the ecological system. Non-invasive alien species are justifiable where no viable indigenous alternative are available for the physical, economic and spiritual well-being of residents and visitors to the property, but should not be introduced simply to satisfy the whims and expectations of uninformed entrepreneurs, tourism operators or visitors (e.g. palm trees, camels, exotic game etc. are inappropriate). Clear, non-discriminatory guidelines on pets and domestic animals for resident staff should be distributed and applied to conservation management staff as well as those of SOE and private tourism establishments. Feral populations of alien species shall be monitored and eradicated where feasible before they become permanent populations or before they affect the integrity of the ecosystem or population dynamics of some species.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Maintain the programme to monitor and opportunistically eradicate undesirable and feral populations of alien species	Incident books and activity reports	Preventative management of alien organisms
2. Review and distribute guidelines on pets, garden plants, and domestic animal to staff, concessionaires, entrepreneurs and tourism operators	Clear guidelines on pets, garden plants and domestic animals at all residences	Clear understanding of reasons for restrictions
3. Develop and distribute information products on the threats posed by alien invasives, including inadvertent 'hitchhikers', to inform visitors and staff	Awareness products on alien invasives in desert environments	Public cooperation in reducing risk

## 2.12 FENCES

Fences are currently largely absent from the Namib Sand Sea. The management plan is based on open systems for the largest possible continuous landscapes, thus new fences shall not be approved except where they have strategic value (e.g. short-term holding areas or enclosures for research monitoring or wildlife management). The eastern boundary of the buffer zone is demarcated by a fence that was originally constructed to reduce friction with neighbours to the conservation area. It defined the boundary, prevented valuable free-ranging animals from straying and restricted potentially destructive wildlife to the park. The historic reasons for the fence was largely met and has since disappeared, thus the fence has become quite permeable. It recently became a contentious issue with some neighbours that would like to have the fence removed. It is, however, a valuable state asset and thus any intentional breaching or removal of the fence should follow procedures for the disposal of state assets. Existing fences shall not be maintained except where neighbouring land use is a threat or where secure fencing is essential for good neighbourliness.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Develop clear guidelines on the requirements for approval of fences to guide planning by concessionaires, tourism operators and staff	Guidelines on fences in the Namib Sand Sea	Few fences and unrestricted wildlife movement
1. Ensure signage for areas with frequent vehicle traffic on the potential risks posed by free-ranging wildlife	Traffic accident register, appropriate signage	Vehicle operator awareness
2. Patrol and maintain fences required for wildlife management as needed	Staff activity reports	Appropriate fence maintenance
3. Evaluate need for intentional breaching or removal of selected parts of the eastern boundary fence	Report on need and condition of boundary fence	Addressing neighbour concerns
4. Where appropriate, initiate procedures for breaching or removal of fences in terms of state asset control procedures	Formal approvals for fence removal	Increased permeability at choke points

### **2.13 WATER POINT MANAGEMENT**

The Namib Sand Sea is virtually devoid of naturally occurring perennial water. The few springs in remote areas are outside the range of most large mammals, thus are especially sensitive to disturbance and often surrounded by largely unresearched archaeological sites. Where temporary pools develop after floods or thunderstorms, open water is subject to high evaporation rates, high demand by wildlife and rapid deterioration of water quality. Any artificial water points shall be subjected to the same pressures as well as a range of long-term ecological effects at such locations. Inadvertent water point establishment through ecotourism development with water points to attract game or poorly planned waste water facilities also need to be taken into account.

Ecological consequences when establishing water points or waste water facilities may cover a range of aspects. The effect of trampling and habitat degradation in the vicinity of water points is well known. Water points are also renowned for their importance to predators, thus desert species are particularly sensitive to movement at water points. The ecological costs for an individual travelling to water in the desert are high, thus the effect of disturbance should not be underestimated. The physiological and behavioural adaptations that allow desert species to survive in the absence of free water may deteriorate through regular access to water, leading to smaller ranges and increased mortality during periods of drought. Costs to an individual of disturbing species at water points are high. Water point development therefore needs to be planned for strategic management of wildlife populations. Planning should not only include aspects of management and maintenance, but also the need to monitor its ecological consequences.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Maintain a map and inventory of all natural and artificial water points with related attributes such as yield, depth and surface area (including lasting temporary ponds and sumps)	Water resource map and database at all ranger stations	Continued water resource management
2. Continued maintenance and cleaning of water points, including monitoring of condition and quality of resources around water points	Activity reports, incident book system	Continued water resource management
3. Develop guidelines on the selection, establishment and ecological monitoring of new water points and waste water disposal	Guidelines on water point establishment and waste water planning	Clear guidelines on water supply management
4. Develop information materials on the adaptations of desert organisms to water scarcity and the effect of excess water	Information posters, visitor behaviour guidelines	Improved sensitivity to the importance of water

## 2.14 COASTAL MANAGEMENT

The intertidal coastal zone, its biota and the species that transcend the marine/terrestrial interface are managed jointly by MET and MFMR staff under agreed co-management principles and protocols that promote synergy, efficiency and elevated conservation management, monitoring and protection of habitats, processes and species. This mutually supportive working environment is based on regular consultations between MET and MFMR management staff. This allows for the identification of key areas, issues and species that require joint monitoring and management. It also developed 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.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Continued liaison and discussions between MET and MFMR regional managers	Collaborative management agreements	Effective costal management
2. Continued collaboration, communication and reporting for identified priority areas and species at the operational level	Activity reports, incident book system	Effective costal management
3. Continued improvement of co-management approaches to ecosystem management and monitoring	Monitoring results	Effective costal management



## 2.15 ROADS

The Namib Sand Sea itself has few roads though it is surrounded by a well-established road network. The most important road is the tarred road leading to Sossusvlei. Maintaining the existing road network is an important aspect of effective tourism management. A number of well-established tracks used by management and research staff link important points within the area. Concession holders are restricted to defined tracks where feasible, and elsewhere to travel corridors where mobile dunes will rapidly cover tracks. This road and track network is essential for management (including monitoring and research) and tourism in such a large area. The track network is being monitored and closed when necessary to allow natural rehabilitation. New roads are rarely developed and only permitted to ease vehicle traffic and visitor pressures, in which case the roadway and likely borrow pits are subject to EIAs.

No off-road driving are allowed except in areas clearly designated and zoned for this purpose, e.g. concession routes, or when essential for management purposes. Off-road driving along concession routes are under the supervision and guidance of tour guides experienced in desert driving, but that will benefit from improved knowledge of the ecosystem in which they operate. It is currently presumed that off-road driving on mobile sand dune belts has little long-term impact, though some reports indicate that especially scarring of dune crests may persist for long periods and may even result in blow-outs and a change in dune structure. More information is required on those aspects, including the most appropriate vehicle types and tyre sizes.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Maintain an accurate GIS-based map of roads and tracks, including decommissioned and rehabilitated tracks	Each ranger/warden station and suitable park GPS should have track network map	Maintaining knowledge about suitable routes
2. Any new roads and borrow pits shall be subject to EIA that shall also consider the values for the world heritage nomination	Chief warden to maintain file of EIA recommendations	Maintaining world heritage values
3. Specific planning will be carried out to consider refurbishing existing roads, especially to ameliorate persisting dust in the Sesriem area, in consultation with MWTC and NPC	Road development plan and schedule with Chief Control Warden	Improving road access and ameliorating negative impact
4. Develop a monitoring plan for tourist concession routes to determine the effect of off-road vehicles on dune morphology	Georeferenced incident book records, annual monitoring results	Monitoring report produced by 2017
5. Develop guidelines on road and track signage that will contribute and explain the attributes for world heritage nomination	Guidelines on appropriate sign technology, size and positioning	Improved visitor guidance and experience
6. Develop training course, testing and registration system for professional off-road drivers and guides along concession routes	Development of driver guidelines and testing system, course registrations	All concession holders to have registered drivers by 2014.

## 2.16 RESTORATION

One aspect of adaptive management is to ensure that landscapes and ecological conditions may return to their natural condition after disasters or inappropriate human activity. The natural processes in many parts of the desert environment are very slow, which may seem to advocate intervention. In some cases, e.g. relatively recent and limited point impacts, immediate action may be appropriate. In some other cases, e.g. perceived 'unnecessary' evidence of human occupation, abandoned roads, or large exploited areas, intentional rehabilitation may be inadvisable or even illegal.

Some despoiled areas and human debris have become tourist attractions, while well-intentioned recent 'restoration' activities have destroyed important historical information through ignorance. Evidence at various places also indicates that natural restoration processes in the Namib varies from rapid to slow, depending primarily on differences in the stability and type of substrate, degree of geomorphological activity and weather conditions. Site or area rehabilitation is not an aspect that should be undertaken as a matter of course but need to be carefully evaluated based on technical considerations, restoration ecology, manpower and time implications, cost and impact on the values of the property. Any rehabilitation project should also include a monitoring and evaluation component to ensure better understanding of restoration ecology in the Namib.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Develop georeferenced database of rehabilitated sites, abandoned areas exposed to natural processes, and restoration techniques	Incident book records and activity reports	Record of rehabilitation activities
2. Develop and implement guidelines for spot rehabilitation	Incident book records and activity reports	Record of rehabilitation activities
3. Develop procedures for planning, consulting, evaluation and approval of site restoration projects (similar to EIA procedures)	Restoration protocols	Oversight on restoration proposals
4. Identify priorities of man-made structures detracting from the integrity of the area that may require restoration	Classification and list of restoration priorities	Planned restoration

## 2.17 LAW ENFORCEMENT

Unlawful activities such as illegal use of wildlife and other natural resources as well as visitor transgressions of regulations intended to minimize impacts on the ecosystems, are currently rare. The safety and security of visitors and staff is a priority to tourism establishments in the area, which contributes to the low incidence of illegal activities. Effective law enforcement patrols and surveillance by conservation staff further contributes to maintaining a zero tolerance approach to illegal acts. The focus of a programme of law enforcement is to maintain compliance with regulations and laws, primarily through forward planning of activities, monitoring for early identification of emerging problems, information distribution, and effective collaboration with other law enforcement agencies such as MFMR staff, the Namibian Police and Ministry of Justice officials. The established radio network allows rapid response to any kind of crises by management staff, while the special training they receive in law enforcement procedures ensures effective prosecution of transgressors. Maintaining and improving the effectiveness of the current system allows staff to focus on other management priorities

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Maintaining an effective communication systems	Annual inspections and reports on communication system	Rapid communication
2. Improve reporting system on law enforcement activities and observations to include nil results	Incident book system and transgression statistics	Focused law enforcement activities
3. Exploit the "rumour mill" to escalate the severity and degree of law enforcement activities	Transgression statistics	Improved compliance with regulations
4. Develop incentives to improve cooperation with other law enforcement agencies and other parks to increase law enforcement monitoring	Operational plan and number of exchange visits by peace officers	Improved compliance with regulations
5. Regular evaluation of law enforcement courses and licensing of honorary rangers as peace officers	Annual number of courses and attendance statistics	Improved enforcement and monitoring capacity



## 2.18 HONORARY NATURE CONSERVATORS

Current and future legislation makes provision for the appointment of Honorary Nature Conservators as sufficient staff to carry out conservation-orientated work, which is the primary purpose of appointing highly trained staff, while also enforcing regulations over a large area, will always be problematic. Honorary Nature Conservators to complement the execution of the management plan in a range of areas such as environmental monitoring, monitoring recreational and tourism activities, resource use, promotion and education, community business involvement and development guidance, neighbour relations, etc. Honorary Nature Conservators will also allow improved collaboration between peace officers with different mandates. For example fisheries inspectors, forestry inspectors and heritage officers are peace officers with training and specific national mandates to enforce regulations in the area. Reciprocal honorary appointments after appropriate training are logical, e.g. suitably qualified MET personnel may be empowered to enforce fisheries legislation, and suitably qualified MFMR personnel to enforce environmental, park and conservation legislation. In addition, dedicated private individuals or officials with specialized skills may supplement the human resources that are available.

The criteria for the selection of Honorary Nature Conservators should be transparent and they must receive appropriate training before they can be appointed such as in park regulations, law enforcement procedures, the incident book system, monitoring requirements and standards, etc.. They should be appointed for three years with specified areas of competence, renewable for further 3-years terms depending on their performance and commitment. The powers and privileges of Honorary Nature Conservators in different areas should also be clear as well as procedures for reporting and feedback, including the appointment of a specific conservation officer as supervisor. It should be taken into account that volunteers and honorary staff have to be managed if they are to be utilized effectively:

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Develop fields of collaboration and terms of reference for reciprocal honorary appointments of peace officers with complementary legal mandates	Interministerial agreements	Improved law enforcement capacity
2. Develop guidelines for the identification and selection of additional Honorary Nature Conservators, a training syllabus, and reporting and oversight procedures.	Honorary Nature Conservators operational guidelines	Transparent Honorary Nature Conservators appointment system
3. Select, train, and appoint Honorary Nature Conservators	Honorary Nature Conservators register	Improved human resource base

## 2.19 MONITORING

Monitoring of a limited number of carefully selected indicators shall inform judicious adaptive management, allow continuous and timely assessment of emergent or actual threats, reflect the state of the environment and improve information products for visitors. On-going observations for long-term datasets are especially important in arid environments where short-term fluctuations in vegetation primary productivity and wildlife distribution and population sizes may be extreme under rare wetter conditions. As management decisions need to be based on recurrent ecological baselines the long-term datasets provide information on the environmental 'norm'. The 'boom and bust' noise of inherent variability in arid ecology may be misleading and incur pointless expense and fruitless work if adaptive management attempts to address perceived natural disasters. Long-term datasets allow for the identification of real disasters and the evaluation of the potential success of possible interventions. These long-term indicators, as well as specific indicators discussed before, are listed in Table 2.19.1 below.

<b>INDICATOR</b>	<b>PERIODICITY</b>	<b>RESPONSIBLE</b>	<b>LOCATION OF RECORDS</b>
<b>MANAGEMENT INDICATORS</b>			
Planning, management and monitoring framework updated	5 year intervals	MET, Control Warden	Office: Control Warden,
Detailed tourism plan developed	5 year intervals	MET, Director of Parks; Director of NRM	Office: Director of Parks, Control Warden, Concession Unit, Gobabeb
Strategic Forum annual meetings (MET, Gobabeb, neighbours)	Annual review	Control Warden	Office: Control Warden, Gobabeb
Consultative Forum of interested parties for on-going operational assistance, guidance, support and feedback	Annual review, quarterly meetings	Control Warden	Office: Control Warden, Gobabeb
Honorary Nature Conservators programme	Annual review	Control Warden	Office: Control Warden, Gobabeb
Community interest group activities, e.g. birds of prey	Annual review	Individual interest groups (MET review)	Office: Control Warden, Gobabeb
<b>HUMAN USE INDICATORS</b>			
Daily detailed tourism records (numbers, types of activities)	Monthly submission; annual review	Sesriem gate personnel, Chief Warden	Office: Chief Warden
On-going detailed concession allocations and use (numbers, types of activities)	Annual review	Chief Warden	Office: Chief Warden, Concession Unit, Gobabeb
Water use and management (tourism & wildlife)	Annual review	Chief Warden	Office: Chief Warden, Gobabeb
Records of research activities and results	Annual review	Chief Warden; DNRM; compiled by Gobabeb	Office: Chief Warden, DNRM, Gobabeb
<b>GEOGRAPHY INDICATORS</b>			
Salt pans/flats; Endorrheic pans (sensitivity 5 areas)	Annually	Chief Warden; Gobabeb	Office: Chief Warden, Gobabeb
Ephemeral rivers, inselbergs, gravel plains, rocky shore (sensitivity 4 areas)	Two year intervals	Chief Warden, Gobabeb	Office: Chief Warden, Gobabeb
Sand sea, Sandwich Harbour lagoon, eastern hills (sensitivity 3 areas)	Five year intervals	Chief Warden, Gobabeb	Office: Chief Warden, Gobabeb
Landscape aesthetics	Two year intervals	Chief Warden, Gobabeb	Office: Chief Warden, Gobabeb
Archaeological and paleontological sites	Two year intervals	Chief Warden, Gobabeb	Office: Chief Warden, Gobabeb
Daily weather and climate; Sesriem, Coast (MFMR), Gobabeb	Daily; monthly submissions; annual review	Recordings: Sesriem, MFMR, Gobabeb; Review: Chief Warden & Gobabeb	Sesriem, Gobabeb & Office Chief Warden
Hydrology and flooding as occur	Intermittent observations	Sesriem, Gobabeb; Review: Chief Warden & Gobabeb	Sesriem, Gobabeb & Office Chief Warden
<b>ECOLOGY INDICATORS</b>			
Annual and perennial vegetation population dynamics	Annually	DNRM, Gobabeb with Tertiary Institutions for remote sensing	DNRM, Gobabeb & Office Chief Warden
Invertebrate population dynamics, on-going measurements	Annual review	DNRM, Gobabeb	DNRM, Gobabeb & Office Chief Warden
Breeding birds of prey/ vultures	Annual review	DNRM, Vulture Group; Chief Warden, Gobabeb	DNRM, Gobabeb & Office Chief Warden
Coastal migratory birds	Annually	DNRM, CETN, Chief Warden, Gobabeb	DNRM, Gobabeb & Office Chief Warden
Large mammal populations	Annually/5 year intervals	DNRM, Chief Warden, Gobabeb	DNRM, Gobabeb & Office Chief Warden
Invasive aliens	Annually	Chief Warden, Gobabeb	Gobabeb & Office Chief Warden

Reliable monitoring mechanisms rely on cost efficient and sustainable data collection carried out at appropriate intervals according to standardized procedures. Monitoring shall be based on existing systems that are already being used within the Park or proven elsewhere in Namibia, e.g. measuring the effectiveness of management through “Namibia’s Management Effectiveness Tracking Tool” (NAMETT). Techniques and monitoring intervals of established procedures shall only be improved or changed where it will not affect the validity and continued use of historical datasets. Some monitoring shall be outsourced to special interest groups and specialist stakeholders where special expertise are needed or where rapid recording of ‘census’ type information is required.

The value of short-term datasets and information to provide context for long-term datasets is not underestimated, thus participatory monitoring and deposition of additional datasets into the archival system shall be encouraged. However, the procedures and tools to integrate, interpret and archive data at different levels (local, regional, national, global) are poor or non-existent and need to be developed. The Gobabeb Centre is a reputable and experienced research and monitoring institute specializing on the Namib and situated within the area, which makes it the logical host for collating, curating, analysing and disseminating data and information resulting from monitoring.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Evaluate and judiciously improve the monitoring framework to be relevant, cost-effective and affordable	Training manual on monitoring framework	Improved monitoring
2. Ensure on-going training and reinforcement of the purpose and procedures of the monitoring framework, e.g. using the incident book system and applicable techniques	Training course records and quality of incident book records	Sustainable and reliable monitoring results
3. Develop procedures and terms of reference or a formal agreement with the Gobabeb Centre for collating, storing and interpreting of collected data together with distribution of information through reports and information products	Signed agreement in place by 2014	Reliable data analysis and information dissemination
4. Develop clear and unambiguous guidelines and advice on the purpose and information value of each indicator to allow rapid assessment and application of information for adaptive management	Active Indicator Monitor board at each ranger station	Improved use and understanding of monitoring for management
5. Develop and distribute information products based on long-term datasets to ranger stations and tourist centres	Updated environmental variability information	Improved desert ecology understanding
6. Develop incentives and mechanisms to encourage tourists and require concessionaires and researchers to contribute observations and data	Data input and range of data points	Community involvement and improved access to rare observations and data from remote locations
7. Terms of Reference and formal agreements on outsourced monitoring tasks to specialist institutions	Specialist monitoring data and reports	Reliable monitoring results



## 2.20 RESEARCH

The evolution of the current management approach and the large number of visitors to the area are the result of the quality of information and understanding that was generated by research. Very little of that research or the available long-term monitoring data was carried out by conservators or conservation organizations even though conservation is the main beneficiary of that research.

A supportive environment to encourage scientists shall continue to benefit conservation and is integral to implementing an ecosystem approach to managing the property, whether applied research in direct support of priority information needs (e.g. EIAs) or baseline research to improve the quality and coverage of information about the interlocking geological, ecological and socio-economic systems. It is envisaged that direct support or commissioning of research are likely to take place as determined by resources and urgent priorities, while most baseline research shall be pursued by independent visiting researchers with permission from MET.

The Division of Research and Monitoring in the MET in conjunction with the Gobabeb Centre facilitates all kinds of research, though important research may take place elsewhere. It is critical, however, that information about research questions and research results are available to inform management planning and to guide the formulation of subsequent research. Active engagement of researchers will improve the availability and interpretation of monitoring information, while involvement in research by management staff shall contribute to their personal motivation, knowledge and understanding of the area.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Ensure that published and unpublished research results are accessible through the Gobabeb Centre Library (e.g. as an open and 'closed' file system)	Digital Library catalogues available to all wardens	Accessible research information
2. Ensure the annual budget makes provision for applied research by staff and ad hoc support to visiting researchers	Staff research programme and specialist researcher database	Sustained research interest
3. Ensure the annual budget makes provision to support the maintenance of the Gobabeb Centre Library and the organizing, capturing and cross-referencing of research results	Information support agreement	Accessible research information
4. Commission priority applied or baseline research required for management planning	ToRs for priority research and research reports	Research support for adaptive management
5. Promote MET research policy, permit procedures and research opportunities to attract additional research interest	Research permit applications and reports	Sustained research interest
6. Identify exceptional research results for rapid visitor information product development	Public dissemination of high-quality research	Promotion of site values and attributes

## 2.21 DATA MANAGEMENT

A key aspect of management planning and adaptive decision-making is access to reliable information captured through monitoring or recorded in incident books, reports, monitoring, research and other activities. That data needs to be stored, curated and interpreted to be effective. Much of the information shall be georeferenced, time-series data that is digitally stored and organized for rapid access through ICT, some as public domain information and some sensitive information only available to registered users (e.g. rare species numbers and locations). Formal establishment of a centre to ensure the maintenance and operation of the various databases, ranging from georeferenced inventories to address lists and catalogues (photos, publications, reports, assets, etc.), is central to the process. The responsibility should rest with a facility with the experience, specific interest, and infrastructure to maintain and update a data management system, e.g. most elements are already in place at the Gobabeb Centre.

It is important to note that these databases can and should be housed at different institutions as ICT access allows rapid extraction over long distances, while distribution improves archival survival. Key storage and access points should be at MET Headquarters, MET Library, Ganab, Sesriem/Zais, Gobabeb, and the National Archives. Additional data storage may occur elsewhere. It should also be noted that storage and access does not necessarily require on-line servers as the same function may be achieved by regularly updated storage devices, e.g. external hard drives.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Develop an accessible and user-friendly Information System and meta database to store and manage data and information	ToRs for Information System development and contractor appointed	Data readily available to authorized users
2. Generate templates to produce annual and other periodic reports that impart key information, maps and figures	Decision on format for standardized reports	Improved access to current information
3. Ensure data security through a distributed archival system and formal agreements regarding information access	Data storage and management agreements with reputable institutions	Archival data security
4. Conclude data management agreement with the Gobabeb Centre or other dedicated stakeholder	ToRs for Information system management and contractual agreement	Sustainable data management
5. Data management agreement should include provision for regular updates of website, displays, stakeholder news briefs, and standardized reports	Regular reports on different aspects include current data	Improved information dissemination to stakeholders

## 2.22 AWARENESS AND PROMOTION

The Namib Desert is one of the best researched and most accessible arid areas globally. However, despite the number of popular and academic publications available to the public, information transmission is poor and mostly reliant on the efforts of visitors themselves. Visitor guides and tour operators are poorly trained and often ignorant in specific aspects relating to the Namib, while information centres at entry points and in close vicinity to popular destinations has been dismantled. Addressing the poor state of on-site information will be prioritized.

Improving the quality of information to visitors shall not only add to the overall visitor experience and satisfaction, but will also assist in visitor management through self-policing by visitors. Reliable and regularly updated information shall also foster resistance to consumptive, invasive and unsustainable tourism products that will encourage tourism entrepreneurs to develop specialized ecotourism packages. Good quality information products such as displays, booklets, DVDs, websites, posters, brochures, maps, signage, etc. can be rapidly produced to address the situation. A valuable management contribution from such products would be to engage visitors and their guides in on-going monitoring activities.

It should be noted, however, that the public service system of competitive pricing often results in contracts awarded to service providers that simply regurgitate information from visitor guidebooks and dated popular publications. Part of the process should therefore be to ensure that current research results are translated into accessible information for the lay person. Improved training of tour guides at national and local levels is also required for which the engagements of training institutions such as the Gobabeb Centre, NATH and the Polytechnic of Namibia is required. Improved training of guides shall ensure that they create exceptional field experiences for tourists by sharing their knowledge in interesting and stimulating ways.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Develop and open information centre at Sesriem with duplication of information products to other tourist information centres	TORs developed and contractor appointed to develop information products	Improved information on qualities of the Namib Sand Sea
2. Develop information boards, concise tourist information (pamphlets, maps) and improved signage for key destinations	Roll-out plan for improved tourist information products	Information products more widely distributed
3. Develop registration process for tour guides with associated guidelines encourage improved guide training	Specific training courses for tour guides	More knowledgeable tour guides and better information to visitors
4. Identification of the kind and numbers of world heritage signage required for installation	Erection of signage at different entry points and main routes	Appropriate marketing of prospective World Heritage status
5. Develop visitor survey tools to record visitor perceptions, understanding and appreciation of the Namib Sand Sea	On-going visitor survey	Assessment of visitor experience
6. Development of an appropriate international marketing strategy in consultation with the Namibia Tourism Board	TORs developed and contractor appointed to develop marketing and advertising strategy	Specific marketing of the Namib Sand Sea as a prime tourist destination



## 2.23 ENVIRONMENTAL EDUCATION

The wealth of available knowledge and ready access to distinct ecosystems offer unprecedented learning experiences to visitors, scholars and schools. Aspects of astronomy, geology, geomorphology, climatology, hydrology, zoology, botany, arid-zone ecology, adaptive evolution, palaeontology, archaeology, cultural and industrial development, conservation, sustainable resource exploitation and many other fields are remarkably clear in this environment. However, effective environmental education requires dedicated staff with experience and a proven approach.

The Gobabeb Centre pioneered environmental education at a range of different levels that was followed by a number of other organizations to exploit opportunities in environmental education. Attempting to duplicate the extensive experience and an established educational programme of the Gobabeb Centre or the other environmental education centres in different regions around the Namib Sand Sea is unnecessary as the various programmes that are in place shall continue. The focus should therefore be to ensure a supportive environment for environmental education centres that continue to benefit conservation, primarily by encouraging and commissioning the development of appropriate educational materials, ensuring that up to date information reach institutions, and by encouraging staff to participate in environmental education through lecturing, escorting groups and facilitating entry to popular destinations.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Dissemination of information products developed for visitor information centres to local schools and environmental education centres	Distribution programme	Improved environmental education on the Namib Sand Sea
2. Develop information booklet for schools and education centres on values and attributes of the property	TORs developed and contractor appointed to develop booklet	National appreciation of the values of Namib Sand Sea
3. Gobabeb Centre to maintain an address list of environmental education and information centres for dissemination of information gleaned from monitoring and research	Regular distribution of information updates	Effective information dissemination
4. Improve reduced entry fee permit process for approved environmental education and youth training programmes	Approved list of education institutions, MoF approved entry procedures	Greater accessibility for educational purposes

## 2.24 TRAINING

Appropriate training of management personnel is an on-going operational requirement to ensure that knowledgeable staff is in place to account for the inevitable mobility of staff through promotions, retirement, resignation or other causes as well as to effectively execute new responsibilities or operational procedures.

The primary training of staff is at appropriate institutions such as the Polytechnic of Namibia or University of Namibia, supplemented through in-service training modules at their stations or specific training courses. These shall continue through the established procedures of the MET. This training, however, does not necessarily provide the specific information or address practical challenges that may have to be confronted. Plans to establish a staff training facility at the Escourt ranger station, where infrastructure is in place, should be expedited to host training courses. Syllabi needs to be developed for practical aspects of conservation management such as fixing and maintenance of boreholes; constructing and installing site infrastructure such as tank stands, toilets, and route indicators; maintaining solar arrays and radio communication infrastructure; practical vehicle maintenance and off-road driving skills; fire fighting and other on-site disaster management techniques; techniques and procedures for carrying out monitoring and telemetry in the Namib; office procedures such as accounting and report writing; law enforcement courses, etc. That training centre may also serve the training needs of all other parks in Namibia and may thus require the appointment of a permanent training officer.

In addition, induction courses on the Namib Sand Sea environment and ecological processes should be fast-tracked for new staff, including how to carry out regular data gathering for indicator monitoring. The Gobabeb Centre as the envisaged data management centre, with its vast experience in desert-specific training, is the most appropriate institution for focused induction training if suitable agreements can be reached. The development of Standard Operating Procedures that can be issued to all staff for rapid consultation should be a medium-term goal of staff training and operational experience.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Operationalize the Escourt Staff Training Centre	Distribution programme	Improved environmental education on the Namib Sand Sea
2. Develop syllabi and training manuals for practical in-service training on a range of topics.	Syllabi and training manuals	Improved in-service training mechanisms
3. Conclude agreement for induction training on environmental processes in the Namib Sand Sea with an appropriate institution	All new appointments underwent induction training	Operational staff familiar with values and processes of the Namib Sand Sea
4. Develop reference folder on Standard Operating Procedures that can be issued to all staff	Updatable Namib Sand Sea management manual in place	Rapid access to management procedures

## 2.25 ANNUAL PLANNING AND MANAGEMENT PLAN REVIEW

Effective implementation of the management plan requires annual cycles of planning for the preparation of annual work plans and budgets by operational staff. Annual work plans are the operational tools used by the staff to schedule their work, while the management plan is a medium-term planning document to ensure that the annual plans address strategic and long-term goals. This planning should be based to exploit achievements and address limitations from the previous years, while also ensuring the scheduling of activities envisaged in the management plan and developing pro-active precautionary approaches to deal with emerging issues. Funds for implementing annual plans are released after approval of the national budget in April of each year, though the operational budget is usually known in January.

Effective planning would therefore be best achieved during the first quarter of each year. Though rarely achieved, it is recommended that annual planning should be carried out in a workshop atmosphere that will allow staff to exchange ideas and recount achievements in a collegial atmosphere. The data management centre should also be represented to present the results of the monitoring process and any other important information, e.g. research and education outputs. The Chief Warden and Wardens are responsible to ensure that the management plan and annual plans are implemented and that legal requirements regarding public finances, work scheduling and public administration are met. They should therefore jointly convene annual planning workshops and review the work of the past year. The Chief Warden, together with the higher management of the Directorate of Regional Services and Parks Management, is responsible for longer-term planning. The allocation of annual funds is guided by target sums set five years in advance through the Medium Term Expenditure Framework and annual projections of the availability of future revenue, thus forward planning towards strategic objectives are essential as the base funding requires managers to meet identified performance targets. The Management Plan itself also needs to be thoroughly reviewed and, revised every five years.

<b>Actions</b>	<b>Monitoring</b>	<b>Output</b>
1. Annual reports to be prepared by January regarding achievements, issues identified, and problems experienced during previous year	Annual reports, including analysis of monitoring data	Communication of management outcomes
2. Schedule annual planning workshop for staff during first quarter	Annual plans from workshop	Improved joint planning and work scheduling
3. On-going identification of strategic issues to be addressed by management	Approved Addenda to management plan or improved guidelines or policies	Improved forward planning to address issues
4. Management plan review workshops in 2016 in consultation with strategic stakeholders	Revised management plan available for approval in 2018	Strategic management











