IUCN Conservation Outlook Assessment 2017 **(archived)**
Finalised on 08 November 2017

Please note: this is an archived Conservation Outlook Assessment for Namib Sand Sea. To access the most up-to-date Conservation Outlook Assessment for this site, please visit https://www.worldheritageoutlook.iucn.org.

Namib Sand Sea

SITE INFORMATION

Country:
Namibia
Inscribed in: 2013
Criteria:
(vii) (viii) (ix) (x)

Site description:

Namib Sand Sea is the only coastal desert in the world that includes extensive dune fields influenced by fog. Covering an area of over three million hectares and a buffer zone of 899,500 hectares, the site is composed of two dune systems, an ancient semi-consolidated one overlain by a younger active one. The desert dunes are formed by the transportation of materials thousands of kilometres from the hinterland, that are carried by river, ocean current and wind. It features gravel plains, coastal flats, rocky hills, inselbergs within the sand sea, a coastal lagoon and ephemeral rivers, resulting in a landscape of exceptional beauty. Fog is the primary source of water in the site, accounting for a unique environment in which endemic invertebrates, reptiles and mammals adapt to an ever-changing variety of microhabitats and ecological niches.
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SUMMARY

2017 Conservation Outlook

Good

The nature of the Namib Sand Sea property – a vast inaccessible area of fog-bathed desert dunes – makes it sufficiently inhospitable to deter most forms of exploration or exploitation. There are virtually no roads or facilities of any kind within the property. Although there were some early pioneer efforts to exploit limited deposits of alluvial diamonds along the coastal plains in the early part of the 20th century, this proved uneconomic. Two mineral prospecting licenses that were procedurally reviewed are being cancelled and the expired EPLS will not be activated. Today the area is protected within the Namib Naukluft Park, with some limited use of desert plants and animals around the fringes of the property by indigenous communities and a growing tourism industry. NSS is not managed in isolation but in the context of the integrated management system of conservation areas and wildlife resources under the Ministry of Environment and Tourism thereby leading to limited resources as a result of larger need of them. Although visitor facilities and information have been improved there are management challenges on monitoring tourism and ecological activities, and controlling alien species particularly plants (especially along the seasonal rivers). Tourism Development Plan and participatory management arrangement with indigenous people address tourism, natural resource exploitation and biodiversity conservation. Water resources require careful management if the few seasonal rivers that penetrate the area are going to be maintained, but the key values of the site seem secure.

Current state and trend of VALUES

Good
Trend: Stable

The Outstanding Universal Value of the Namib Sand Sea is the result of complex geological, biophysical and ecological interactions that have resulted in the evolution of unique plant and animal species that are especially adapted to life in

a fog-bathed dry desert. The prevailing biophysical conditions occur at such a scale as to be largely unaffected by human activity, and the extraordinary natural beauty of the place, with its ever-changing dune formations, is maintained by the perpetual strong winds. Thus the geological, ecological, biodiversity and aesthetic values of the site are well conserved and in a stable condition.

Overall THREATS

Low Threat

The Namib Sand Sea is one of Africa’s least threatened sites, unaffected by human settlement or livestock on account of a lack of fresh water and the nature of its vast area of ever-changing fog-bathed sand dunes. The core of the area is inaccessible and rarely visited by people, but there are tourism activities and a limited amount of community-use of resources around its fringes. These activities threaten the integrity of comparatively small, but crucial areas of the site. Diamond mining was undertaken on a small scale by pioneer operators in the first half of the 20th century but mining has now been prohibited as the State is in the process of terminating the existing EPLS. There remains a threat of ecological change along the few seasonal rivers from upstream dams, subterranean water extraction, and the fluvial transport of the seeds of invasive alien plants, but none of these threats are likely to alter the fundamental values of the site. The implementation of a Tourism Development Plan and the National Policy on Protected Areas' Neighbours and Resident Communities will assist to reduce threats.

Overall PROTECTION and MANAGEMENT

Mostly Effective

The majority of this vast uninhabited desert survives in a largely undisturbed state due to the extreme prevailing conditions and difficulty of access. The few areas that are readily accessible are located close to the edge of the site where visitor accommodation (and most critically, water) can be provided. So, despite very low levels of management intervention the unique ecological values of the site remain largely intact and pristine. Management of tourism, especially around Sossusvlei and the Sesriem area (where three quarters of the park’s visitors are concentrated) presents some challenges, and there is a need to enhance

management capacity and visitor management in this area particularly.

FULL ASSESSMENT

Description of values

Values

World Heritage values

- **World's only coastal desert with extensive dune fields influenced by fog**
  Criterion:(viii)

  The Namib Sand Sea (NSS) is primarily composed of two dune systems, an ancient (semi-consolidated) one overlain by a younger active one. The dune fields make up 84% of the area, with the remainder composed of a variety of other geomorphic features including gravel plains and gramadullas (8%), coastal pans/flats (4%), rocky hills at the fringes (3%), inselbergs within the sand sea (1%), a coastal lagoon, endorheaic pans, ephemeral rivers and rocky shores. The outstanding attributes of the sand seas are derived from interactions between the land, the ocean and the atmosphere. Strong winds from various directions, linked to rain and fog, have an overriding influence on the area and define its key attributes (World Heritage Committee, 2013; IUCN, 2013).

- **Massive dunes made of sand transported from afar**
  Criteria:(vii)(viii)

  The NSS is derived from material transported from afar. Sand is carried to the NSS from the interior of southern Africa by river, ocean current and wind. This three-part 'conveyor system' begins with erosion of material in the headwaters of the Orange River which is carried into the South Atlantic, where it is picked up and driven northwards by strong ocean currents. Deposited as beach sand it is then mobilised and transported inland by wind

where it creates the diversified aeolian desert landforms and features of the NSS (World Heritage Committee, 2013).

► Diversity of dune formations and natural beauty

Criterion:(vii)

Sixteen distinctive dune types are recognized across the three main zones of the sand sea, with transverse dunes in the coastal strip, linear dunes in the centre and star dune systems in the east. This diversity of dune formations creates a spectacular dunescape with a unique interplay of shape, colour, movement and habitat (World Heritage Committee, 2013; IUCN, 2013). The clarity and visibility of the dunescape is enhanced by the clear sky which is devoid of dust, moisture and air pollutants (Namibia, 2012; IUCN, 2013).

► Plant and animal adaptations to desert conditions

Criterion:(ix)

Plant and animal communities are continuously adapting to life in the hyper arid environment. Fog serves as the primary source of water and this is harvested in extraordinary ways while the ever-mobile wind-blown dunes provide an unusual substrate in which well-oxygenated subsurface sand offers respite and escape for ‘swimming’ and ‘diving’ invertebrates, reptiles and mammals. The outstanding combination and characteristics of the physical environment – loose sand, variable winds and fog gradients across the property – creates an ever-changing variety of micro-habitats and ecological niches that is globally unique on such a scale (World Heritage Committee, 2013; IUCN, 2013).

► Rare and endemic species

Criterion:(x)

Although the sand sea habitat exhibits relatively low levels of overall species richness, certain taxa of the sand sea fauna and flora show high levels of endemism. Eight species of plant (53% of the sand sea total), 37 arachnids (84%), 108 insects (52%), 8 reptiles (44%), a bird (11%) and two mammals (17%) are known only from Namib sand sea habitats (Namibia, 2012; IUCN, 2013).

Assessment information

Threats

Current Threats

Low Threat

The remote and inhospitable nature of the desert dunes ensures that there is little disturbance to the vast majority of the interior of the property. The highly scenic and accessible area around Sossusvlei is subject to heavy pressure from tourism and impacts such as vehicle tracks, litter and sanitation, aircraft noise and over-crowding are already affecting the site. Some alien species are present, and eradication is difficult because of re-infestation with seeds transported into the property along seasonal water-courses and pet animals brought by inhabitants. The implementation of a Tourism Development Plan, participatory management arrangements with indigenous people and resident communities, and removal of alien species will help to ameliorate the threats.

▶ Invasive Non-Native/ Alien Species

Low Threat
Inside site, localised(<5%)
Outside site

There are some invasive plants and animals, including 11 species of plants, 1 fish, 2 birds, 2 mammals and 12 invertebrate species noted by the State Party in the nomination dossier. Most of the invasive species are either plants carried into the property by ephemeral rivers or feral populations (Ministry of Environment and Tourism, 2013a). Alien plants are difficult to eliminate due to regular re-infestation during each flooding cycle while feral animals are difficult remove because of the sporadic refill. The Ministry of Environment and Tourism has developed a programme which monitors and opportunistically eradicate undesirable and feral population of alien species (Ministry of Environment and Tourism, 2013a).

► Tourism/ Recreation Areas

High Threat
Inside site, throughout(>50%)
Outside site

Although the nature of the terrain across most of the property limits access by visitors there are some potentially damaging impacts of tourism. These are already being experienced in some areas and include off-road driving, noise pollution from low-flying sight-seeing aircraft, litter and sanitation problems, unauthorised camping, overcrowding and disturbance of critical wildlife habitat (e.g notably a vulture breeding colony (IUCN 2013). The demands of tourism are growing rapidly and present levels of management input (financial and staffing) are barely adequate to address these demands. A Tourism Development Plan should be implemented in order to establish carrying capacities and affordable access for Namibians, better interpretation and education facilities at Sesriem, improve provision of relevant information materials to increase visitor appreciation, improve waste disposal procedures, better regulation of aerial flying heights and introducing no fly zones and improve training and registration of guides.

► Fishing / Harvesting Aquatic Resources, Hunting (commercial/subsistence)

Low Threat
Inside site, localised(<5%)
Outside site

The Topnaar community living in scattered villages along the Kuiseb River (which marks the northern boundary of the property) claim ancestral rights to land and resources within the property. They maintain a limited number of livestock (about 442 cattle, 2 083 goats, 277 donkeys, 327 sheep; Ministry of Agriculture, Water and Forestry, 2016) which are grazed within the northern fringes of the property, and harvest other renewable natural resources for subsistence use (notably the wild !Nara melon fruits). They are given a limited hunting quota for animals that are shot by Ministry staff for distribution among community members. In order to promote conservation and sustainable natural resource management and socio-economic development the Ministry of Environment and Tourism developed a National Policy on Protected Areas' Neighbours and Resident Communities (Ministry of

Environment and Tourism, 2013a,b; Namibia, 2015). The policy provides guidelines on the involvement of neighbours and resident communities in protected area management and benefits thereof, while at the same time recognizing the need to promote biodiversity conservation.

Potential Threats

Low Threat

The greatest potential threat is a reduction in the seasonal flow of watercourses through increased upstream use of water, and ecological changes to the Sandwich Harbour area resulting from subterranean water extraction from the Kuiseb River valley. The threat of mining has been significantly reduced as a result of the undertaking by the State Party to cancel the existing two prospecting licenses and that no more licenses will be activated.

► Mining/ Quarrying

Low Threat
Inside site, extent of threat not known
Outside site

Although there are no active mining operations within the nominated property, diamond mining has been undertaken in the coastal zone of the NSS periodically since the early 1900s and some abandoned infrastructure remains to this day. Notwithstanding that the Langer Heinrich and Husab uranium mines to the north of property are operational, the mines are located far away from the property to an extent that their activities will have no impact on the property (Namibia, 2016; Mining Review Africa, 2009; Jamasmie, 2015). Despite discoveries of uranium on gravel plains north of the property, as well as quarries of dimension stone, the prospects for significant new finds of diamonds, uranium or other minerals within the property are considered limited. In recognition of this, as well as the incompatibility of mining and World Heritage Sites the State Party made an undertaking of cancelling existing Exclusive Prospective Licenses (EPLs) 4323 and 4324, whose renewal by custodian Ministries (Ministry of Mines and Energy and Ministry of Environment and Tourism) was a procedural oversight, and no other EPLs are currently active (Namibia, 2016).

► Dams/ Water Management or Use

High Threat
Inside site, widespread(15-50%)
Outside site

In a country as dry as Namibia, water resources have special significance and there is a real possibility that any surface water and subterranean aquifers associated with the property will be used, with unknown ecological consequences. In particular the ephemeral rivers which arise in the western escarpment and drain into the property (or along its borders) are threatened by the possibility of upstream impoundments. Furthermore, extraction of subterranean water supplies from the Kuiseb River valley (which is already happening at a significant scale to supply the nearby port of Walvis Bay, several coastal towns, and mines and industry) may alter the ecology of the Ramsar-designated wetlands at Sandwich Harbour (as well as other attributes of the nominated property). These potential threats need to be explicitly recognised. Developments that are likely to impact the property must be subject to rigorous Environmental Impact Assessment (EIA) and mitigation procedures specifically evaluating potential and likely effects on the attributes of the property, which the current legislation and regulations regarding environmental management and evaluation of EIAs do not address.

Protection and management

Assessing Protection and Management

► Relationships with local people

Some Concern

Although there are no people living inside the property, the Topnaar community is settled along its northern boundary, within the Namib-Naukluft Park and buffer zone of the NSS. The Topnaar community wants to gain formal recognition of ancestral rights to land and resources for preferential access to the benefits of tourism, recognition and protection of community culture and unrestricted access to Topnaar cultural sites. The State Party developed a National Policy on Protected Areas' Neighbours and Resident

Communities whose aim is to address the concerns of the indigenous people and conservation of biodiversity (Namibia, 2015). The national policy on protected areas and neighbours/residents allows for consultation, benefit sharing, right to practice cultural customs etc. within the framework of national laws and regulations. However there are no participatory management arrangements specific to the World Heritage property or receive legal recognition of their rights.

► Legal framework

Some Concern

Whilst the Nature Conservation Ordinance provides for the conservation of nature and establishment of game parks and nature reserves, a number of other bodies of legislation are relevant to management of the property including the Environment Management Act (2007), Minerals (Prospecting and Mining) Act (1992), Namibian Tourism Board Act (2000), National Heritage Act (2004), and Water Resources Management Bill (2004). Whilst none of the existing legislation have specific mandate that provides the level of protection required to guarantee the future integrity of the property, particularly in respect of mining, tourism and community rights, a Tourism Development Plan was commissioned and a National Policy on Protected Areas' Neighbours and Resident Communities was developed to address threats from tourism, indigenous peoples' concerns and biodiversity conservation. Although some activities that would be incompatible with World Heritage status are currently being undertaken in other parts of the Namib-Naukluft Park, including uranium mining and large-scale water extraction, the State Party has taken an undertaking to cancel the two EPLs that are currently running. That being the case there is still need to promulgate laws or policies that regulate mining, water abstraction and sustainable resource use in protected areas including the World Heritage property leading to (a) the permanent cessation of all mineral prospecting and mining, (b) sustainable water extraction and (c) the recognition of indigenous community rights and their accommodation within the management of the property. There is no law in Namibia that prohibits prospecting and mining within World Heritage properties, so the legal protection needs to be strengthening by incorporating this into the legal framework.

► Enforcement

Mostly Effective

Unlawful activities such as illegal use of wildlife and other natural resources as well as visitor transgression of regulations intended to minimize impacts on the ecosystem are rare (Management Plan NSS World Heritage Site 2014). The Ministry of Environment and Tourism collaborates with Ministry of Fisheries and Marine Resources, Namibian Police and Ministry of Justice to combat crime. Conservation officials carry out law enforcement patrols and surveillance in order to maintain compliance with regulations and laws in regards to such issues like speed limits, off- road driving, flying heights, camping restrictions and management of waste. Staff compliment is however low to cope up to the expected levels of law enforcement (IUCN 2013). Information on crime records was not provided hence the effectiveness of law enforcement cannot be assessed.

► Integration into regional and national planning systems

Highly Effective

Management of the property is well integrated with regional and national planning systems. The NSS nomination dossier (2012) lists 24 national, regional and local plans supporting conservation of the property, ranging from Namibia’s Vision 2030 to specific regional, municipality and village plans.

► Management system

Mostly Effective

The property is state-owned land and lies within the Namib–Naukluft Park (which is itself an integral part of the planned Namib-Skeleton Coast National Park). It is managed by the Ministry of Environment and Tourism, based on the Nature Conservation Ordinance (1975). Protection of the area dates back over a century. The legal establishment of the Namib-Naukluft Park, encompassing the NSS, has involved seven different stages starting in 1907 and culminating in 1986. The first stage involved the establishment of a game reserve on the northern edge of the NSS, and this was progressively expanded with the addition of further areas until the present configuration of the Namib-Naukluft Park was achieved in 1986. The Management Plan of the

NSS which was finalized in 2014 addresses issues such as conservation, research, monitoring, tourism, enforcement, education, traditional practices and cultural heritage within the context and aspirations for national and regional development (Management Plan for NSS World Heritage Site 2014). The property has a zonation map which illustrates the operational management zones.

► Management effectiveness

Some Concern

Conservation areas and wildlife resources in Namibia are managed through integrated mechanisms that allows optimal use of manpower and financial aspects (Management Plan NSS World Heritage Site 2014). Although the NSS is not being managed as a distinct unit, it benefits from the flexibility of having access to a large potential resource base. The Management Plan 2014 has not yet been reviewed and information for a management effective evaluation is not yet available. However the financial and human resources available for management are insufficient to undertake the range of tasks required for effective management. Whilst most of the area is inaccessible and requires no management intervention, there is a need for additional resources to improve the effectiveness of tourism regulation, community outreach, visitor interpretation, ecological monitoring and alien plant control (IUCN, 2013).

► Implementation of Committee decisions and recommendations

Mostly Effective

Pursuant to requests from the World Heritage Centre (IUCN, 2013) the State Party finalized and submitted the Management Plan NSS World Heritage Site, addressed issues relating to termination of mining, participatory management arrangements with indigenous people, visitor interpretation facilities, monitoring programmes, tourism concessions and alien species (Namibia, 2015). The zonation map was submitted and clarification of Husab uranium mining and Mining Cadastre Portal were provided. However strengthening management capacity and support to Gobabeb Research and Training Centre have not yet been addressed.

► Boundaries

Highly Effective

The boundaries of the nominated property fall within the Namib-Naukluft Park, encompassing about 60% of the Park. They have been carefully designed to embrace as much as possible of the pristine sand sea habitats within the park, whilst excluding areas of the park that might be subject to future mining, abstraction of water or high-impact tourism activities (such as recreational quad-bike use etc). The boundaries of the property follow natural features where possible, using the coast-line to define the western boundary, and the Kuiseb River as its northern boundary (excluding a section near its mouth where water abstraction is likely). Meanwhile, the eastern and southern boundaries are simply ‘lines in the sand’, designed to allow an area of sufficient size outside the property (but still within the park) to be allocated for uses that may not be compatible with world heritage status. The property is surrounded by a buffer zone of variable width along its northern, eastern and southern boundaries. This buffer zone (8 995 km2) lies entirely within the Namib-Naukluft Park, and its eastern and southern boundaries extend to the boundary of the park. Furthermore, the eastern boundary of the park borders on large-scale private land-holdings that are increasingly given over to tourism, game-ranching and other land-uses that enhance the ecological viability of the wider landscape. These private properties serve effectively as a useful ‘outer buffer zone’ (although this is not formally recognised or supported by legislation) (IUCN, 2013).

► Sustainable finance

Some Concern

There is no specific budget or dedicated staffing for the NSS, but the Namib-Naukluft Park receives an annual operational budget allocation equivalent to about US$ 850,000 and has a permanent staff of 28. Additional government funds may be allocated for capital expenditure within the park according to specific needs. Although this level of funding is barely adequate for a park of this size, it remains relatively stable and has been increased progressively over the past five years (IUCN, 2013).

► Staff training and development

Some Concern

Although information on the staff profile is not available visitor guides and tour operators are poorly trained and often ignorant in specific aspects relating to Namib Desert (Management Plan NSS World Heritage Site 2014), although the Gobabeb Reserach and Training Centre has initiated such training and developed a dedicated Namib Sand Sea training guide. Added responsibilities relating to monitoring and ecological management in line with the implementation of the Management Plan, a Tourism Development Plan and implementation of the Protected Area, Indigenous and Resident Communities Policy may require further staff training and development. The Gobabeb Centre has initiated induction courses on the NSS environment and ecological process for staff as planned (Management Plan NSS World Heritage Site 2014).

► Sustainable use

Mostly Effective

The indigenous Topnaar community, now living in scattered settlements along the Kuiseb River, has used the land and resources of the NSS for centuries (IUCN, 2013). They are a nomadic people who have traditionally moved to new areas within their forbidding landscape as dictated by changing conditions and resource availability. Today, many of their traditions are being lost, and most of their settlements are occupied by the old and young, as most adults of working age opt for paid employment in nearby centres (Legal Assistance Centre, 2013). The traditional harvesting of !Nara fruit has been transformed into an open access system where everyone is in competition for the fruit due to commercialization, which causes distrust between members of this community and their traditional authority (Legal Assistance Centre, 2013). Although participatory management arrangements with the indigenous people have been put in place the impact of commercialization of !Nara fruit need to be monitored

► Education and interpretation programs

Mostly Effective

Since inscription in 2013 notable improvements on information and

interpretation of NSS have been achieved (Namibia, 2015). Visitor interpretation facilities were established at Sesriem and Sossusvlei, information on Namib Sand Sea is available at Sesriem at the Namib Wildlife Resorts, a plaque about the NSS World Heritage Site has been placed to the entry to the site, banners about the site are on the walls of the Headquarters of the Ministry of Environment and Tourism and are also made available at tourism and public events (Report on the state of conservation NSS World Heritage Site 2015). Visitor guides and tour operators however are poorly trained and often ignorant in specific aspects relating to Namib Desert (Management Plan NSS World Heritage Site 2014). The Gobabeb Centre has initiated improved training of tour guides from the local Topnaar community and some hospitality centres. Further training of guides and tour operators at local and national levels is required. Gobabeb has also developed specific outreach programmes like indigenous people, schools and university students to increase knowledge and appreciation of the property.

► Tourism and visitation management

Some Concern

Tourism is developing much faster than the capacity to manage it. In 2011 there were more than 135,000 visitors (focused primarily on the Sesriem/Sossusvlei area), supported by a network of approximately 60 tourism lodges on private land outside the property. The Directorate of Regional Services and Parks Management has only 28 staff whose responsibilities include conservation, monitoring and law enforcement (e.g. adherence to speed limits, control of off-road driving, flying heights, camping restrictions, waste management, etc) and revenue collection. In addition to heavy daily visitor traffic to the Sossusvlei and Sandwich Harbour areas, there are 7 active 4x4 concessions which allow convoys of vehicles to make multi-day traverses of the NSS with overnight camping at stipulated sites. These convoys are rarely accompanied by law-enforcement officials due to lack of staffing and appropriate equipment and financial allocations, especially transport to cover such a vast area adequately.

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Ministry of Environment and Tourism and are also made available at tourism and public events (Namibia, 2015). A Tourism Development Plan for Namib-Naukluft Park was commissioned to enhance the identification, allocation, management and monitoring of tourism concessions (Namibia, 2015), but did not adequately explore options for optimising use but rather recommended diversification which would have further challenged adequate management. Despite the improvement in visitor facilities and management of tourism concessions there is need to monitor the impacts from tourism and introducing appropriate mitigation measures. Additional resources are needed to enhance management and enforce existing controls. The property is heavily understaffed so there is a need to address this issue in the face of increasing tourism.

► Monitoring

Some Concern

Some monitoring of biophysical and ecological parameters (e.g. rainfall, temperature, humidity, fog, vegetation, invertebrate, mammal and bird populations) has been undertaken at the Gobabeb Training and Research Centre since 1962. However processing of data to inform management planning and decision making has been sporadic and uncoordinated (NNCWH, 2012). The nomination dossier identifies 23 key indicators for measuring the state of conservation of the property, classified into management, human use, geographical and ecological indicator categories (NSS World Heritage nomination dossier, 2012). So far, the only programme of key ecological and management effectiveness has been the introduction of the Incident Book Monitoring System (Report on the state of conservation NSS World Heritage Site 2015). Short- and long-datasheets are archived at Gobabeb Centre which is situated within the area and with its reputation on research and monitoring is ideal host for collating, curating, analysing and disseminating data and information from monitoring (Management Plan NSS World Heritage Site, 2014)

► Research

Highly Effective

The Gobabeb Training and Research Centre has established a unique record of fundamental research results spanning more than 50 years and providing

extraordinary insights into the adaptations of plants and animals to life in the fog-desert and associated ecological processes. This portfolio of research results is unique at a global scale and the facilities at the Gobabeb Centre should ensure that this body of knowledge and information can be further developed and enhanced. The Centre is also spearheading the training of visitor guides and tour operators as well as the translation of research results into accessible information for the lay person. It is fundamental that research results inform management planning and guide the formulation of subsequent research (Management Plan NSS World Heritage Site 2014). Annual budgets should also make provision for research and support the maintenance of the Gobabeb Centre Library, organising, capturing and cross referencing of research results.

Overall assessment of protection and management

Mostly Effective

The majority of this vast uninhabited desert survives in a largely undisturbed state due to the extreme prevailing conditions and difficulty of access. The few areas that are readily accessible are located close to the edge of the site where visitor accommodation (and most critically, water) can be provided. So, despite very low levels of management intervention the unique ecological values of the site remain largely intact and pristine. Management of tourism, especially around Sossusvlei and the Sesriem area (where three quarters of the park’s visitors are concentrated) presents some challenges, and there is a need to enhance management capacity and visitor management in this area particularly.

► Assessment of the effectiveness of protection and management in addressing threats outside the site

Mostly Effective

Natural resources exploitation, invasive species, tourism, mining and water abstraction pose external threats to the property. There is limited management capacity to address threats arising outside the site, although some community outreach is undertaken to regulate use of key resources around the fringes of the property, particularly by the Topnaar communities living along the Kuiseb River. Alien plants are carried into the property by seasonal rivers and there is little capacity to control them either at source

(outside the property) or within it. Self-regulation by established tourism operators visiting the site is largely effective, but there is nevertheless significant disturbance to some ‘visitor hotspots’ resulting from unregulated tourism activities. The Ministry of Environment and Tourism should consistently engage relevant ministries over the issues of mining and water extraction

▶ **Best practice examples**

The Gobabeb Research and Training Centre is a positive example of a public-private partnership arrangement to incubate and promote bespoke research and training, where the infrastructure and some support is provided through public channels, while academic excellence in research and training is ensured by civic engagement and independent project management and implementation.

Although still in its infancy stage, a participatory management arrangement with indigenous people and improved information and guidance of visitors will go a long way in regulating sustainable resource utilisation, improving neighbourhood relations and conservation of biodiversity

State and trend of values

Assessing the current state and trend of values

World Heritage values

▶ **World’s only coastal desert with extensive dune fields influenced by fog**

Good
Trend:Stable

The geological and geomorphological (erosion, transportation, deposition, sand particles) and climatic (ocean currents, winds, fog) setting and processes have been stable over several millennia (Namibia, 2012). Such a compact and resilient system can withstand human influence (Pers. obs., 2013).

► Massive dunes made of sand transported from afar

Good
Trend:Stable

The three-phase transport system which brings material from the interior of southern Africa by river, ocean current and wind is an ongoing phenomenon which has been in existence for more the 5 million years (Namibia, 2012). The long period of existence, large scale of the system and in accessibility of most of the area make human influence insignificant. Natural disturbances like climate change remain indeterminable.

► Diversity of dune formations and natural beauty

Low Concern
Trend:Stable

The diversity of the dune formations is primarily the result of the interactions of the biophysical conditions, wind and terrain across the property and whilst the dunes are in a continual state of flux, the complexity of the dune systems (16 dune types are recognized; Namibia, 2012) is likely to persist. There is a possibility that damming of the inflowing seasonal rivers outside the property could prevent the periodic flood events that maintain the dune characteristics of areas such as Sossusvlei, which would affect a small but crucial area of the property.

► Plant and animal adaptations to desert conditions

Good
Trend:Stable

Plant and invertebrate species of the site exhibit unique adaptations to life in this fog desert. Most remarkably plants and animals have developed highly distinctive morphological, physiological and behavioural adaptations to condense and harvest fog as a primary source of water in this hyper-arid environment (IUCN 2013). Their size, population size and geographical range over vast areas of the desert ensure their resilience to possible local environmental perturbations or disturbance.

► Rare and endemic species

Good
Trend:Stable

The rare and endemic species of the Namib Sand Sea are mostly small invertebrate and plant species with large viable populations spread over a wide area of desert (Namibia, 2012). Although they could be vulnerable to the effects of climate change, there is no evidence of any immediate threat to these unique species.

Summary of the Values

▶ **Assessment of the current state and trend of World Heritage values**
Good
Trend: Stable

The Outstanding Universal Value of the Namib Sand Sea is the result of complex geological, biophysical and ecological interactions that have resulted in the evolution of unique plant and animal species that are especially adapted to life in a fog-bathed dry desert. The prevailing biophysical conditions occur at such a scale as to be largely unaffected by human activity, and the extraordinary natural beauty of the place, with its ever-changing dune formations, is maintained by the perpetual strong winds. Thus the geological, ecological, biodiversity and aesthetic values of the site are well conserved and in a stable condition.

Additional information

Benefits

Understanding Benefits

▶ **Legal subsistence hunting of wild game**

The indigenous Topnaar community, who live in the northern fringes of the property along the Kuiseb River, has used the land and resources of the NSS for centuries (IUCN 2013). Their livelihoods depend on inter alia hunting of

wild animals.

► Collection of wild plants and mushrooms

The indigenous Topnaar community, now living in scattered settlements along the Kuiseb River, has used the land and resources of the NSS for centuries. Their livelihoods depend on exploitation of the area's natural resources which includes harvesting of wild fruits, notably wild !nara melon.

► Livestock grazing areas

The indigenous Topnaar community, now living in scattered settlements along the Kuiseb River, has used the land and resources of the NSS for centuries (IUCN 2013). Their livelihoods depend on exploitation of the area's natural resources and including subsistence farming (rearing animals and gardening). They keep livestock along the Kuiseb River which is estimated to be around 442 cattle, 2 083 goats, 277 donkey and 327 sheep (Ministry of Agriculture, Water and Forestry, 2016).

► Access to drinking water

The indigenous Topnaar community, who live in scattered settlements along the Kuiseb River, has used the land and resources of the NSS for centuries (IUCN 2013). Traditionally water for livestock and the Topnaar community was derived from dug out wells from the Kuiseb River. More recently supplies had been replaced by boreholes and taps on the pipeline which are provided by the government on a fee (Management Plan NSS World Heritage Site 2014)

► Wilderness and iconic features

The sheer size of the property with its forbidding conditions and popular destinations like Sossusvlei coupled with good planning, zonation, management and collaboration between conservation and tourism sectors has a potential for a high quality eco-friendly experience that includes inter alia wilderness value (Management Plan NSS World Heritage Site 2014).

► Outdoor recreation and tourism, Natural beauty and scenery

Visitors to NSS enjoy the outcome of marvellous geological and ecological

processes that are at play. The diversity of dune formation (16 distinctive dune types) in NSS creates a spectacular dunescape with a unique interplay of shape, colour, movement and habitat (SoOUV, IUCN 2013). In addition to the geological and geomorphological processes the property has unique ecological processes resulting in physiological, morphological and behavioural adaptations of flora and fauna.

Although statistical information is lacking tourism at NSS particularly at Sesriem and Sossusvlei has shown a tremendous exponential growth (NSS Word Heritage nomination dossier 2012). In support of the influx of tourists a network of approximately 60 tourism lodges on private land outside the property were developed (IUCN 2013).

► Importance for research, Contribution to education

The Gobabeb Research and Training Centre is globally recognized for its excellence in research on desert environment as it has established a unique record of fundamental research results spanning over 50 years (IUCN 2013). The research outputs from Gobabeb assist in understanding the climatic, geological and ecological processes at NSS, Namib Desert in general and its conservation at all levels (NSS World Heritage nomination dossier 2012, IUCN 2013, Management Plan NSS 2014). Through Gobabeb, NSS offers opportunities for students from various tertiary institutions to do diploma and undergraduate research projects that contribute to the understanding of desert environment and its conservation for the benefit of future MET staff.

► Tourism-related income, Provision of jobs

Although statistical information is lacking, tourism in the NSS, particularly at Sesriem and Sossusvlei has shown a tremendous exponential growth (Namibia, 2012). The increase in tourist arrivals at NSS translates into increase in tourism receipts.

For the purpose of management, conservation, monitoring ecological and tourism activities, and outreach programmes, 28 staff were assigned to NSS. In tandem with the increase in tourists, tourism infrastructure including 60 lodges on private land was developed (Namibia, 2012). Although information on the number of jobs created through tourism activities is not available, tourism creates jobs at local, regional and national levels.

Summary of benefits

The indigenous Topnaar community, who resides in scattered settlements along the Kuiseb River in fringes of the northern boundary of the property derives the following benefits from the NSS: pastures for their animals, water for the livestock and people, hunting and harvesting of wild fruits, notably wild !nara melon. The NSS, which has diverse dune formations (16 distinctive dune types) that create a spectacular dunescape with a unique interplay of shape, colour, movement and habitat is a popular tourist destination. Although statistical information is lacking, tourism in the NSS particularly at Sesriem and Sossusvlei has shown a tremendous exponential growth. In sync with increase in tourist arrivals a robust tourism infrastructure including approximately 60 lodges on private land was developed. 28 staff are deployed at NSS to carry out management, conservation, monitoring of ecological and tourism activities, revenue collection and outreach programmes at NSS. Similarly the booming tourism industry creates jobs at local, regional and national level, even though the number of the created employment posts is not available. The Gobabeb Research and Training Centre, with over 50 years of research and training experience, continue to provide invaluable information on the geological and ecological processes of the NSS and the Namib Desert in general and conservation of the desert environment. The NSS through Gobabeb Research and Training Centre offers space and facilities to schools and tertiary institutions for training as well as creating employment opportunities.

Projects

Compilation of active conservation projects

№	Organization/ individuals	Project duration	Brief description of Active Projects
1	Gobabeb Research and Training Centre		Numerous initiatives concerned with fundamental research on desert species, ecological monitoring, weather and climate change, etc.
2	Ministry of Environment & Tourism, Directorate of Parks and Wildlife		Re-introduction of extirpated large mammal species, e.g. giraffe, blue wildebeest, etc.

№	Organization/ individuals	Project duration	Brief description of Active Projects
3	Ministry of Environment & Tourism, Directorate of Parks and Wildlife		Tracking migrations and movements of large herbivores and carnivores, e.g. satellite tracking of cheetah and the near-endemic Hartmann's zebra; camera traps at waterpoints, seasonal strip counts, etc.
4	Ministry of Environment & Tourism, Directorate of Scientific Services		Annual counting and ringing at vulture breeding sites
5	Ministry of Environment & Tourism, Directorate of Scientific Services		Semiannual monitoring of migratory birds at Sandwich Harbour and nearby Walvis Bay Lagoon (Ramsar site)
6	Gobabeb Research and Training Centre	From: 2016 To: 2020	Monitoring of livestock resource utilisation, movement and environmental impacts
7	Gobabeb Research and Training Centre	From: 2016 To: 2022	Programme to raise tourism operator awareness of sensitive areas and processes to reduce footprint in NSS
8	Gobabeb Research and Training Centre, MET Directorate of Parks and Wildlife,	From: 2017 To: 2020	Multidisciplinary analysis of grazing impact around artificial waterpoints (piosphere)

Compilation of potential site needs

№	Site need title	Brief description of potential site needs	Support needed for following years

1	Development of a Waste Management Plan	The increase in waste and unsanitary practices at tourism hotspots does not impact on the attributes of the property, but has an effect on visitor appreciation and experience. Attempts to ensure visits to the property remains affordable by Namibians, and the burgeoning costs of basic infrastructure to manage exponential increases in visitors, has the effect that the current waste disposal and sanitation system is inadequate. This requires the development of a waste disposal and sanitation strategy by professionals, including costing, training and monitoring for successfully implementing a suitable Waste Management Plan.	From: 2018 To: 2020
2	Improvement of technological infrastructure to support management and monitoring	The vast area of the NSS only has 28 staff deployed at the NSS have to carry out management, conservation, monitoring of ecological and tourism activities, revenue collection and outreach programmes, which limits the capacity for law enforcement patrols. Specific requirements for crime scene investigation and prosecution of illegal activities furthermore restricts the ability of staff to effectively enforce regulations, e.g. respect for airspace and flying height restrictions. Reliable statistics on incidents of poaching, traffic and off-road violations, illegal entry and camping, waste disposal and sanitation, etc. cannot be obtained when regular patrolling of such a vast area is restricted. Effective technological roll-out and remote sensing will assist in improved monitoring and effective law enforcement.	From: 2018 To: 2022
3	Develop Tourism Statistics and Intelligence	Tourism has shown a tremendous exponential growth, fuelling a robust private sector tourism industry with more than 60 lodges on private land. Impacts from this growth include off-road driving, noise pollution from low-flying sight-seeing aircraft, litter and sanitation problems, unauthorised camping, overcrowding and spiralling costs. The 28 staff deployed at the NSS have to carry out management, conservation, monitoring of ecological and tourism activities, revenue collection and outreach programmes. Currently the tourism statistics and management incidents are not centralised, which restricts the ability to develop strategies for addressing specific issues.	From: 2018 To: 2020
4	Develop Tourism Development Plan	report was commissioned towards developing a Tourism Development Plan to obtain input from stakeholders for improved management of tourism related impacts. The Gobabeb Research Centre furthermore did specific investigations into sanitation, waste management and water utilisation related to tourism. Tourism impacts are being experienced in some areas of NSS and these include off-road driving, noise pollution from low-flying sight-seeing aircraft, litter and sanitation problems, unauthorised camping, overcrowding and disturbance of critical wildlife habitat (e.g notably a vulture breeding colony (IUCN 2013). The demands of tourism are growing rapidly and present levels of management input (financial and staffing) are barely adequate to address these demands, which the report that was commissioned failed to address. Although interpretation and education facilities have been improved there is need to investigate and commission a Tourism Development Plan in order to establish carrying capacities and affordable access for Namibians, further improve interpretation and education facilities at Sesriem, improve provision of relevant information materials to increase visitor appreciation, improve waste disposal procedures, better regulation of aerial flying heights and introducing no fly zones and improve training and registration of guides.	From: 2018 To: 2022

5	Develop specific NSS strategy to implement the national Protected Area, Neighbours and Resident Community Policy	The rights of local communities residing in nature reserve and game park were not legally recognized prior to the establishment of the Protected Area, Neighbours and Resident Community Policy (IUCN 2013). The local community concerns are lack of formal recognition of ancestral rights to land and resources. In particular the local community want preferential access to the benefits of tourism, recognition and promotion of community culture and unfettered access to cultural sites (IUCN 2013). Recognizing local community concerns and engaging such communities in, sustainable utilization and conservation of biodiversity is the sole intention of the national Protected Area, Neighbours and Resident Community Policy. The development of a specific strategy and action plan for implementation of the policy at the NSS property is therefore recommended. The indigenous residents are already allowed free and unfettered movement around their homesteads; are allowed to sustainably harvest natural resources; have no restrictions on traditional cultural practices; and were allocated a preferential tourism concession. Specific targeted development products were implemented to allow preferential benefits to the local community from tourism, increase income from traditional resource harvesting, and recognize elements of traditional culture n terms of the UNESCO Convention on Intangible Cultural Heritage. Distrust between local residents and towards their legally recognized traditional authority, as well as unsustainable exploitation of community privileges, needs to be resolved (Legal Assistance Centre, 2013).	From: 2018 To: 2020

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