



Ministry of Environment and Tourism

Strategic Environmental Assessment (SEA) for the coastal areas of the Erongo and Kunene Regions

Summary of the Study Report

January 2008

Namibian Coast Conservation & Management Project – NACOMA



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ACRONYMS AND ABBREVIATIONS

BCLME	Benguela Current Large Marine Ecosystem
CBNRM	Community Based Natural Resource Management
CMC	Contingency Management Committee
DST	Decision Support Tool
EA	Environmental Assessment
EIA	Environmental Impact Assessment
ETM+	Landsat Enhanced Thematic Mapper Plus
GIS	Geographic Information System
ICZM	Integrated Coastal Zone Management
MET	Ministry of Environment and Tourism
MFMR	Ministry of Fisheries and Marine Resources
MME	Ministry of Mines and Energy
MPA	Marine Protected Area
NACOMA	Namibian Coast Conservation and Management Project
NACOWP	Namibia Coast Conservation and Management White Paper
NBSAP	Namibia's Biodiversity Strategy and Action Plan
NDP	National Development Plan
NGO	Non Governmental Organisation
NWCRA	National West Coast Recreation Area
PPP	Policies Plans Programmes
RDP	Regional Development Plan
SEA	Strategic Environmental Assessment
SRTM	Shuttle Radar Topography Mission
TFCA	Trans Frontier Conservation Area
ToR	Terms of Reference
UNAM	University of Namibia

1. INTRODUCTION

In September 2006, the Namibian Coast Conservation and Management Project (NACOMA) commissioned DHI Water & Environment to develop a user friendly, decision guiding and policy relevant Strategic Environmental Assessment (SEA) of the Erongo and Kunene regions' coastal zones. The information, data and findings resulting from the SEA process are, further, also to be presented in a Decision Support Tool (DST). This tool will be disseminated to political and technical decision makers at local, regional and national levels in order to assist them in taking decisions on biodiversity conservation, land use planning, and social and economic development planning in the Kunene and Erongo coastal zones.

The SEA and DST will also form inputs to NACOMA's other activities. It is intended that all data and other information collected during the SEA process will also feed into the preparation work for potential separate regional coastal profiles for particular use by the Kunene and Erongo Regional Councils. A specific contribution to the preparation of these regional profiles will be identified in the recommendations that will be derived from the SEA. These recommendations will inform the finalisation of a review of existing institutional mandates, policies and laws for coastal management in Namibia.

In these ways, the results of the SEA will contribute to the development of a Namibia Coast Conservation and Management White Paper (NACOWP) to ensure that coastal development planning and management is based on pertinent information and data and on analysis and consideration of the most suitable actual and potential land uses. This summary provides the main findings and conclusive maps from the SEA (Skov et al., 2007). As per the Terms of Reference (ToR), the SEA contains:

1. A description of current land uses, impacts, threats and pressures along the coastal zones, with recommendations for prevention and mitigation overall and in relation to Policies, Plans and Programmes (PPPs), including spatial data for use in the DST;
2. A description of environmental/biodiversity conservation and management gaps, problems and implementation difficulties of current environmental/biodiversity conservation and management safeguards, management/control practices, and conservation/biodiversity management targets. This includes detailed concrete recommendations for improvement of environmental/biodiversity conservation and management overall and in relation to PPPs and data for use in the DST;
3. The outcomes of the integration of (i) and (ii) above in relation to existing PPPs.

Also included in the ToR is a specification for a description of the SEA process including objectives and outcomes of workshops/consultations and incorporation of comments/suggestions. The Inception Report contained full details of the consultative process to the end of 2006. This account is updated with details of the overall SEA process since that time and is incorporated in the comprehensive methodological annex (Appendix 1) that accompanies the SEA.

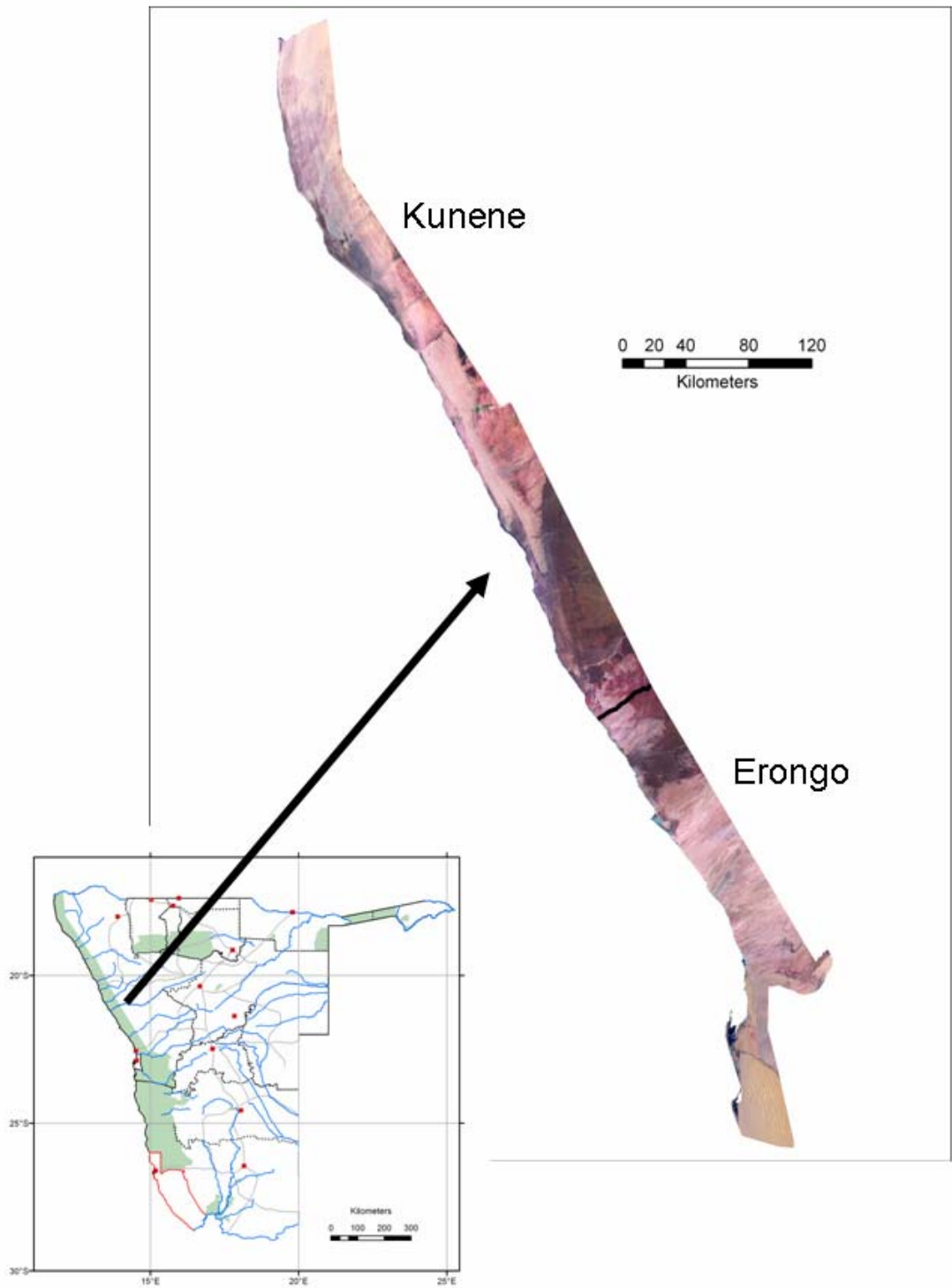


Figure 1: Outline of the Erongo and Kunene coastal zones covered by the SEA.

2. METHODOLOGY

SEA is usually described as an Environmental Assessment (EA) process and method that assists in strategic decision making above the individual project level. SEA therefore refers to the environmental assessment of policies, plans, and programmes (PPPs) towards the purpose of achieving ecologically sustainable development. These days, SEA is increasingly seen as a tool which can address the inter-relationships between biophysical, social and economic impacts, rather than environmental impacts alone. The World Bank's approach to SEA follows in this line. SEA is intended as "a participatory approach for up streaming environmental and social issues to influence development planning, decision making and implementation processes at the strategic level." Three types of SEA are identified by the Bank: sectoral EA, regional EA, and other types of EA. Within each type of SEA a wide range of continuum approaches may be applied from impact-centred to institution-centred approaches¹. The SEA for the Kunene and Erongo Coastal zones can be seen as an institution-centred regional SEA, focused on a particular geographical area.

SEA is a very useful tool for coastal planning and management. According to two experts in the field, it can:

- Enable coastal managers, when they are making decisions, to raise the importance of coastal concerns to the same level as other aspects of development planning
- Facilitate consultation, negotiation and consensus between organisations and the public on a range of coastal issues.

At the same time, in its consideration of the inter-relations between processes, as discussed above, SEA can be particularly helpful taking environmental issues into account whilst preparing or evaluating land use plans. For NACOMA, as for any other Integrated Coastal Zone Management (ICZM) initiative, SEA can help in identifying both the environmental opportunities and the constraints to social, physical and economic development in a coastal zone – and thus supply a broad strategic framework within which ICZM can occur. In this way, SEA provides at least some of the strategic parameters or guidelines within which ICZM can best take place.

Many hundreds (if not thousands) of technical and scientific studies of the biophysical and environmental conditions and dynamics of Namibia's lengthy, thinly populated 1,570 km coastline have been made over the years. Similarly, many attempts, these now dating back several decades, have also been made to link environmental, social and economic dimensions in planning for coastal development. Yet, stakeholders have apparently found it very difficult to reach decisions on resolving key issues like the integrated conservation and management of the dune belt between Walvis Bay and Swakopmund, the Walvis Bay Nature Reserve and Sandwich Harbour. These issues appear to hang on in an unresolved fashion for many years. What is really lacking is not technical or scientific knowledge, or the existence of Policies, Plans and Programmes. There is a plethora of PPPs. Many of these are good documents. Others exist in an unfinished or semi-finished form. Many of them are seemingly unread, let alone implemented. **The real difficulty lies in the inability by stakeholders to find common understandings of and a shared strategic perspective on the economic, social and environmental interactions necessarily involved in coastal development today, and of the adjustments, compromises and trade-offs that need to be made to assure better coastal planning and management.**

A key to a successful development and application of the SEA and DST has been the ongoing liaison with the stakeholders during the entire project. Stakeholder involvement has focused on delivery of planning documents and data, methodologies related to the analysis of land use

¹ www.worldbank.org/seatoolkit

suitability, including the analysis of biodiversity trends as well as on discussions on individual land use plans. The three workshops have served as focal points for communication with the stakeholders. An important element of the project has been the establishment of the coastal SEA GIS (Geographic Information System) – a GIS mapping system covering all major landscape, biodiversity, infrastructure, land use and PPP data of the coastal regions of Kunene and Erongo. The structure of the coastal SEA GIS and metadata information is found in Appendix I. The main goal of the SEA GIS is to facilitate the DST as a tool for assisting the decision-making process at the regional level. Hence, the available physical, biological and land use data have been analysed in an integrated way using multi-criteria evaluation to enable trade-offs between economic, social and environmental issues. In this way the end user will now be able to use the modelled land use suitability data with background information and his or her own data to explore various development scenarios.

A mapping system in support of a coastal SEA not only requires integrated analyses of land use, planning and environmental data, but it also requires a relatively high resolution to produce sufficiently detailed information to be useful in the decision-making process related to various land-use options. Although some GIS data, e.g. the infrastructure data held by the municipalities of Walvis Bay and Swakopmund, are available in high resolution, the majority of GIS data from the Atlas of Namibia or from the Namibian Biodiversity Database are only available in relatively low resolution, this typically exceeding 10 km. Thus, in order to map key components of the coastal landscape with sufficient detail two remote sensing data sets have been used: a Landsat ETM+ data set from 2001 in 28.5 m resolution (University of Maryland) and a digital topographic data set (SRTM) in one meter vertical and 90 m horizontal resolution (NASA). The ETM+ data have been processed to a seamless backdrop for the SEA GIS and have been used as a basis for digitising exact river courses and locate areas with prominent vegetation. The SRTM data have been used to estimate the relief and topographic complexity of the coastal zone. Estimated fine-scale distributions of lichen communities were made available by Dr. Christoph Schultz at the German Aerospace Center. An orthorectified coastline and bathymetry data were made available by the Benguela Current Large Marine Ecosystem (BCLME) project. The data made available by the stakeholders were used to map the spatial extent of current land uses, priority zones for development of some land uses according to PPPs and the range of exploitable resources.

Estimation of land use suitability was made by integration of the PPP data, exploitable resource ranges, current land uses, environmental data, and modelled biodiversity hot spots. Although the two regions boast a variety of internationally recognised nature conservation assets the current boundaries of protected areas may not agree entirely with the gradients in coastal biodiversity found in the regions. Accordingly, gradients in biodiversity were estimated by mapping the distribution of the following 20 priority areas or habitats for conservation: Lichen distribution in Central Namib estimated in 2003, Main habitat for *Welwitschia*, Main habitat for Quiver tree, Main habitat for Mopane, Main breeding zone for Damara Tern, Fur seal colonies, Zone of medium herbivore abundance, Zone of regular Elephant occurrence, Lion density above 0.004/ km, Leopard density above 0.005/km, Mountain zebra density above 0.25/km², Wetlands of global importance, Distance less than 30 km from the Escarpment, Rock outcrops and cliffs, Rocky shorelines, Distance less than 140 km from Etosha, Distance less than 2 km from regularly vegetated ephemeral rivers, Distance less than 5 km from the Brandberg massif, Zones of extensive coverage of higher plants and Areas of high topographic complexity.

These priority areas/habitats for conservation were chosen on the basis of landscape characteristics known as important environmental drivers in relation to the movement of prioritised species of large mammals between Etosha and the coast, in relation to the distribution of prioritised species of birds and higher plants, and in relation to increased levels of diversity and endemism in plants, invertebrate and vertebrate animals (e.g. Harrison et al., 1997; Simmons et al., 1998; Curtis & Mannheimer, 2005, Loots, 2005). The mapped priority areas/habitats were combined into three classes of area importance. Land use suitability was modelled for each land use type using multi-criteria evaluation (weighted linear combination). The environmental factors for each land use were combined with information (if available) on

exploitable resources, areas currently developed for urban land use, areas outlined by PPPs as priority development areas and the mapped priority areas/habitats for conservation. The four latter data sets were used as technical constraints to development: i.e. no development was regarded as suitable if the area was outside a PPP zone, or in areas of no exploitable resources, or in urban land use zones, or priority areas/habitats for conservation.

3. SEA ASSESSMENT - GENERAL

More than 90% of the two coastal regions fall within Namibia's national protected areas system. At the same time, the boundaries of the Skeleton Coast Park, the West Coast Recreation Area and the Namib-Naukluft Park were proclaimed before Namibia gained independence and the modern environmental legislative framework in support of the integration of nature conservation and sustainable development was established. Thus, with the exception of the Namib-Naukluft Park, no clear goals have been set up linking management of human resource use and the conservation status of key species and habitats. As a result it is unclear which biodiversity elements constitute the focus for the coastal parks, and which elements are the focuses of more wide-scale habitat conservation action due to their widespread occurrence or lower susceptibility to human activities. This lack of conservation targets degrades both the conservation of the most sensitive elements of the biodiversity in the coastal parks as well as the implementation of sustainable development within the park's boundaries.

Like other studies on biodiversity trends in Erongo and Kunene, the SEA clearly indicates a mismatch between the boundaries of the coastal parks and the general trends in biodiversity found in the coastal regions. The trends are quite striking and underline the fact that conservation priority areas and habitats in the protected coastal parks are indeed not evenly distributed along or across the coastal strip. The NBSAP provides for the implementation of article 95:1 of the Namibian Constitution and the Convention on Biological Diversity and it offers to the Ministry of Environment and Tourism (MET) the legal mechanisms for achieving the goal to develop management plans for the coastal parks. Currently, however, management plans with zoning of the area and tourism development plans have only been prepared for the Namib Naukluft Park. In that respect the SEA provides guidance to the zonation of the parks into potential areas for sustainable development and areas of differential sensitivity and importance as a basis for identifying core areas for conservation to be held free of any development.

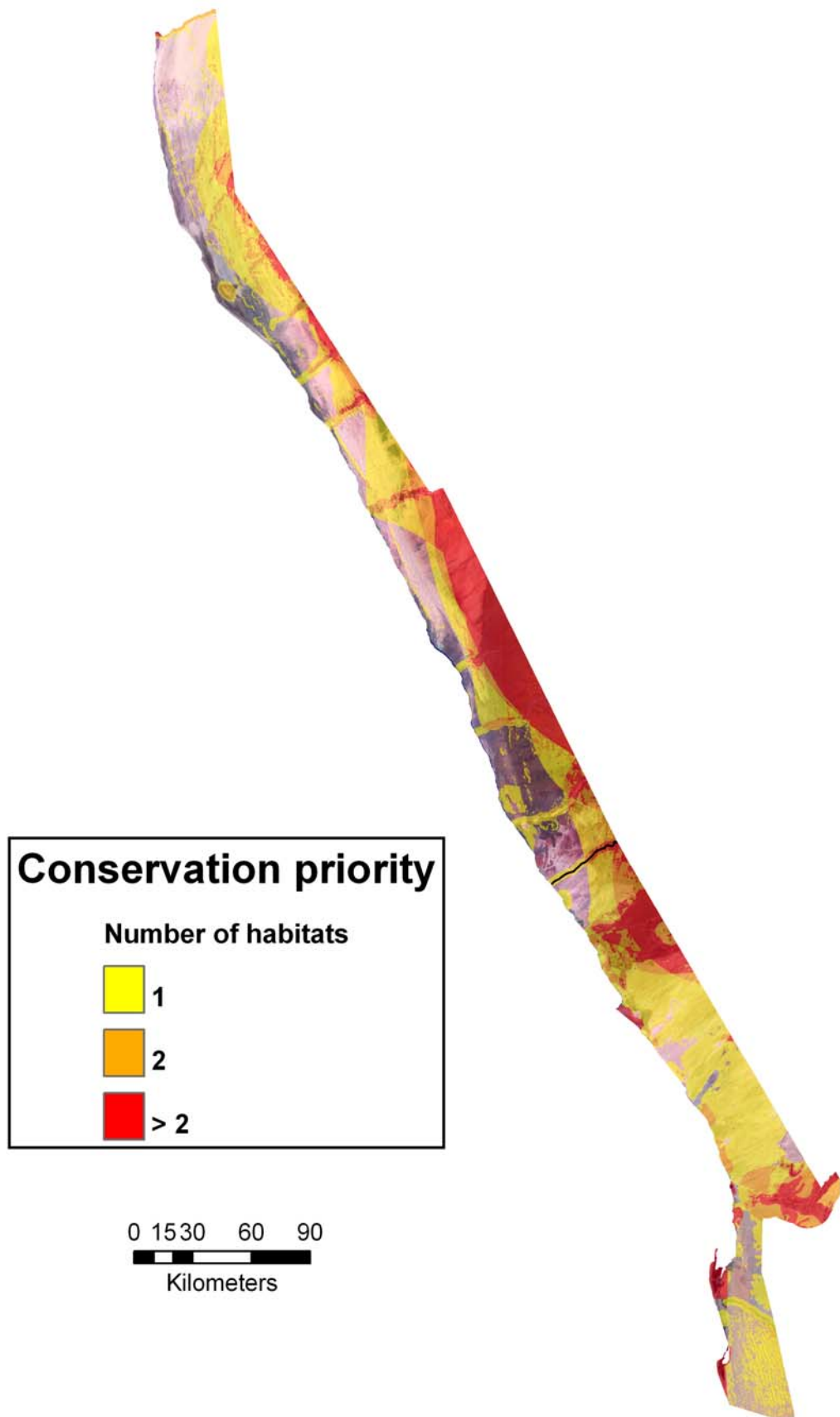


Figure 2: General Biodiversity trends as reflected by the analysis of the distribution of priority areas and habitats for conservation. Priority areas have been grouped into three categories according to the number of target habitats present.

Due to the enormous biodiversity assets of the coastal regions of Erongo and Kunene and the sensitive ecosystems they support, the largest development potential is related to the tourism industry. Although tourism land use patterns can not currently be separated into the various types of tourism activities undertaken on the coast, it is clear that low-impact adventure and wildlife tourism (eco-tourism) can be widely applied and developed hand-in-hand with the conservation of biodiversity hot spots. Indeed, in terms of competition with other destinations – both domestic and international and even regional – preservation of the extraordinary conditions of the coastal environment in Kunene and Erongo might give the industry a competitive edge.

However, due to the fact that tourist policy and plan making are lagging behind both at regional and local levels, a current strategy and a support programme for both conventional and eco-tourism are urgently needed to boost the sector in both Kunene and Erongo. Local governments, at times working together, are enabling the activities of a resurgent private sector. But coordination between stakeholders seems poor, and there is little shared understanding of how coastal tourism has shifted its target markets, adapted its products, and moved forward. Up to date information to back up such an understanding is lacking. In this situation, there is a danger that environmental planning and management receives only lip service, and the resources on which coastal tourism depends are degraded. The need to strengthen the basis for capitalising on the potential win-win development scenario between eco-tourism and nature conservation on the coast is closely linked to the need to strengthen the power of MET relative to other line ministries and to align tourism development on the coast with the MET Concessions Policy. The full use of the tourism potential in the coastal areas will also depend on the implementation of the Neighbours and Residents Policy, as tourism is currently growing in inland escarpment areas outside the coastal zone.

Compared to eco-tourism, other land uses, including traditional 'high-impact' tourism, possess a significantly smaller development potential in the two coastal regions. In spite of the lower potential, sustainable development is possible to achieve for all land uses by adopting the following environmental standards for land use development in pristine and sensitive environments:

- Avoidance of the most sensitive areas identified on the basis of a detailed baseline, in which habitat sensitivity in focal areas for land use development is mapped or modelled prior to environmental impact studies. The SEA provides guidance on the general location of hot spots of biodiversity, and may be used as basis for designing more detailed studies of the sensitivity of the areas in relation to various development projects;
- International standard environmental impact studies coupled to careful mitigation which secures the application of effective response mechanisms, which can then allow developments to proceed in close proximity to important and sensitive habitats. In cases where significant impacts can not be avoided, changes to the planned development must take place. In cases where impacts of minor or moderate scale are estimated, careful mitigation measures must be set up and the residual impact following implementation of mitigation must be estimated. Assessments of single project as well as cumulative impacts of a planned project together with all other existing human activities must be included.
- Comprehensive environmental monitoring and management, which secures that the level of control necessary to assure authorities and NGOs of compliance with environmental quality objectives for development in proximity to sensitive habitats, requires quantifiable compliance targets. Of equal importance are effective and rapid response mechanisms, to allow feedback of monitoring results into compliance targets and work methods.

Eco-tourism potential

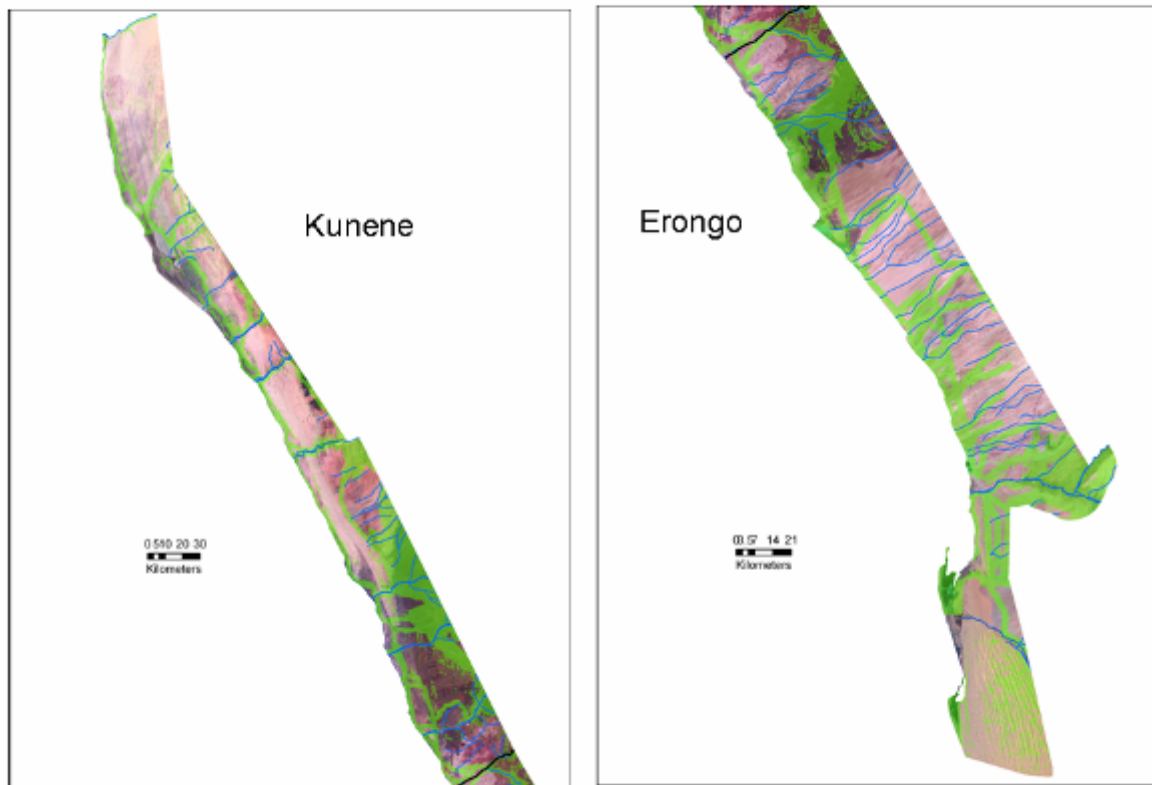


Figure 3: Eco-tourism potential in Kunene and Erongo coastal areas.

As stated in the Vision 2030 sub-vision on urbanisation there is a growing need for Namibia's secondary cities like Walvis Bay and Swakopmund to play a bigger part in absorbing urban development than they do today, when Windhoek is hosting the major urban growth. Accordingly, the need for better urban policy, planning and management to accommodate urban growth is likely to become a more urgent imperative in the future. Sustainable urban development will rely on urban policy, planning and management practices facilitating the development of the Walvis Bay - Swakopmund area as a sub-regional platform to spatially concentrate, accommodate and enhance the benefits of urban and economic growth in the Erongo Region.

The location of nearby areas of conservation priority like the river valleys of the Kuseb and Swakop rivers, the wetlands like Walvis Bay Lagoon, lichen fields and localised high densities of breeding Damara terns severely constrain the suitability for spreading urban land use beyond areas currently allocated to residential, beach resort and industrial establishments. However, even facing these constraints Walvis Bay and Swakopmund can increase their importance as a key national asset by developing an improved basis for spatial planning and management, by observing high standards of strategic and impact assessment and by developing detailed tourism plans.

Potential for urban development

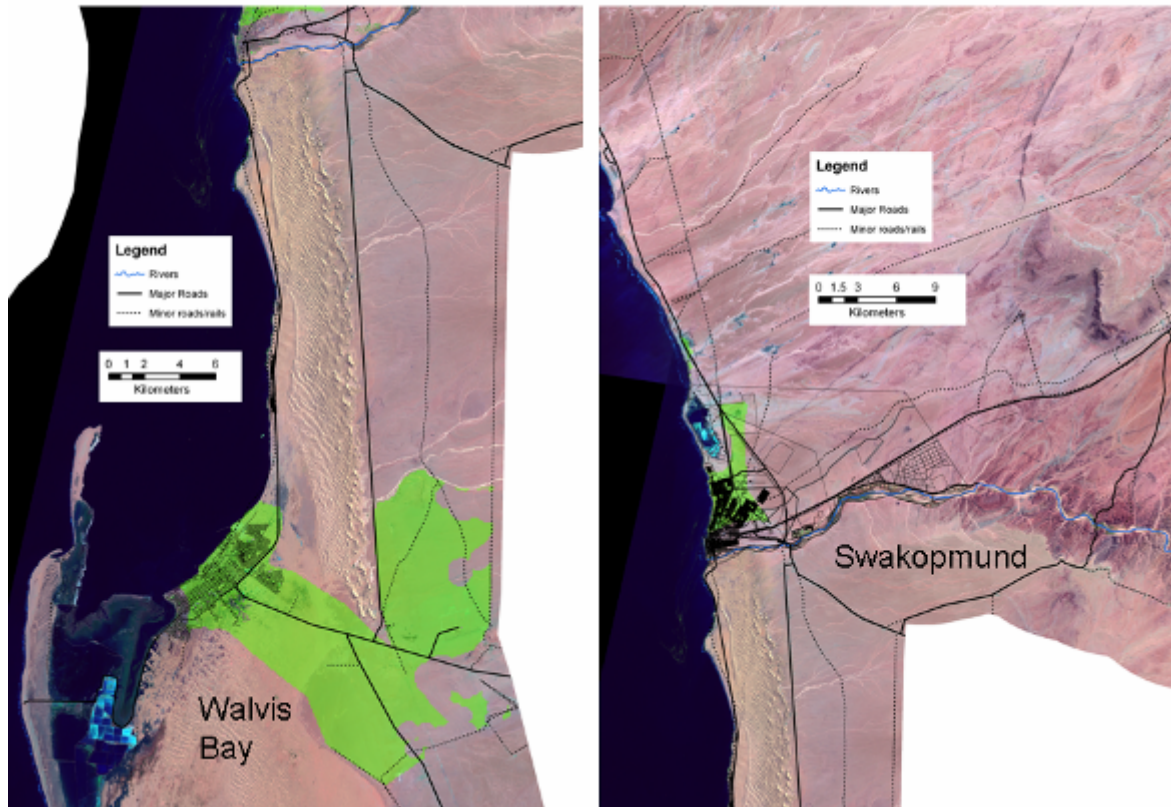


Figure 4: Potential for urban development in Walvis Bay and Swakopmund

A major factor in the future economy of Erongo and Kunene is the mining industry. In order to improve planning of the extraction of minerals and avoid unsustainable development of the industry on the coast the environmental standards for land use development in pristine and sensitive environments mentioned above must be observed. It is particularly important to ensure liaison with MET at an early stage of prospecting for mineral extraction in the protected areas and national monuments. For each licence awarded, MME and the MET must agree with the licensee on the scope of the prospecting in terms of volume of soil/sand removed. Larger amounts may only be removed after exemption or renewed application and permit. A new Bill is being prepared which introduces requirements for financial guarantees for reparation of environmental damage and the setting up of trust funds for rehabilitation after mine closure. This may provide leverage for the enforcement of rehabilitation. The environmental monitoring of mining activities which is carried out by the Division of Engineering and Environmental Geology of MME provides for an important environmental control of potentially adverse impacts like excessive water supply, dust emission and pollution of surface- as well as groundwater. Here, again, MET should be involved as a third party to evaluate monitoring results.

Better planning of water resource use in mining activities must also be regarded as a key to a more sustainable mineral extraction on the coast. The existing water use policy, which leaves the organisation of water supply to the individual mining company, has to be replaced by a policy which ensures that suboptimal water extraction/desalination and distribution patterns do not emerge. As the current water use in Erongo is over-utilising the water resource, desalination plants are being considered whenever future water demands are discussed. A feasible project has yet to appear, but other coastal developments in arid zones have resorted to this solution and the cost of the technology is decreasing. Namwater may licence a desalination plant feeding mines through a distribution network to mines based on the Rössing pipe.

Aquaculture (fish and seafood) has gained considerable interest in Namibia over the last few years. The current National Development Plan (NDP 2) calls for the promotion of aquaculture activities and the national policy paper Vision 2030 both foresee a thriving aquaculture industry. Since 2003, the Aquaculture Act has provided a legislative context, and the policy paper Towards the Responsible Development of Aquaculture (2001) and the Aquaculture Strategy (2004) were developed to address the development of a sustainable aquaculture sector. Recently, detailed plans have been developed for Erongo, while very little aquaculture has been proposed in the Kunene region due to the distance to market and infrastructure challenges. In addition, the Walvis Bay Council has proposed to zone two plots between Walvis Bay and Swakopmund for aquaculture development with land based facilities. Unfortunately, the current plans have not been founded on the basis of a comprehensive environmental master plan which considers both the natural marine environment from a feasible production and environmental point of view. An environmental master plan could provide a detailed zoning on the basis of the SEA and water quality data available from BCLME and could provide a sectoral strategic environmental assessment including modelling of effects on local water quality properties. The modelled suitability for sea-based and land-based aquaculture made by this SEA indicates that suitable locations in Erongo are few and localised and associated with Walvis Bay, Swakopmund and Henties Bay. Hence, proper planning of aquaculture developments in Erongo will require careful scrutiny of potential land use conflicts between residential areas and suitable areas for aquaculture.

Potential for aquaculture development

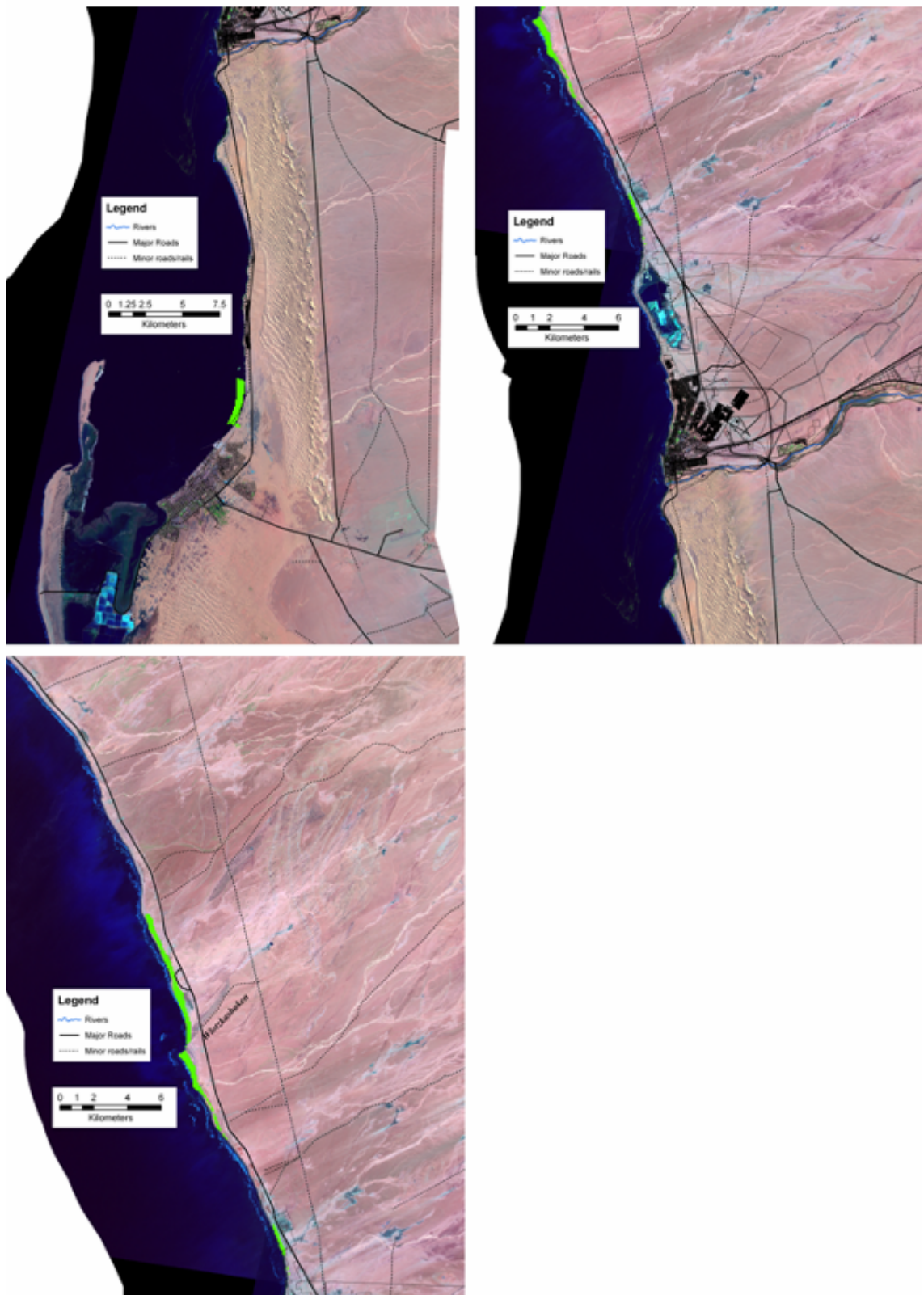


Figure 5: Potential for aquaculture development in Walvis Bay, Swakopmund and Wlotzkasbaken

4. SEA ASSESSMENT - SPECIFIC

1.1. Erongo

1.1.1. Sandwich Harbour

The SEA classified the area as of very high conservation priority. In line with the new Wetland Policy, Sandwich Harbour should be declared a Marine Protected Area to protect the large numbers of water birds, fish spawning and rearing in the area, the shark population and the possibility of right whale calving. A detailed management plan should be prepared allowing strict protection of the site, while enabling low-impact eco-tourism to continue to take place.



Sandwich Harbour
Photo: N. Cadot

1.1.2. Walvis Bay Wetland

The SEA classified the area as of very high conservation priority. In line with the new Wetland Policy, enforcement of the Walvis Bay Nature Reserve Management Plan should be pursued in the short term. MET should formally designate the Nature Reserve as a protected area. MET, the Walvis Bay Municipality and the Coastal Environmental Trust of Namibia should ensure further enforcement of the national Wetland Policy in the area by adopting the Nature Reserve Management Plan.

MET, the Walvis Bay Municipality and the Coastal Environmental Trust of Namibia should as soon as possible also establish a long-term environmental monitoring programme including the biodiversity elements for terrestrial, coastal as well as offshore habitats found in the wetland. A baseline for the monitoring programme should produce diversity gradients in relation to tourism, aquaculture and agriculture and the acquired data should feed into the requirement for improved Environmental Impact Assessments. To make full use of the potential for development of eco-tourism and traditional tourism in the wetland, a tourism development plan for the Nature Reserve should be drafted by the Walvis Bay Municipality in collaboration with the Walvis Bay Tourism Association and the Marine Tour Association of Namibia. Developments of all tourist activities in the reserve and accommodation adjacent to the reserve should occur on the basis of permissions subject to Environmental Impact Assessment. A feasibility study of the development of the existing aquaculture farms for oyster and future marine and land-based aquacultures in the wetland should be made in relation to the most sensitive parts and residential areas.

The aquaculture development near Pelican Point is in waters zoned for port activities and included in the nature reserve. The planned area conflicts with the dredge spoil dump site nearest to the harbour and may conflict with the conservation targets for the nature reserve. An environmental master plan for the AquaPark should include provisions for retrieving oysters when dredging and spoil dumping is in progress and detailed assessments of impacts on coastal and marine biodiversity elements.



Walvis Bay Lagoon
Photo: N. Cadot

1.1.3. Dune belt

Following the intent of Cabinet decision no. 5th/27.03.07/013 the dune belt, which is currently managed by MET, should be included in the Walvis Bay Nature Reserve, and free zones for off-road driving should be maintained east of Walvis Bay and east of Long Beach. The demarcation of the free zone east of Long Beach should take account of the area used by breeding Damara terns south of Long Beach. The management and environmental monitoring of the area should be part of the activities proposed for the Nature Reserve. Expansion of eco-tourism activities should be promoted through inclusion of the dune belt in the proposed Walvis Bay tourism development plan. Once the existing mining licenses expire, new reconnaissance, prospecting or mining licences should not be granted in the dune belt. The zoning of eco-tourism and free zones for off-road driving should become object of a detailed Environmental Impact Assessment.



Dune belt between Swakopmund and Walvis Bay
Photo: N. Cadot

1.1.4. Walvis Bay

The process for the revision of the Walvis Bay Municipality Structure Plan will be concluded in the next months. This will involve, in part, the discussion and approval of the proposals relevant to the Esplanade and to the coastal area. This process provides a valuable opportunity for Walvis Bay Municipality and other stakeholders to resolve the land use and zoning issues that have caused controversy for a long period. The proposals for the Esplanade are broadly in line with the structure plan. The proposal for encouraging higher density developments and activities related to conventional tourism along the lagoon, should be reconsidered or justified further, as the modelled land use suitability for conventional beach tourism in the Walvis Bay area indicates low suitability along the lagoon. Protests about the proposed mixed use development on the Atlantis Sports Grounds could be set to rest by keeping the development on the eastern side of the road, and therefore not closing the Esplanade to through traffic.

The SEA indicates high biodiversity values in the northern part of the coastal area adjacent to the Swakop River and the land use suitability maps indicate a lack of suitability for land uses other than eco-tourism. This area remains undeveloped, and the only proposal for development that was subjected to an EIA in recent years – a residential area near the Swakop River in 2002 – was rejected by MET on the basis of the Environmental Impact Assessment (EIA) and the Peri-Urban Policy. In view of its biodiversity and recreational and landscape values, it is recommended that the area, which is still in any event state land, be maintained solely as a Conservation Area, as per the original Walvis Bay Structure Plan and Peri-Urban Land Use Policy. The proposals for nodal residential developments near the Swakop river mouth and in the Vierkantklip area should be rejected. The Conservation, Eco-Tourism and Aquaculture – these are uses that do not fit easily with one another – zone at Caution Reef should also be shelved.



Walvis Bay
Photo: N. Cadot

The *fait accompli* of urban and economic development on the southern part of the coast should be accepted by stakeholders. This development started nearly 20 years ago with the proclamation and development of Long Beach. It was given ample room for expansion by WBM's rezonings in 2003 and the subsequent development of Long Beach Extension 1 and of the three new residential areas that are now either underway or planned for the near-term future. The structure plan revisions propose a mix of harbour and aquaculture, residential and public beach/recreational activities in the area. These should be accepted, as indicated by the SEA land use suitability models. More analysis will have to be done on the means that can be used, such as design guidelines, for assuring that these very different land uses do not conflict with one another, with negative impacts for residents and the natural environment. At the same time, sufficient public beach and recreational space and access to it for residents will be needed to also be assured. Given that the land-use suitability models indicate that the majority of the area sustains low suitability for aquaculture and high suitability for tourism the potential for increased recreational uses of the area should set the scene.

1.1.5. *Swakopmund*

It will be necessary for SM and MFMR to decide jointly which portions of the land between Mile 4 and the Mile 4 Saltworks should be allocated to aquaculture and which to possible future urban development. In principle, both uses can be accommodated, as indicated by the SEA land use suitability models, providing measures are taken to mitigate any impacts from the essentially industrial processes which characterise aquaculture. The area north of the Saltworks is seemingly more suitable for land-based aquaculture development. An EIA is recommended for any future developments of scale in the area.



Mile 4 Saltworks and Swakopmund
Photo: N. Cadot

1.1.6. *Mile 4 Saltworks*

The Mile 4 Saltworks comprises a private nature reserve of 400 ha, saltworks, guano platforms and oyster production. No conflicts seem to exist between the waterbird concentrations, the salt extraction, oyster production and guano scraping at the Saltworks. In line with the new Wetland Policy the current seemingly sustainable activities should be monitored and any new development should be subject of environmental impact assessment. The area just north of the Saltworks has been identified as a potential development area for land-based aquaculture by MFMR, and the land use suitability models of the SEA indicate that the area is suitable for aquaculture development.

1.1.7. *Wlotzkasbaken*

Under the auspices of the ERC, a structure or development plan should be prepared for the Wlotzkasbaken area. This should highlight both development options (residential, recreational, aquaculture, etc.) and the zoning of future land uses.

1.1.8. *Henties Bay*

The tourism development in Henties Bay overlaps with an urbanisation of prime land along the beach, and it is therefore recommended to consider future profitable and sustainable tourism development along the coast of the town of Henties Bay. Development should continue to be directed towards the south of the current urban area. The potential for land-based aquaculture should be pursued to the south of the town.



Henties Bay
Photo: N. Cadot

1.1.9. *Brandberg Massif*

The SEA classified the area as of very high conservation priority. The rocky areas of the Brandberg Massif, which are connected with Namibia's highest mountain Brandberg, at 2,606m, located in the central section of the Namib Desert some 30 km from the boundary of the National West Coast Recreation Area, is a priority area for conservation of a wide range of desert plants and animals. The area also includes the Messum Crater. Recent analyses show that Brandberg is the epicentre of a rich vein of endemic mammals, reptiles, plants and amphibians that runs from the Sperrgebiet in the south to the Otjihipa Mountains in the north. No other area in Namibia is as rich in endemics as the Brandberg massif; among the 90 endemic plants, eight are found nowhere else, whilst three of six near-endemic frogs, eight of 14 near-endemic mammals, 49 of 59 near-endemic reptiles, and 11 of 14 near-endemic birds occur on or around this inselberg. No land use development, except for eco-tourism, should take place in the Brandberg Massif.

1.1.10. *Cape Cross Nature Reserve*

Currently this wetland is registered as a nature reserve with the purpose to restrict access to the public. The seal reserve is visited by 40,000 tourists per year. In line with the new Wetland Policy, the current seemingly sustainable levels of tourism, guano-scrapping and small-scale salt-extraction activities should be monitored and any new development should be subject of environmental impact assessment.



Cape Cross Guano Platform
Photo: N. Cadot

1.1.11. *National West Coast Tourist Recreation Area (NWCTRA)*

MET should develop a new conservation management regime for the NWCTRA, which satisfies the requirements for improved integration of growing land uses and nature protection. New management plans should establish a multiple use framework for future developments with zonations for all land uses, including information on the most sensitive areas to be avoided by mining activities, on the basis of detailed profiles of landscape, vegetation, wildlife, livestock and human settlements. The SEA provides assistance to this process.

The mapping of priority areas for conservation indicates that the most sensitive areas and areas with the largest eco-tourism potential within the NWCRA are found at Cape Cross Lagoon and Seal Reserve, the river beds and associated areas of the Swakop and Ugab rivers

and the rocky area associated with the Brandberg Massif and the Messum Crater. Other land uses, including conventional tourism, should be focused on the parts of the NWCRA with limited concentration of biodiversity. The development of conventional and eco-tourism should be guided by a tourism plan for the area.

1.2. Kunene

1.2.1. Skeleton Coast National Park

The Skeleton Coast National Park is a globally unique place, and must maintain its protected status and wilderness characteristics. At the same time, increased sustainable activities regarding tourism are possible which will benefit locals and neighbours in adjacent conservancies. The government's policies on Protected Areas, Neighbours and Resident People and the Policy Framework for Concessions in Proclaimed Protected Areas should be implemented as soon as possible, and the park's Master Plan should be agreed upon and enforced. New management plans for the Skeleton Coast National Park, the Trans Frontier Conservation Area (TFCA), and the proposed extension to Etosha should establish target habitats for conservation and species action plans as well as zonations for all land uses, including areas to be avoided by mining activities, on the basis of detailed profiles of landscape, vegetation, wildlife, livestock and human settlements. The SEA provides guidance to this process.



Mõwe Bay – Skeleton Coast National Park
Photo: J. Paterson

Development of diamond mining activities in the park is undertaken without advice on sensitive zones to be avoided and best areas for location of pipelines, tracks and roads. The lack of a detailed management plan has also introduced other activities in sensitive areas like off-road driving, recreational angling, private tourism, littering and the excavation of trenches. The SEA and the mapping of priority areas for conservation will contribute to the understanding of the sensitive areas. The most sensitive areas are the mouth of the Kunene River, the river beds of the ephemeral rivers with prominent stands of higher plants and the eastern-central sector between Koigab and Hoanib rivers. The easternmost parts of the river beds of the Ugab, Huab, Koigab, Uniab, Hoanib, Khumib and Hoarusib located within the Skeleton Coast National Park are characterised by habitats which support elevated densities of a wide range of taxa and species, like growth of *Acacia* spp. and *Colophospermum mopane*, rocky areas like the Agate Mountain and high topographic complexity. The unique fauna includes several species of large herbivorous and carnivorous mammals, and bird species like the Black harrier. The eastern-central sector of the Skeleton Park between Koigab and Hoanib rivers marks a zone of significant concentrations of habitats, especially for mammals migrating between Etosha and the coast as well as for a number of bird species recruited in the Escarpment. In addition the zone supports extensive coverage of *Welwitschia*, and rock outcrops are found centrally while an area of high complexity is found in the south. The zone is used both by relatively common

mammal species like Springbok as well as by rare and endangered species like Mountain zebra, Lion, Elephant and Leopard. Elephants seem mainly to use the northern-most part of the zone.

The northern part of the Skeleton Coast Park from the Kunene River to Möwe Bay should remain a closed area and be integrated with the planned TFCA. Möwe Bay should develop its tourism potential to accommodate and shelter for day trippers from Terrace Bay and fly-ins; this would include new housing to replace the existing pre-fab constructions. The landing site (“harbour”) should be improved to allow launching of angling boats. The MET facilities should be rehabilitated with a clear objective of becoming a showcase sustainable settlement with solar and wind power, desalination, housing construction etc. Terrace Bay should be developed to capitalise on the suitability of the location for tourism, including beach resorts. The area might be developed into a high-end angling site and the point-of-departure for day trips to Möwe Bay and trips to the adjacent core wilderness area with accommodation in an all inclusive resort. Torra Bay should remain a site for budget accommodation aimed at domestic, and SADC region eco-tourist and angler target groups. The development of a Skeleton Coast Biodiversity Center in support of eco-tourism should be explored aiming at the improved potential for wilderness safaris in the Skeleton Coast – Etosha extension area.

Considering its vast area, the park ranger staff is severely understaffed. It should be discussed in MET, MME, MFMR and other relevant Ministries how existing responsibilities with respect to surveillance and inspection of the North West of Namibia can most efficiently be carried out. Costs could be shared and rangers could carry out duties for other ministries to increase frequency and efficiency. From the biodiversity and eco-tourism point of view the proposal for the construction of a port in Cape Fria or Angra Fria should not be pursued, since the necessary infrastructure developments will severely affect the present remoteness/wilderness attraction to tourists. Unless national strategic concerns or strong economic incentives dictate a revisiting of the proposal it seems neither feasible nor sustainable under the present conditions.

1.2.2. *Conservancies*

In order to develop a wider palette of tourist services in the Skeleton Coast National Park with the involvement of the conservancies it is of the utmost importance that the Master Plan adopts a multiple use framework for the management of the park, which includes the three conservancies of Palmwag, Etendeka and Hobatere. A multiple use framework needs to be developed with detailed advice on sensitive zones to be avoided by tourism, mining exploration and production and other human activities as well as advice on the best locations for the placement of supporting infrastructure like pipelines, tracks and roads.

1.2.3. *Kunene River Mouth*

The building of a dam at Epupa will require that a management framework be set up covering the entire lower Kunene River for successful management of the TFCA. Water availability influences the type and biological quality of the planned TFCA.



Kunene River Mouth
Photo: J. Paterson

This is especially true in the Kunene River Mouth as it is located in an arid region. A thorough understanding of the overall hydrology is thus imperative for all management aspects both in the TFCA as such as well as in the upstream part. Literally, the Kunene River Mouth is the 'end of the line' and all interventions in the upstream part will inevitably have an impact downstream. Unpredictable changes in the overall climate conditions may also dramatically influence the Delta area. Obviously, strategies to construct a dam may have significant adverse effects on the potential for freshwater fisheries, aquaculture and angling. Management aspects of the TFCA should therefore be seen in a dual context – both from an upstream view and from a downstream view.

5. THE SEA DECISION SUPPORT TOOL (DST)

One of the outcomes of the coastal SEA is the synthesis of PPPs and the GIS-based dissemination of information and data within the framework of a user-friendly, policy relevant and IT-based DST. The DST has the role of informing the decision making process on land use options in the two coastal regions, and does not provide decisions per se. As the GIS capacity of the primary end-users, the Regional Councils, is relatively low the DST has been developed as a stand-alone application, - either as a cluster of PDF files with results of the suitability maps for each land use type or as a collection of GIS files, encompassing all major results and background files, which can be viewed in the widely available ArcView 3.2 as well as in the freeware ArcExplorer.

The early version of the DST will be disseminated as a CD-ROM, which apart from the PDF-files and GIS files will also contain the SEA Final Report and a manual for using the maps in ArcView/ArcExplorer. Following this a longer-term solution for the DST needs to be developed, which ensures that the DST data and functions are available via the Web. In figure 1 the design of the DST has been sketched. In figure 2 the potential Coastal DST Web server has been sketched. The DST Web service may be installed on a PC server at MET with copies residing on the PCs of other key institutions like the regional councils of Kunene and Erongo and the municipalities of Walvis Bay and Swakopmund. Following the finalisation of the Strategic Environmental Assessment and DST for Karas and Hardap, the DST Web service could accommodate a full set of land-use suitability scenarios and background data for the entire Namibian coastline.

The coastal GIS the DST will have a resolution of 90 m. This high resolution serves to provide the end users with possibilities for resolving land use conflicts/solutions at the finest possible scale with the data at hand. The choice of regions and sub-regions and themes to display is different between the PDF and the ArcExplorer application. In the PDF maps showing pre-defined themes for the different sub-regions will be available, while in ArcExplorer the end user will be able to select any theme and any portion of the mapped coastal stretch of Kunene and Erongo for visualisation. The collection of GIS maps with ArcExplorer will make it possible for the local user to add his/her own project data in vector and raster format.

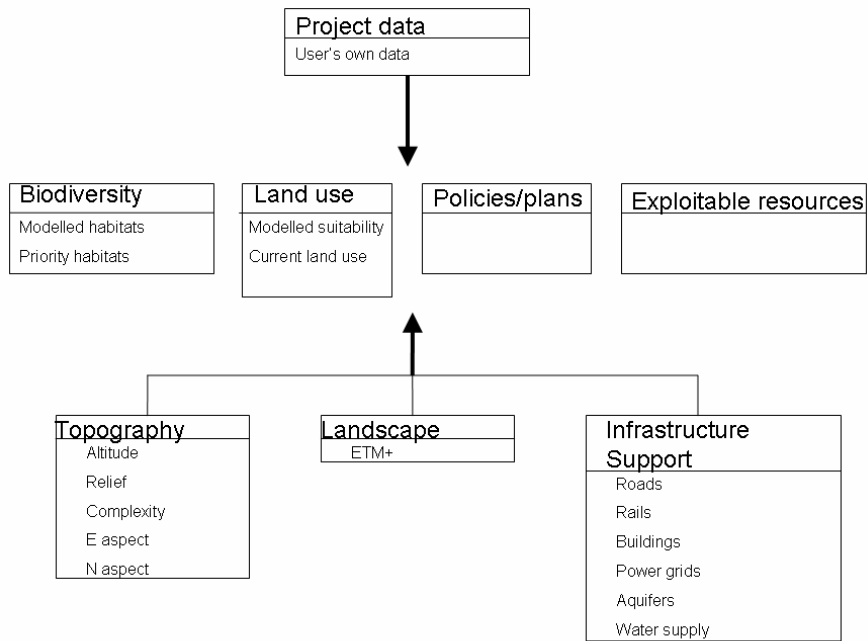


Figure 6: Design of the coastal DST, with main themes and data types supported

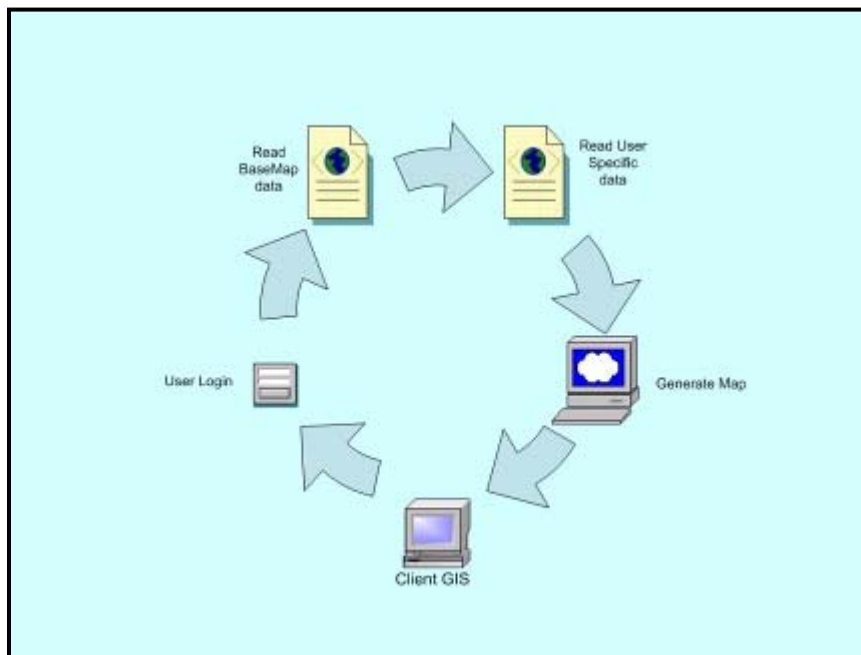


Figure 7: Sketch of the potential coastal DST Web server.