Namibia's Natural Resource Sector

A CONTRIBUTION TO
VISION 2030

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FIRST DRAFT

September 2001
VISION FOR THE NATURAL RESOURCE SECTORS FOR 2030

Namibia shall develop its natural capital for the benefit of its social, economic and ecological well-being by adopting strategies that:

- Promote the sustainable, equitable and efficient use of natural resources;
- Maximise Namibia’s comparative advantages; and
- Reduce inappropriate resource use practices

However, natural resources alone cannot sustain Namibia’s long-term development, and the nation must diversify its economy and livelihoods.
ACKNOWLEDGEMENTS

The Namibia Natural Resources Consortium extends their gratitude to Dr. Burger Oelofson (MFMR), Mr Piet Heynes (DWA) and Mr Bertus Kruger (DRFN) for acting as external reviewers on selected chapters in this document. In addition it wishes to thank all individuals that participated in the natural resource sector Vision 2030 consultative workshops.

LIST OF ABBREVIATIONS, ACRONYMS AND TERMS USED IN THIS DOCUMENT

BENEFIT - The Benguela Environment Fisheries Interaction and Training programme
CBNRM – Community Based Natural Resource Management
DEA – Directorate of Environmental Affairs
DF – Directorate of Forestry
DRFN – Desert Research Foundation of Namibia
DWA – Department of Water Affairs
EA – Environmental Assessment
EEZ – Exclusive Economic Zone
EIA – Environmental Impact Assessment
EIF – Environmental Investment Fund
EMA – Environmental Management Act
EPZ – Economic Processing Zone
GDP – Gross Domestic Product
GMOs Genetically Modified Organisms
GRN – Government of the Republic of Namibia
IBAs – Important Bird Areas
ICZM – Integrated Coastal Zone Management
ICZMP – Integrated Coastal Zone Management Plan
ISO – International Standards Organisation
MAWRD – Ministry of Agriculture, Water and Rural Development
MET – Ministry of Environment and Tourism
MFMR – Ministry of Fisheries and Marine Resources
MHSS – Ministry of Health and Social Services
MHWS – mean high water spring (tide mark)
MLRR – Ministry of Lands, Resettlement and Rehabilitation
MME – Ministry of Mines and Energy
MoL – Ministry of Labour
MWTC – Ministry of Works, Transport and Communication
NAMDEB – The partnership formed between the Government of Namibia and De Beers. This company owns the sole mineral rights to prospect for diamonds in the Sperrgebiet (Diamond Area 1).

Namport – Namibian Port Authority
NAPCOD – Namibia’s Programme to Combat Desertification
NBRI – Namibia’s Botanical Research Institute.
NDTF – National Drought Task Force.
NDVI – Normalised Difference Vegetation Image
NEPRU – Namibian Economic and Policy Research Unit
NGOs – Non governmental organisations
NNBTF – Namibia’s National Biodiversity Task Force
NNF – Namibia Nature Foundation
NOAA – National Oceanic and Atmospheric Administration (USA)
NPC – National Planning Commission.
NRA – Natural Resource Accounts
RAMSAR SITE – A wetland of recognised international importance, (under the Ramsar Convention) especially as a waterfowl habitat.

SADC – Southern African Development Community which consists of the following 13 country members: Angola, Botswana, Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe.
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(Source: Research and Information Services of Namibia)

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EXECUTIVE SUMMARY

INTRODUCTION

Commercial fishing, mining, agriculture and nature centred tourism currently sustain Namibia’s national economy and the majority of rural Namibians rely heavily on natural resources for their livelihoods. In addition, Namibia’s natural environment provides essential services, natural capital and genetic resources that buffer the Nation against economic uncertainty, disease and environmental change.

Namibia’s renewable natural resource base is characterised by low productivity and/or high variability. The country’s soils are generally poor, easily degraded and most of the land has low capability for conventional agricultural activities. In the absence of a clear vision – one that is guided by well-formulated policies and consistent strategies - it is inevitable that Namibia’s high dependence on natural resources will become economically and ecologically unsound.

Since Independence the Namibian government has adopted planning as a management tool to help ensure effective decision-making. Five-year development plans, beginning with National Development Plan I (NDP I) for the period 1995 – 2000, are at the heart of this strategy. This document is one of eight thematic studies that, when combined, will form Namibia’s VISION 2030 which aims to enhance sustainable human development by formulating a shared vision on strategic issues facing Namibia’s future. This report recognises VISION 2030 as a broad, unifying vision that will help to guide the country’s five-year development plans from NDP III through to NDP VII and, at the same time, provide direction to government ministries, the private sector, NGOs and local authorities.

The overriding message that this study conveys is: By capitalising on Namibia’s comparative advantages and providing appropriate incentives to use our natural resources in the most efficient way possible, decision-makers today will be in a better position to create a safer, healthier and more prosperous future for all Namibians – to 2030 and beyond.

There must, however, be focussed political will to achieve this. Governance must be improved and issues relating to environmental degradation, growing poverty and economic stagnation must be addressed through sound policy development and strict implementation.

The document is presented in two main sections: Section A, which provides an overview of Namibia’s natural capital and environmental issues; and Section B which provides in depth discussion regarding Namibia’s Ideal Vision to 2030, the key challenges that will prevent us from realising this vision, the key strategies needed to get there and the indicators that are needed to help track our progress.

A. OVERVIEW OF NAMIBIA’S NATURAL CAPITAL AND ENVIRONMENTAL ISSUES

1. MARINE ENVIRONMENT AND FISHERIES

Characteristics of Namibia’s marine environment
Namibia’s entire 1600 km long coastal zone falls within the Namib Desert and is characterised by low rainfall and limited freshwater resources. The inshore marine environment provides valuable migration and nursery habitats for many marine organisms. The few coastal towns and settlements are important centres for tourism, industry and commerce and, although employment opportunities are limited, these towns currently attract large numbers of rural migrants.

Namibia’s marine ecosystem, the Benguela, supports vast populations of commercially exploitable fish species. The climatic conditions that determine prevailing winds, ocean currents, water temperature and fish stock distribution vary with temporary changes in the Earth’s atmosphere. As a result, the maximum
EXECUTIVE SUMMARY

INTRODUCTION

Commercial, federal, private, academic, and public entities cooperate to implement and maintain a national marine sanctuary. This document examines the development and implementation of marine sanctuaries and the potential for future expansion.

The benefits of marine sanctuaries include protection of marine habitats, preservation of biodiversity, and enhancement of local economies. These sanctuaries serve as model systems for the management of marine resources.

A. OVERVIEW OF NATIONAL CAPITAL AND ENVIRONMENTAL ISSUES

I. MARINE ENVIRONMENT AND RESOURCES

Characterization of Florida's marine environment is crucial for understanding the economic and environmental value of marine resources.

Florida's marine environment is characterized by a diverse array of habitats, including coral reefs, seagrass beds, and mangrove forests. These ecosystems provide numerous benefits, such as coastal protection, habitat for marine life, and recreational opportunities.

To protect and conserve these resources, marine sanctuaries have been established. These sanctuaries serve as protected areas where fishing and other extractive activities are restricted. This allows for the recovery of marine populations and the protection of critical habitats.
sustainable yields of fish stocks fluctuate from one season to the next and it is difficult to manage Namibia’s marine resources on a sustainable basis.

**Importance of marine fisheries to Namibia’s national economy**
The marine fisheries sector is an important foreign exchange earner and significant employment generator for Namibia. Prior to independence the country’s fishing industry was subject to open access and as a result of poor management, overexploitation of some of the most productive fisheries occurred. After independence Namibia took firm control of the country’s territorial waters and the marine fisheries sector grew rapidly. In terms of economic performance, output doubled from 1990 to 1993 and since then, despite a 35% drop in landings, earnings from this sector have remained roughly constant – largely as a result of an increase in fish processing which adds value to landed fish.

**Declining fisheries and marine environment degradation**
The causes and consequences of declining fisheries and marine environment degradation are summarised as follows:

- **Variable environmental conditions** which could increase in a response to atm atmospherianges linked to global warming.

- **Poor management and overexploitation of fish stocks.** Practices that can result in overfishing include, fleet overcapacity, inappropriate gear and fishing disturbance of spawning behaviour. Many factors hinder efforts to improve fisheries management. Strict enforcement is needed to ensure that illegal vessels are kept out of EEZs and that national fleets practice sound management. A lack of adequate capacity to carry out the scientific research needed to set suitable TACs can also be a constraint.

- **Coastal degradation.** Coastal degradation is currently limited in Namibia. However it is likely to increase with growing coastal development over the next 30 years. Human activities responsible for coastal degradation include:- The draining and clearing of lagoons and estuaries (e.g the Walvis Bay lagoon); upstream dams, deforestation, agricultural and urban pollution which have had a detrimental effect on water quality entering the Orange River mouth, reducing its potential as a fish-nursery area; Marine pollution, caused when seagoing vessels accidentally or purposefully deposit sewerage, oil and other wastes into the ocean.

- **Wastage and post harvest discards.** Fishermen inadvertently kill and waste large numbers of marine species when they target one economically valuable species.

**Potential growth within the marine resource sectors to 2030**
Despite improvements in fisheries management since 1990, some stocks are considered to be in decline. This is largely because of adverse environmental conditions that have dominated since the 1980s. Despite the unpredictable variabilty displayed by Namibia’s marine environment, there is optimism regarding future earnings from the marine fisheries sector. However, once maximum sustainable yields are reached, no further growth in harvesting can be expected. If managed properly, and there is growth within the fish processing sector, the fishing industry could remain a high earner on a sustainable basis to 2030. The industry foresees an increase in exports of high value fish products to overseas markets. In addition more efficient trade and improved export markets for marine products to landlocked country’s within the SADC region are expected. Futhermore, there is considerable potential for expanding mariculture and diversifying the marine resources sector. In particular, nature centred tourism activities (for example, low impact whale/seal watching and visits to the offshore islands for birdwatching) provide ideal opportunities for sustainable economic growth.

**Efforts to mitigate marine environment degradation and to enhance the value of marine resources**
Since independence considerable improvements have been made regarding the monitoring and regulation of Namibia’s fish stocks.

- After independence a 200-mile exclusive economic zone (EEZ) was declared. The GRN also set conservative Total Allowable Catches (TAC’s) in order to promote the sustainability of resources and to enhance the recovery of depleted stocks.

- In 2001 fishing rights were extended and it is expected that this change in policy will provide an incentive for companies to adopt more sustainable fishing practices.

- In order to discourage the targeting of bycatch species by-catch fees have been introduced.

- In an attempt to limit unnecessary coastal degradation without restricting coastal development an Integrated Coastal Zone Management Plan (ICZMP) has been adopted.
Government fisheries scientists are assisted by outside consultants in setting their estimates regarding TACs for certain species.

In order to counteract marine pollution Namibia does not allow dumping and has an almost 100% observer coverage on the fishing vessels to enforce the regulation. In response to the regulations set by the International Convention on the Prevention of Pollution from Ships (MARPOL) all port authorities are expected to provide facilities for the retrieval and correct disposal of oily ballast water and other waste matter that accumulates on board ships.

2. FRESHWATER AND FRESHWATER RESOURCES

Water scarcity – Namibia’s primary limiting factor for development
Namibia suffers from extreme water scarcity. The only permanently flowing rivers lie near to, or form part of, the countries international boundaries. The lack of readily available freshwater in the interior of the country remains the most important limiting factor for development.

Broad overview of Namibia’s water resources and consumption
- Water in Namibia is scarce due to low and highly variable rainfall and high rates of evaporation.
- Although perennial rivers have the greatest potential as water resources, they are located far from the areas of highest demand. Sustainable management of perennial rivers in Namibia is difficult because they are shared by several countries.
- All rivers that originate within Namibia’s borders are ephemeral. The water table associated with these rivers is high and their banks characteristically support vegetation that provide important resources for people and wildlife living in the arid areas of Namibia.
- Storage dams on Namibia’s ephemeral rivers are subject to high losses through evaporation. Although necessary for water supply to farms and towns, the impoundment of ephemeral river flow can have serious environmental and social implications as it causes a lowering of the water table and reduces downstream underground aquifer recharge.
- Due to shortages in surface water, Namibia relies heavily on groundwater reserves. These reserves are subject to low recharge rates from rainfall and periodic ephemeral floods. Despite this, groundwater is vital for farmers and most towns throughout western and central Namibia.
- Approximately 50% of Namibia’s total population live in the proximity of the northern perennial and seasonal rivers and are involved with fishing activities. 90% of these people derive some income from the sale of fish. Fish numbers in the Okavango River have declined dramatically since 1984. The major cause for declining freshwater fish populations in Namibia is overfishing.
- Although agriculture accounts for over 70% of the water used in Namibia, it contributes little more than 10% to GDP. The value added to the water used for agricultural activities in Namibia (especially irrigation) is very low (an estimated N$7.2/m³) when compared to that used for manufacturing (N$272/m³) or tourism and other service sectors (N$574/m³)

Future water demand, freshwater depletion and degradation
Over the next 30 years, water demand in Namibia will increase rapidly in some areas (in particular, all expanding urban areas, many of which are located far from easily available sources of water) and only moderately in others. The current problem of distributing the available water to where it will most be needed will be exacerbated and, due to full exploitation of developed resources, expensive new water sources (for example desalination plants and new dams) will need to be developed. Water demand for irrigation, currently the main water consumer, is expected to increase considerably.

Once it has been contaminated, groundwater is almost impossible to clean up. Consequently, Namibia is extremely vulnerable to the effects of water pollution – mainly because of the country’s limited supply of surface water and high dependency on groundwater sources. Being the shared end user of two of its major perennial rivers also makes Namibia vulnerable to pollution. Water-monitoring activities in Namibia are currently considered to be inadequate.

Freshwater depletion and degradation threatens human and livestock health, and socio-economic development. It reduces livelihood options and exacerbates rural poverty. In addition increasing costs of supply are inevitable as expensive new infrastructure need to be developed. As water in some areas becomes more scarce and expensive, development options become increasingly limited. Cost recovery of the capital
5. RESOURCES AND WATER RESOURCES

Water scarcity – a critical issue for the future. The world's water resources are finite and are already stretched to the limit. The growing population and increased demand for water are putting pressure on these resources. Overexploitation of groundwater and pollution are further exacerbating the situation.

The importance of water cannot be overstated. It is essential for human survival, agriculture, and industry. As the population continues to grow, the demand for water will increase, making conservation and efficient use of water resources crucial.

Technological advancements have led to the development of new methods for water treatment and desalination, which are helping to meet the growing demand. However, these solutions are expensive and require a significant investment.

Effective water management and conservation practices are essential. This includes reducing water waste, improving irrigation methods, and investing in water-efficient technologies. Collaboration between governments, industries, and communities is key to addressing the water crisis.

In conclusion, water is a precious resource that needs to be treated with care and respect. With continued innovation and responsible management, we can ensure a sustainable and secure water future for all.
spent on developing expensive new water resource infrastructure is likely to become more and more difficult – especially as the number of teenage headed households are set to increase dramatically over the next few decades, as a direct result of the growing HIV/AIDS epidemic.

**Efforts to reduce rates of freshwater depletion and degradation and to enhance the value of water**

It is recognized that the enforcement of Integrated Water Resource Management and Water Demand Management strategies are essential if our goals regarding social well-being, economic development and environmental health are to be realized. To date, efforts to reduce the threats to water resources in Namibia have been extensive and include:

- ** Adopting a stricter economic approach to water pricing.**
- ** Water conservation initiatives** including:- efforts to reduce evaporative losses from dams; the development of water re-use and reclamation strategies; and the development of alternative water sources.
- **Using water in the most economically viable and ecologically sound manner.** Tools such as Natural Resource Accounting and Strategic Environmental Assessment are being adopted. Ultimately these tools will help guide policies regarding future water use and will prevent impacts on freshwater ecosystems and the resources and services that they provide.
- **Improving catchment, river and aquifer management** through the establishment of several agreements between Namibia and her neighbours regarding shared river basins. In addition rural communities are becoming increasingly responsible for their own water points through the establishment of water point committees.

### 3. WILDLIFE, FORESTRY AND TOURISM

**Namibia’s biodiversity and wildlife resources**

Biodiversity may be broadly defined as the variety and variability among living organisms and the natural environments in which they occur. Namibia’s biodiversity includes innumerable species of wild plants and animals, collectively called ‘wildlife’, which inhabit the country’s six major biomes. Only a small number (possibly as little as 20%) of Namibia’s wildlife species have been described to date. Of the 13,637 species that have been described, almost 19% are endemic or unique to Namibia.

**The critical importance of Namibia’s wildlife resources**

Despite the fact that only some species are directly useful to humans as sources of food, fibre, medicine or tourism, all species are of ecological importance. Natural ecosystems provide vital genetic material (an invaluable resource that is regularly required to enhance domestic crop and livestock species) and essential life sustaining services that underpin our survival.

**Biodiversity loss**

Although it may not always be obvious, no environmental crisis will have a more lasting impact on future generations than the widespread loss of biodiversity. Every time a species is lost, our ecosystems become less complex. As ecosystems lose complexity, outbreaks of pests and disease become prevalent and essential ecological functions become disrupted. Ultimately, the loss of wild species increases vulnerability to drought, floods and other extreme events like global climate change. In turn, these impacts threaten food supplies, sources of wood and medicines, and the sustainability of the tourism industry. The major (direct) causes of biodiversity loss include:-

- The loss, fragmentation and conversion of natural habitats
- The unsustainable harvesting of wild plants and animals and wildlife products
- Pollution
- The introduction of alien invasive organisms that threaten the survival of indigenous species.
- Water transfer and storage schemes and the regulation of perennial river flow by dams and weirs

Human population pressure, poverty, the lack of secure and exclusive tenure and insufficient intersectoral policy co-ordination are the most important indirect causes of biodiversity loss in Namibia. It can be assumed that those areas in Namibia that have the highest human population and livestock densities and that have been subjected to extensive land clearing are those that have suffered the highest losses in biodiversity.
The importance of wildlife harvesting to subsistence economies
Currently about 62% of Namibia's population live in rural areas. At a national level it is estimated that 33% of total household consumption in rural areas comes from wild foods. The most important wild products that are harvested include: firewood, wood for construction and woodcarvings; thatching grasses; medicinal products and veld foods (from nuts, fruits, leaves, roots and bark); meat (from game animals and fish). Sustainable harvesting of wildlife resources is threatened by a lack of tenure over resources, overutilisation and the loss of biodiversity.

Legal harvesting of wild plants and animals
The direct use of biodiversity in Namibia contributes to over 30% of our GDP. Indirect uses associated with natural ecosystems values e.g. ecosystem functions that provide us with clean air, water and productive soils are of even greater value and underpin our survival. There is no conflict between using natural resources and the notion of conservation, provided that resources are used sustainably and equitably. Many existing policies are inappropriate in this regard – they either deprive access to resources or allow their over-use.

Tourism
Tourism is the world’s fastest growing industry. Since the 1980s there has been increased interest in visiting natural settings, undisturbed areas and unusual destinations. Almost all tourists visiting Namibia expect a nature centred experience and Namibia’s biggest attraction is undoubtedly its sparsely populated, spectacular arid scenery and wide open spaces. Preserving these assets is fundamental to developing tourism as a sustainable economic sector. In addition to its contributions to the national economy Namibia's tourism industry is capable of:-

- Contributing to wildlife conservation and biodiversity protection.
- Contributing to poverty alleviation, particularly in rural areas, through direct and indirect employment; and
- Improving the earning ability of rural women and enhancing traditional Namibian culture by stimulating trade in basketry, pottery and other traditional crafts.

Land-use for tourism in parts of Namibia outside protected areas has extremely high economic potential. Through the CBNRM program communities in communal areas invest in wildlife and benefit from the resulting tourism development opportunities. Earnings from these activities increased almost seven fold between 1996 and 2000. In addition several privately owned nature reserves, some rich in endemic species, have been developed and neighbouring freehold farmers have begun to form conservancies, allowing better management of wildlife, more sustainable off takes and improved tourism opportunities.

Despite these successes several challenges threaten growth within the tourism industry. These challenges include:

- Maintaining high standards of service and quality of experience.
- Improving political stability and reducing levels of crime in Namibia.
- Improving planning and creating a clear vision for Namibia’s tourism industry. In the absence of a proper plan and vision Namibia’s unique tourism product will rapidly be spoiled. Unfortunately signs of impacts from poorly controlled tourism activities have already begun to emerge.
- Preventing “leakage” of tourism-generated foreign exchange.

Efforts to mitigate biodiversity loss and to enhance the value of wild species, wildlife products and tourism

- The establishment of an Environmental Investment Fund (EIF). Once established this fund will ensure that at least part of the revenue generated from tourism activities in state owned parks will be used to help conserve the environmental resource base upon which tourism depends.
- Extending conservancies to new areas.
- The creation of the Environmental Management Act which offers opportunities for preventative management.
- The new Park and Wildlife Bill, which is exploring ways of creating incentives for land owners and managers to diversify into wildlife and tourism in more efficient and cost effective ways.
- Improving knowledge. Many studies are in progress that will help improve Namibians knowledge regarding natural resources and biodiversity in Namibia.
• Improvements in pollution control through the establishment of the Pollution and Waste Management Control Act.

• Improved development plans and capacity building. There have been concerted efforts to integrate national development plans and to improve the capacity of conservancies to manage their wildlife resources. Promising initiatives are emerging regarding the transboundary management of the Namib Desert.

• The provision of electricity to rural areas is occurring at a steady rate. This will help reduce rates of deforestation and dependence on firewood for energy.

4. LAND CAPABILITY, RANGELANDS AND AGRICULTURE

‘Low land capability - a severe constraint to sustainable agriculture

In Namibia surface water is scarce, availability of grazing is variable and livestock carrying capacity is low. These environmental constraints severely limit the development of rain fed cultivation and commodity farming throughout most of the country. Despite these constraints, a large percentage of the land is used for agricultural purposes and many thousands of families still “live off the land” for their livelihoods. Considering the low capability of the land for husbandry, it is not surprising that Namibia’s agricultural sector is subject to uncertain output, regular crop failure and a drain on state finances, through heavy subsidies and drought relief.

Inequitable land distribution and use

German colonial policies and the South African apartheid administration laid the foundation for the way in which Namibia’s land is currently divided and utilized.

• Between 60% and 70% of Namibia’s population practice subsistence agro-pastoralism on communal land that is state owned, and constitutes approximately 41% of the total land area.

• Less than 10% of the people live in the freehold farming areas. This privately owned land constitutes approximately 44% of the total land area. 1.5% of the total land area is comprised of exclusive diamond concession areas. 13.5% has been proclaimed as conservation areas.

• On average freehold agriculture contributes less than 4% to the GDP (including meat processing) and 27% of exports. Since the 1970’s many freehold livestock farmers have moved towards mixed game/livestock farming. This diversification helps to create a valuable buffer against drought.

• Agriculture in the communal areas is vital for the livelihood of most rural households. Distant markets limit the development of farming in the communal areas and agricultural incomes are low and variable. Veterinary fences that prevent the spread of contagious livestock diseases have limited the export marketing opportunities of communal farmers.

• Not all farmers in Namibia can be defined as “serious”. There are several absentee farmers that own freehold land and illegal fencing of prime land by wealthy individuals has become common.

Land degradation – threatening future agricultural output

Land degradation reduces the production potential of the land. It occurs when there is a decline in plant cover or when one type of vegetation is replaced with other, often less productive, species. Namibia’s arid savannah systems and dry woodland areas that have reverted to savannah-type systems as a result of extensive deforestation are the most susceptible to land degradation.

The environmental manifestations of land degradation in Namibia - soil erosion, bush encroachment and soil salination are causes of economic loss and escalating poverty through declining agricultural production and a loss of food security. This leads to human migration, rapid urbanisation and an increased need for the government to import food. Land degradation in Namibia is usually attributed to overgrazing, land clearing for crop farming or inappropriate cultivation techniques. Ultimately, however, desertification occurs as a result of the policy framework and incentives and regulations that encourage inappropriate land management practices. The lack of tenure, the inequitable access to land and a lack of integrated planning are all important factors affecting land degradation in Namibia.

Issues relating to the inequitable access to land in Namibia must be addressed as soon as possible. Recommendations regarding resettlement that could help prevent future conflict and environmental degradation, whilst maintaining equity include

• Removing fences and purchasing freehold farms that border on communal land,
LAND AND FACILITIES

1. Land Capability - As a result of the impact of agriculture, there is an increasing demand for land. The land is used for both agricultural and non-agricultural purposes. The land is also used for recreation and wildlife conservation. The land is also subject to environmental regulations and policies. It is important to ensure that the land is used sustainably and that the land is managed in a way that is beneficial to the environment and the community. The land is also subject to the management of the local government and other agencies.

2. Agriculture - Agriculture is an important part of the economy. It provides employment and contributes to the local economy. The agriculture sector is also subject to environmental regulations and policies. It is important to ensure that the agriculture sector is managed in a way that is beneficial to the environment and the community. The agriculture sector is also subject to the management of the local government and other agencies.
• Awarding secure tenure over land and all natural resources to communities;
• Improving capacity in order to develop community institutions capable of allocating land rights and managing natural resources sustainably.
• Moving wealthy farmers who currently occupy large pieces of illegally fenced off land in the communal areas onto freehold land.
• Protecting “agriculturally under utilised” land that has high potential for other forms of land-use (e.g. tourism) but low potential for farming activities from resettlement of farmers.
• Extending CBNRM activities into all areas that have high potential for tourism.

Trends in agricultural growth, rural household food security
Although Namibian producers currently supply all of the nations red meat requirements, the country has suffered a grain deficit since 1964. Through its National Agriculture Policy government aims to expand irrigation activities up to five fold but makes no mention of strategies needed to reduce environmental impacts associated with soil salinisation, pesticide run-off and control over the use of potentially polluting fertilisers that are likely to accompany irrigation expansion. Increasing pollution from these substances could threaten Namibia’s future meat exports to European markets. In addition this policy does not reject the use of subsidies for any products that may enhance agricultural production. While it is generally accepted that there is no potential to intensify veld grazing without increasing land degradation in the country, the National Agricultural Policy also proposes the expansion of livestock production onto under utilised land north of the Veterinary Cordon Fence.

Although 94% of rural households identify agriculture as their main activity it is has begun to make a declining contribution to communal farmers’ household income. In most years, households are unable to produce enough grain for the family’s requirements.

Mitigating land degradation and encouraging sustainable land-use
Considering Namibia’s low land capability for intensive agriculture, future focus should be placed on employment in the non-agricultural sectors that hold the greatest promise for economic growth, income generation, and poverty reduction. Agricultural and resettlement programmes should concentrate on supporting the serious farmers who make productive use of their farms and impoverished communal farmers who have other choice but to live off the land. Incentives and disincentives should be developed to persuade the wealthy absentee freehold and communal farmers to make their land available for other users and other purposes.

Combating land degradation and encouraging sustainable land-use practices demands interlinked political, social, economic and educational approaches. These include:
• Providing incentives for family planning and education services combined with appropriate and diversified land-use options.
• Integrating anti-land degradation schemes into national environment and development planning.
• Recognising the interdependence between agriculture and other issues in particular, water management, biodiversity conservation and human well-being.
• Providing appropriate, effective decentralised and integrated support services (extension, research, education, credit, marketing, etc.).
• Providing incentives for people to protect themselves against present and future extreme events e.g. drought.
• Developing effective and sustainable uses of land and natural resources that do not threaten their future productivity.

Since independence several projects, programmes and policies have been put in place which are helping to achieve the national goal of sustainable development. These are summarised in the main part of the document.

5. MINING

An overview of mining in Namibia
Namibia is endowed with a rich variety of mineral resources. Diamonds remain the country’s premier mining commodity although uranium, gold, copper, salt, zinc, lead and fluorspar, semi-precious stones, industrial
minerals and dimension stone are also produced. Mining related activities, other than formal mines include mining claims, non-exclusive prospecting licenses (NEPLs) and exclusive prospecting licenses (EPLs), and formal mines. Currently there are only 13 active mines in Namibia.

**The importance of mining to Namibia’s economy**

Virtually all mining output is exported. In 1998, minerals represented approximately 36% of Namibia’s merchandise exports but contribution to GDP has fallen from approximately 28% in the 1980’s, to current levels of between 12%-14%. In addition to its national importance, mining has stimulated significant infrastructure development and have been responsible for supporting a variety of community initiatives, conservation projects, training and skills-development programmes and various other social causes in Namibia.

**Opportunities for future growth**

Despite rising costs, uncertain prices and variable labor relations, mining is likely to maintain its significant contribution towards Namibia’s socio-economic development over the next three decades. The small-scale mining sector is expected to grow in relative terms and there is the possibility for the development of “mining tourism”, where operating mines provide tourism experiences, such as going underground or searching for diamonds. In the case of the Swakopmund salt mine, the idea of mining-linked tourism can be developed further – to embrace a nature centered experience, as this mine is also a registered private nature reserve and one of the best localities in Namibia for observing shorebirds.

**Environmental impacts of mining and mitigation measures**

If managed badly, mining can result in a great variety of impacts that threaten human health and environmental integrity. However, with modern Environmental Assessment applied during planning and the implementation of Environmental Management Plans (EMP) during the operational phase, mines in Namibia are increasingly better planned, and negative impacts can usually be mitigated and localised. Moreover, mines are under increasing pressure to obtain ISO certificates that will enhance their chances of selling their commodities to Western markets. Despite these recent improvements, a century of mining with little or no planning to reduce environmental damage, has impacted heavily upon large areas in Namibia, especially in the Namib Desert. There are currently approximately 40 abandoned, unrehabilitated mines in Namibia, of which 40% are in nature reserves.

**6. SITUATION ANALYSIS**

Section A of this report highlights Namibia’s strong dependence on renewable and non-renewable natural resources. It also demonstrates the complexity of managing these resources on a sustainable basis because of unpredictable fluctuations in marine resources, water scarcity, high rainfall variability and low capability of the land to support intensive forms of agriculture.

**Cross cutting issues**

It is important to recognise the most important cross cutting issues within the natural resource sectors. These are summarised in the main part of the document (Table 6.1). This summary, lays a foundation for identifying the key challenges we face, the strategies we must adopt in order to attain our Ideal Vision to 2030 and the key actors involved in this process.

**Policy assessment**

Since 1990, the Namibian government has adopted a number of policies that promote sustainable development. While many policies have been a step in the right direction, some have been developed in isolation, resulting in omissions of key issues or even contradictions with other policies. Some of the more important policies relevant to natural resources are analysed in Appendix 3.

**Important economic themes regarding Namibia’s future**

Three important economic themes recur within Namibia’s five natural resource sub-sectors. Addressing these issues is essential to Namibia’s future. In summary, there is a need:

- For economic diversification.
- To implement development plans that take into account the Total economic Value of resources and not just their direct use values.
The importance of meeting the needs of the economy's growth:

Various initiatives have been proposed to address this issue. It is crucial to understand that economic growth is not just about increasing the size of the economy. It is also about ensuring that the growth is sustainable and inclusive. This means that the benefits of economic growth should be distributed fairly across the population. The government needs to work closely with businesses and industries to ensure that they are contributing to the overall economic growth. This can be achieved through various strategies such as investing in infrastructure, providing incentives for businesses to innovate, and promoting exports.

Opportunities for Future Growth:

The government needs to focus on creating a conducive environment for businesses to thrive. This can be achieved by reducing regulations, providing financial support, and investing in human capital. The government should also work with the private sector to identify areas where there is a need for increased investment. By doing so, the government can create a virtuous cycle of growth where businesses grow, create jobs, and, in turn, generate new investment opportunities.

Government's Role in Economic Development:

The government needs to play a proactive role in economic development. This can be achieved by investing in education and training, providing infrastructure, and creating a stable and predictable regulatory environment. The government should also work with international organizations to leverage their expertise and resources to support economic development initiatives.

Conclusion:

Economic growth is a complex and multifaceted process. By focusing on creating a conducive environment for businesses to thrive, investing in human capital, and leveraging international resources, the government can ensure that the economy continues to grow and prosper.
To develop and maintain economically sound systems of tenure over all natural resources.

Laying a foundation to develop an Ideal Vision for Namibia’s natural resource sector to 2030

a) Broad environmental trends regarding Namibia’s future:

- Increasing population, poverty and unemployment
- Increasing demand for natural resources
- Increasing loss of biodiversity
- Increasing land degradation
- Increasing costs of water supply
- Increasing pollution
- Increasing temperatures (in response to global warming)
- Increasing pestilence and crop infestations
- Increasing spread of known diseases (e.g. HIV and malaria) and the likelihood of new, emerging diseases (e.g. Congo fever in northern Namibia)
- A decline in freshwater fish stocks
- A decline in rural food security.
- A decline in economic development options

b) Key certainties, that must be considered an integral part of Namibia’s future include:

- High variability within the marine environment
- Poor and fragile soils that are easily degraded.
- Highly variable rainfall, rangeland carrying capacity and rain fed crop production (in areas where this is viable).
- Increasing water scarcity (and it’s accompanying economic consequences).
- The effect of HIV/AIDS on Namibia’s labour force and society

c) Key uncertainties that must be considered when regarding Namibia’s future include:

? Political stability and governance.
? Poverty mitigation, equitable income distribution and access to land
? Impacts of climate change.
? The lack of knowledge regarding livelihood strategies and how people will adjust to environmental trends and issues.
? Improvements in technology and new scientific discoveries, which may either worsen or improve the impacts of current environmental and social problems in Namibia.
? The impact of the environmental information explosion and how it will influence political will, institutional commitments, policy development, public participation and programme implementation
? Changes in the global economic arena and other international factors.

B. THE IDEAL VISION FOR NAMIBIA’S NATURAL RESOURCES BY 2030

1. THE IDEAL VISION

Namibia’s Ideal Vision for 2030 is one that fully embraces the idea of sustainable development. In constructing the visions for each of Namibia’s natural resource sectors (Table 7.1 in the main document), it became clear that by 2030 Namibia should have become far less dependant on using the land for low value agricultural activities that exacerbate land degradation. Rather, there should be a strong move towards capitalizing on the country’s comparative advantages within the global market. By 2030 agricultural activities should focus on the cultivation of high value crops and there should have been improved value adding to meat and fish products. In addition, there should be appropriate development of high quality, low impact consumptive and non-consumptive tourism. A good example of how Namibia could capitalise on its comparative advantage, is through the rational economic development of the Namib Desert -
The IDEAL VISION for Namibia’s Natural Resources by 2020
development that takes into account the Total Economic Value of this seemingly barren and unproductive tract of land.

OVERALL VISION FOR THE NATURAL RESOURCE SECTORS FOR 2030

Namibia shall develop its natural capital for the benefit of it social, economic and ecological well-being, by adopting strategies that:

- Promote the sustainable, equitable and efficient use of natural resources;
- Maximise Namibia’s comparative advantages; and
- Reduce all inappropriate resource use practices.

However, natural resources alone cannot sustain Namibia’s long-term development, and the nation must diversify its economy and livelihoods.

2. KEY CHALLENGES THAT ARE LIKELY TO HINDER PROGRESS TOWARDS THE IDEAL VISION.

- Population growth and settlement patterns.
- Increasing water stress.
- Poorly planned development and inappropriate industrialisation.
- The loss of biodiversity Land issues.
- Poverty and inequality.
- Consumption patterns.
- Poor governance.
- Increasing competition with neighbouring countries for shared natural resources.
- A lack of human resources.
- The HIV/AIDS epidemic.
- The need to improve access to existing knowledge and fill knowledge gaps.
- The need for a stable macroeconomic environment.
- The adverse impacts of global atmospheric change.
- Environmental threats and issues associated with rapid urbanisation.
- The need to create a shared vision amongst all Namibians

3. KEY STRATEGIES THAT NEED TO BE ADOPTED

Strategies identified were grouped into the following sub-headings and, as such, are summarised in Table 8.2. in the main document

- Peace, stability, political commitment and governance
- Transboundary arrangements
- Investment incentives
- Institutions and partnerships for environmental protection and management
- Health and human resources
- Diversification

Political tools for achieving sustainable development

a. Developing local Agenda 21 initiatives
b. Improving co-ordinated transboundary planning and management for all shared resources.
c. Improving national policies, institutions and agencies through:
   - Taking an integrated approach.
   - Creating policies and plans that recognise the Total Economic Value (TEV) of Namibia’s natural resources.
   - Regular policy review.
   - Tackling the root causes of environmental problems.
   - Improving institutions.

Technical tools for achieving sustainable development

a. Environmental Assessment (EA)
b. Improving environmental education at all levels of society
c. Acquiring and preserving knowledge
OVERALL VISION FOR THE NUTRIENT ALLOCATE STRATEGIES FOR 2015

**Vision**
- Taking into account the facts and figures of the current situation, the vision of the Nutrient Allocations Strategy for 2015 is to:
  - Poultry production and sustainable broiler production
  - Improved animal health
  - Improved feed efficiency

KEY CHALLENGES THAT ARE LIKELY TO HINDER PROGRESS TOWARD THE IDEAL

- **Issues**
  - Improved animal health
  - Improved feed efficiency

KEY STRATEGIES THAT NEED TO BE ADDED

<table>
<thead>
<tr>
<th>Strategic Issues</th>
<th>Required Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved animal health</td>
<td>- Develop and implement feed efficiency improvements</td>
</tr>
<tr>
<td>Improved feed efficiency</td>
<td>- Increase feed conversion rates</td>
</tr>
</tbody>
</table>

E.7 in the table above

Strategies identified are grouped into the following categories and are summarized in Table 5.

- **Components**
  - Improved animal health
  - Improved feed efficiency
  - Increased feed conversion rates

To support the implementation of the above strategies, a series of recommendations are provided.

- **Recommendations**
  - Develop and implement feed efficiency improvements
  - Increase feed conversion rates
  - Implement environmental protection measures

Technical Q&A for further environmental protection

- Environmental Protection (EAP)
  - Implement environmental protection measures
  - Increase feed conversion rates
  - Implement environmental protection measures
• Capitalising on indigenous knowledge
• Filling knowledge gaps
• Improving access to modern computer-based information and communication technologies (ICTs)
d. Monitoring progress towards sustainable development

Economic tools that can enhance sustainable development
• The adoption and enforcement of strict polluter pays policies and reduced duties and tax credits for the importation of environmentally sound technologies.
• Reducing ill-considered market-based incentives
• Applying natural resource economics and the construction of Natural Resource Accounts (NRA) as mainstream economic tools to help planners and decision makers to assess the real value of natural resources and to determine the costs of environmental degradation or natural resource loss.
• Ensuring, wherever possible, payment for the use of resources (water, land, grazing).

4. KEY INDICATORS

In order to successfully monitor Namibia’s progress to sustainable development and the Ideal Vision, reviews on the state of the environment and Namibia’s progress need to be conducted at regular intervals. As part of the consultative process in developing this report, participants at the Vision 2030 workshops on Namibia’s natural resource sectors drew up a list of indicators for each sector. However most of these indicators (Table 9.1 in the main part of the document) are extremely broad and still require clarification.

Efforts are currently being made at an international level to select an aggregated group of indicators that will form the environmental equivalent of UNDP’s Human Development Index. However, defining such a broad subject as Sustainable Development through quantitative measures is extremely difficult. An answer to this challenge may be to develop one unifying indicator - a Sustainable Account indicator that will draw on a country’s Sustainable Development Accounts (SDA). The SDA process will assess national human capital, natural resource capital and economic growth.
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INTRODUCTION

In the past, peoples’ ability to alter the natural environment was limited. Nowadays, the combination of high population growth, rapid technological advancement and the ever-growing demand for raw materials are able to change the natural functioning of the planet in a dramatic and long lasting way. Consequently, our present day actions and the policies that guide them are able to have impacts, both positive and negative, that extend well into the future.

Throughout the world the concept of sustainability has taken hold and, as stated by a fellow African, it is the duty of every country today to ensure that:-

"...the oceans and land, and their associated natural resources, must be regarded as a sacred trust which has been bequeathed to us by our ancestors. This resource base must be handed over to future generations intact or in an enhanced condition" (B. Okigbo in: World Bank, 1995)

Meeting this goal is not easy. All too often the rewards of economic development are accompanied by huge costs to the environment and threats to the life support systems that underpin our very survival. In the 21st century, planning for the future and ensuring strict implementation of key strategies has become imperative.

Namibia’s unsustainable reliance on natural resources – the need for change

Commercial fishing, mining, agriculture and nature centred tourism currently sustain Namibia’s national economy and the majority of rural Namibians rely heavily on natural resources for their livelihoods (Table 1). In addition, Namibia’s natural environment provides essential services, natural capital and genetic resources that buffer the Nation against economic uncertainty, disease and environmental change.

Table 1. Percentage of people per region that depend on natural resources for their livelihoods (Source UNDP 1999)

<table>
<thead>
<tr>
<th>REGION</th>
<th>% of economically active persons employed in the agriculture, hunting, forestry or fishing sectors</th>
<th>REGION</th>
<th>% of economically active persons employed in the agriculture, hunting, forestry or fishing sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khomas</td>
<td>6</td>
<td>Oshikoto</td>
<td>61</td>
</tr>
<tr>
<td>Erongo</td>
<td>20 (almost all in marine fishing)</td>
<td>Kunene</td>
<td>65</td>
</tr>
<tr>
<td>Karas</td>
<td>24 (including marine fishing)</td>
<td>Caprivi</td>
<td>70</td>
</tr>
<tr>
<td>Hardap</td>
<td>36</td>
<td>Ohangwena</td>
<td>73</td>
</tr>
<tr>
<td>Otjozondjupa</td>
<td>37</td>
<td>Omusati</td>
<td>74</td>
</tr>
<tr>
<td>Oshana</td>
<td>41</td>
<td>Okavango</td>
<td>74</td>
</tr>
<tr>
<td>Omaheke</td>
<td>58</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Namibia’s renewable natural resource base is characterised by low productivity and/or high variability. The country’s soils are generally poor, easily degraded and most of the land has low capability for conventional agricultural activities. In the absence of a clear vision – one that is guided by well-formulated policies and consistent strategies - it is inevitable that Namibia’s high dependence on natural resources will become
economically and ecologically unsound. If poor resource management practices are allowed to dominate, the country’s natural capital will be eroded and the ability of the natural environment to provide essential services will be disrupted. Human health will suffer and the country’s economic future will become increasingly precarious. The Ideal Vision proposed in this document recognises this scenario and proposes key strategies to avoid it.

Why VISION 2030?

Since Independence the Namibian government has adopted planning as a management tool to help ensure effective decision-making. Five-year development plans, beginning with National Development Plan I (NDP I) for the period 1995 – 2000, are at the heart of this strategy.

This document is one of eight thematic studies that, when combined, will form Namibia’s VISION 2030 which aims to enhance sustainable human development by formulating a shared vision on strategic issues facing Namibia’s future. It offers an overview of:-

A. Namibia’s natural capital. Each natural resource sub-sector (Marine environment and fisheries; Freshwater resources; Wildlife, forestry and tourism; Agriculture, rangelands and land capability; and Mining) is investigated with respect to its:-

- Current status;
- Economic importance and growth potential;
- Issues that threaten further growth;
- Current efforts to mitigate the effects of environmental degradation and to enhance the natural capital;
- The major cross-cutting issues between the sectors;
- Policy soundness;
- Recurring economic themes; and
- Broad trends and uncertainties regarding the future.

B. The Ideal Vision for the natural resource sector to 2030. This section includes the key challenges and strategies needed to achieve the Ideal Vision and the key indicators that are needed to help track Namibia’s progress to a more sustainable future.

This report recognises VISION 2030 as a broad, unifying vision – epitomising the concept of sustainable development and moulded, to some extent by Namibia’s Green Plan and NDP II. Ideally VISION 2030 will help to guide the country’s five-year development plans from NDP III through to NDP VII (see diagram on next page) and, at the same time, provide direction to government ministries, the private sector, NGOs local authorities.

Although this was largely a desktop study drawing on available literature pertaining to Natural resource management and environmental issues in Namibia, public participation was called upon to help formulate the Ideal Vision. Five consultative workshops were

---

1 Based on the foundation laid by Namibia’s Green Plan, an effort was made to include environmental and sustainable development aspects within NDP II through the identification of cross-cutting issues and options and the co-ordination of sectoral plans. This resulted in a more integrated product than was the case with NDP I.
held which brought together government, non-government and private sector technical experts (Appendix 1). Through a process of brainstorming and discussion, participants at these workshops helped to guide the formulation of the second section of the document.

The need for political will and improved governance

The Namibia Natural Resource Consortium and all those who participated in the process of developing this report, consider the Vision 2030 study to be an important step in the process of achieving sustainable development. Namibia is still able to avoid the negative impacts of development that other nations have suffered in the past. There must, however, be focused political will to achieve this. Governance must be improved and issues relating to environmental degradation, growing poverty and economic stagnation must be addressed through sound policy development and strict implementation.

The overriding message that this study conveys is: *By capitalising on Namibia's comparative advantages and providing suitable incentives to use our natural resources in the most appropriate, efficient way possible, decision-makers today will be in a better position to create a safer, healthier and more prosperous future for all Namibians — to 2030 and beyond*
Figure B. HIGH VARIATION IN POPULATION DISTRIBUTION

Despite the fact that Namibia as a whole is described as one of the world’s most sparsely populated countries, certain areas are heavily populated. 2% of the land, in the Cuvelai drainage area of north central Namibia, is estimated to support 28% of the entire Namibian population, mostly in rural densities greater than 100 people/km².

In the past, human distribution was very largely determined by freshwater availability, soil fertility, and natural resource availability. Today, high population growth rates, reduced land capability and reduced economic prospects in the rural areas, have resulted in urban migration. Despite the overriding trend of rapid urban growth, about 45% of Namibia’s total population is still concentrated in rural areas within the Caprivi, Oshangwena, Okavango, Omusati, Otjozondjupa, Oshana and Oshikoto Regions.
A. AN OVERVIEW OF NAMIBIA’S NATURAL CAPITAL AND ENVIRONMENTAL ISSUES
A REVIEW OF NAMIBIA'S NATURAL CAPITAL AND ENVIRONMENTAL ISSUES
1. MARINE ENVIRONMENT AND FISHERIES

CHARACTERISTICS OF NAMIBIA’S MARINE ENVIRONMENT

Overview of Namibia’s coastal zones and systems

Namibia’s entire 1600 km long coastal zone falls within the Namib Desert. Approximately 78% of the shoreline is comprised of sandy beaches, 4% of mixed shores of sand and rock and 16% of rocky shores. Bays are scarce and lagoonal shores constitute only 2% of the entire coastal zone (Campbell 1993). The land that flanks the coastline comprises mobile sand dunes, extensive gravel plains and occasional exposed bedrock surfaces. In certain areas lagoons and sand spits have formed as a result of the littoral drift of large volumes of sediment that enter the ocean via the episodic flooding of westward flowing rivers. The Namibian coastline provides valuable migration and nursery habitats for many marine organisms. The few coastal towns and settlements are important centres for tourism, industry and commerce. Other important characteristics of Namibia’s coastal zones are summarised below.

- **Low rainfall and limited freshwater resources** currently limit economic growth and the expansion of most coastal towns. The development of a desalination plant near Swakopmund by 2003 promises to ensure that future water demand at the coast will be met.

- **Rapid urbanisation.** Despite limited employment opportunities and rising unemployment, Walvis Bay, Swakopmund, Lüderitz and Henties Bay have become major destinations for migrants from the northern rural areas. Based on the national average, these towns are growing at an estimated rate of 5.5% per annum. Water and energy supply, sewerage systems and waste disposal facilities in these towns need to be upgraded if future demands are to be met.

- **The tourism sector** has shown tremendous growth in recent years and continues to expand. Angling is one of the major attractions and the West Coast recreation area is renowned as an excellent area for sport fishing. The desert, sand dunes, Cape Cross seal Colony, coastal birdlife and mining “ghost towns” also attract visitors to these areas. Nature cantered tourism along the Namib coast has high potential for growth.

- **Mineral based industries.** Guano is harvested from four artificial bird platforms. Production fluctuates with bird populations and has declined considerably this century Namibia’s coastal conditions are highly suitable for the cheap production of salt through solar evaporation of seawater. Most of the salt produced is exported to African countries. Contamination by wind blown sand affects the quality of the salt produced in the Walvis Bay area and limits the expansion of this industry (UCT 1996). In recent years, diamond mining, an extremely important revenue earner, has focussed increasingly on offshore localities. The life of the known deposits is estimated to last until 2025.

- **Aridity and poor soils limit the development of large scale agriculture** along Namibia’s coast. However, high quality asparagus, a saline resistant crop, is grown on small plots (20 ha in total) along the banks of the Swakop River. Small-scale vegetable farming for the local market is practised along the banks of the Swakop and Omaruru Rivers.

- **Namibia’s coastal wetlands**, including the three Ramsar sites (Sandwich Harbour, the Walvis Bay lagoon and the Orange River mouth) are believed to provide valuable nursery areas for certain coastal fish species (H. Holtzhausen pers.comm) and feeding grounds for palaeartic and resident wading shorebirds. Industrial and urban development has reduced the flood area and altered the physical processes in the Walvis Bay lagoon, Namibia’s

---

1 For example, Walvis Bay and Sandwich Harbour.
largest and most important wetland. This has affected the normal flushing of wind blown sand from this wetland resulting in increased siltation. Natural geomorphological changes threaten Sandwich Harbour. Pollution and industrial development threaten the Luderitz lagoon, salt marsh and tidal mud flats.

- **13 small off-shore islands** provide safe breeding and roosting habitats for several species of sea and shorebirds including African Penguins, Cape Gannet, Cape Cormorant, Bank Cormorant, Crowned Cormorant, Hartlaubs Gull and African Black Oystercatcher. These islands have high potential for nature based tourism activities.

- **Pollution control** is inadequate throughout Namibia. Public awareness is low and littering has become a major problem in and around most urban centres. With the exception of Walvis Bay, none of the coastal towns and settlements have separate disposal facilities for hazardous waste and municipal dumps are generally poorly designed and monitored (Tarr 1997). Neither the Walvis Bay nor the Luderitz Harbours provide adequate waste collection services, and it is common practice for ships to dump sewage and other waste in or near the harbour. The absence of bunker oil storage and processing facilities in these towns encourages oil spillage and dumping. Currently Namport is unable to cope with large oil spills. A national oil spill contingency plan does exist but is inadequate due to a lack of equipment and irregular rehearsal of procedures. Increased traffic in both harbours is inevitable and increased pollution is expected. The presence of coastal fog and atmospheric inversions tend to concentrate any air pollution created at the coast and limits its dispersion. Air pollution, which occurs in the environs of fish processing factories in Walvis Bay, threatens the town’s prospects of developing a tourism industry.

**High environmental variability**

Namibia’s living marine resources form part of the Benguela ecosystem, which is characterised by one of the world’s most intense upwelling systems. The upwelling process is driven by the south Atlantic high pressure system and the south westerly winds that result from it. The south westerly winds blow the surface waters offshore and this gets replaced by deep oceanic waters. These cold, nutrient rich waters allow phytoplankton to thrive, forming the basis of a highly productive food chain which supports vast populations of commercially exploitable pelagic, demersal and other fish species (Table 1).

Marine environments, in particular upwelling systems, are notoriously variable. The climatic conditions that determine prevailing winds, ocean currents, water temperature and, therefore, marine species assemblages and distribution fluctuate with shifting seasons and other temporary or cyclical changes in the Earth’s atmosphere. The trade winds that drive the upwelling process are particularly sensitive to changes in atmospheric pressure and may die down altogether at certain times of the year. In addition, unpredictable climatic and oceanic conditions are influenced by periodic “sulphur” eruptions, large scale algal blooms and invasions by large bodies of oxygen depleted water. These phenomena all impact upon marine food chains, fish recruitment and the rate of marine resource production. As a result, the maximum sustainable yields of fish stocks fluctuate from one year to the next, rendering it difficult to manage Namibia’s marine resources on a sustainable basis.
IMPORTANCE OF MARINE FISHERIES TO NAMIBIA’S NATIONAL ECONOMY

- The marine fisheries sector is an important foreign exchange earner and significant employment generator for Namibia. Between 1990 and 2000 the combined fisheries and fish-processing sector contributed an average of 10% to the GDP. During the same period these sectors contributed an average of 25% to Namibia’s export earnings. These sectors are estimated to be responsible for 6% of total formal employment or 14,000 jobs (MFMR, unpublished report 2001).

- Prior to independence Namibia’s fishing industry was subject to open access. As a result of poor management, overexploitation of some of the productive fisheries occurred (in particular the highly valuable pilchard and anchovy fisheries). After independence Namibia took firm control of the country’s territorial waters and the marine fisheries sector grew rapidly. In terms of economic performance, output doubled from 1990 to 1993 and since then, despite a 35% drop in landings (due to unfavourable environmental conditions), earnings from this sector have remained roughly constant. The major reason for this has been an increase in value adding of landed fish (MFMR 1998). In addition, the value of the Namibian dollar has increased the local currency unit value of exported goods.

DECLINING FISHERIES AND MARINE ENVIRONMENT DEGRADATION

At least 70% of the world’s commercially important marine stocks are reported to be either in a state of depletion, in the process of collapsing or slowly recovering. Furthermore, many marine ecosystems throughout the world have begun to display signs of irreversible damage.

Although unsuitable environmental conditions sometimes cause large populations of marine organisms to die off, they are seldom considered responsible for permanent changes to fish stocks. On the other hand, poor management and overexploitation are capable of leading to the virtual or complete disappearance of a targeted fish species. Coastal degradation, a major cause of biodiversity loss, can also be responsible for a decline in commercial fisheries. Other growing threats to the global marine environment include the unintentional introduction of alien species from ships ballast waters,6 wastage and post harvest losses and poorly managed aquaculture activities. Currently these threats affect Namibia’s marine environment to varying degrees. Their causes and consequences are discussed in more detail below.

The causes and consequences of declining fisheries and marine environment degradation

*Variable environmental conditions.* Global atmospheric change is expected to result in many complex atmospheric and oceanic changes. These changes are likely to cause an increase in the environmental variability of the earth’s oceanic systems (IPCC 1996) and ultimately increase difficulties regarding fish stock management. There is also a causal relationship between the El Niño Southern Oscillation in the south Pacific Ocean and the dominance of anchovy or pilchard in upwelling systems throughout the world.

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6 Namibia’s fishing industry is possibly the only one in the world that more than doubles the landed fish value of its catches (Dr. B. Oelofse, pers. comm).

6 For example, certain algal species that cause red tides and the European mussel that has invaded the west coast of southern Africa.
Poor management and overexploitation of fish stocks. During the 1970s poor management resulted in the overexploitation of Namibia’s extensive pilchard stocks which, to date, have shown no signs of recovery to their former state. Practices that result in overfishing include, fleet overcapacity, inappropriate gear and fishing disturbance of spawning behaviour. Many factors hinder efforts to improve fisheries management. Strict enforcement is needed to ensure that illegal vessels are kept out of EEZs and that national fleets adhere to conservation and management measures. A lack of adequate technical or financial capacity to carry out the scientific research needed to set suitable TACs can also be a constraint. Even when this capacity is in place, disagreements concerning stock fluctuations and TACs commonly occur. In Namibia disagreements between the fishing industry and MFMR scientists over the accuracy of TAC’s has resulted in the industry hiring its own scientists to assess the recruitment of stocks. As the industry grows and becomes financially more powerful, it is expected to make increased investments into its own scientific assessment of stocks. This could result in healthy competition and, subsequently, more accurate stock assessments. On the other hand, the industry could follow world-wide patterns by exerting pressure on the government to allocate higher TAC’s than are sustainably viable.

Many fishing countries have allowed short to medium term economic and social objectives to outweigh sustainable development objectives. Subsidisation of fishing fleets commonly occurs causing overcapitalisation in the fleets and making it very difficult to prevent overfishing when stocks are depressed below the level where it would have ceased to be economically viable without subsidies.

Coastal degradation. Damaging impacts to coastal areas can be responsible for a decline in marine biodiversity and economically important fish populations. Although coastal degradation is currently very limited in Namibia, it is likely to increase with growing coastal development over the next 30 years. To date the human activities responsible for coastal degradation include:-

- The draining and clearing of the Walvis Bay lagoon, an important coastal wetland, for conversion into urban land.
- Upstream dams, deforestation, agricultural and urban pollution which have had a detrimental effect on water quality entering the Orange River mouth, reducing its potential as a fish-nursery area.
- Marine pollution, caused when seagoing tankers, passenger and cargo ships accidentally or purposefully deposit sewage, oil and other wastes into the ocean. Periodic oil spills that can occur during oil exploration, retrieval and transport activities also pose a major threat to Namibia’s coastal environment. Filter-feeding molluscs (for example, cultivated oysters and mussels) are particularly vulnerable to the effects of polluted water. Levels of marine pollution are expected to increase with rising populations and the growth of the coastal towns of Lüderitz, Walvis Bay, Swakopmund and Henties Bay.

Wastage and post harvest discards. Fishermen inadvertently kill and waste large numbers of fish, seabirds, turtles, marine mammals and other organisms when they target one economically valuable species. The amount of wasted marine life is estimated to be 33% of the global catch. At high levels of off-take, this wastage of marine life has begun to threaten global marine biodiversity.

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7 The west coast steenbras, one of Namibia’s line angling species is thought to be highly dependent on inland wetland areas (Sandwich Harbour, the Walvis Bay Lagoon and the Orange River mouth) for breeding. The role of these wetlands as breeding areas for commercial fish species is still unknown.
POTENTIAL GROWTH WITHIN THE MARINE RESOURCE SECTORS TO 2030

Current status and trends within marine fisheries
Despite improvements in fisheries management since 1990, some stocks (in particular pilchard) are considered to be in decline (Table 1.1). This is largely because of adverse environmental conditions that have dominated since the 1980s. Despite the unpredictable variability displayed by Namibia’s marine environment, there is optimism regarding future earnings from the marine fisheries sector.

Table 1.1 Current status and expected trends regarding Namibia’s commercial fish stocks

<table>
<thead>
<tr>
<th>FISHERY</th>
<th>SPECIES</th>
<th>CURRENT STATE</th>
<th>CAUSE/EXPECTED TRENDS/COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pelagic</td>
<td>Pilchard</td>
<td>Overexploited</td>
<td>Overfishing. No growth expected until stock recovers (if at all)</td>
</tr>
<tr>
<td></td>
<td>Anchovy</td>
<td>Low abundance</td>
<td>Adverse environmental conditions</td>
</tr>
<tr>
<td></td>
<td>Juvenile horse mackerel</td>
<td>Abundant</td>
<td>Present environmental conditions favorable</td>
</tr>
<tr>
<td>Midwater</td>
<td>Horse mackerel</td>
<td>Abundant</td>
<td>Present environmental conditions favorable</td>
</tr>
<tr>
<td>Demersal</td>
<td>Hakes</td>
<td>Not at maximum sustainable yield, but improving</td>
<td>Slow recovery from overfishing and adverse environment</td>
</tr>
<tr>
<td></td>
<td>Monkfish</td>
<td>State uncertain but good recruitment for a number of years</td>
<td>Management will improve with the introduction of TAC and Quota management system</td>
</tr>
<tr>
<td></td>
<td>Kingklip</td>
<td>Stock is growing</td>
<td>Not a directed catch</td>
</tr>
<tr>
<td></td>
<td>West coast sole</td>
<td>Unknown</td>
<td>Mostly occur in the shallow areas and protected by the 200m depth restriction on all trawling</td>
</tr>
<tr>
<td>Deep Sea</td>
<td>Alphonsino</td>
<td>Migratory and state uncertain</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Orange roughy</td>
<td>Uncertain. Decrease in availability - is it due to overfishing, intermittent spawning or fishing disturbance?</td>
<td>Long lived, low production species, unlikely to sustain substantial catches</td>
</tr>
<tr>
<td></td>
<td>Oreoc dory</td>
<td>Uncertain</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Deep sea red crab</td>
<td>Population stable</td>
<td>Shared with Angola. Co-management has been initiated.</td>
</tr>
<tr>
<td>Commercial and recreational line fishing</td>
<td>Albacore tuna</td>
<td>On maximum sustainable yield.</td>
<td>Managed by ICCAT</td>
</tr>
<tr>
<td></td>
<td>Big eye tuna</td>
<td>On maximum sustainable yield.</td>
<td>Managed by ICCAT</td>
</tr>
<tr>
<td>Species</td>
<td>Status</td>
<td>Notes</td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Snoek</td>
<td>Uncertain but seems to be on the increase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kob</td>
<td>Fishing pressure is too high</td>
<td>Should be a decrease in commercial fishing pressure and restrictions on angling</td>
<td></td>
</tr>
<tr>
<td>West coast steenbras</td>
<td>Fishing pressure is too high</td>
<td>Restrictions on angling needed</td>
<td></td>
</tr>
<tr>
<td>Barbel</td>
<td>Healthy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blacktail</td>
<td>Precarious</td>
<td>More restrictive bag limits</td>
<td></td>
</tr>
<tr>
<td>Rock lobster</td>
<td>Rock lobster</td>
<td>Slow growth but consistent increase since 1992</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TAC’s are increased slowly to allow for a continued recovery back to maximum sustainable yield levels of around 1200 mt</td>
<td></td>
</tr>
<tr>
<td>Mariculture</td>
<td>Pacific oysters</td>
<td>Production on increase</td>
<td></td>
</tr>
<tr>
<td></td>
<td>European oysters</td>
<td>Very low production but good prospects</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Black mussels</td>
<td>Farming has started but many difficulties are experienced</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seaweed</td>
<td>Very promising with 10 ha culture in Luderitz lagoon. Top Quality.</td>
<td></td>
</tr>
<tr>
<td>Marine mammals</td>
<td>Cape fur seals</td>
<td>Population very robust and still growing. Not yet harvested at maximum sustainable yield levels.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increased harvesting levels possible as shown by latest models</td>
<td></td>
</tr>
</tbody>
</table>

**Potential scenarios to 2030**

One optimistic scenario for fish harvesting predicts good recovery of fish stocks to maximum sustainable yields by 2016. On the basis of this scenario the fisheries sector could experience a growth rate of 6 - 9% between 1998 and 2017 (Blackie in Tarr 1997). Once maximum sustainable yields are reached, no further growth in harvesting can be expected, but if managed properly, and concerted efforts are made to ensure the value adding of harvested fish, this sector could remain a high earner on a sustainable basis beyond 2030. The industry foresees an increase in exports of high value fish products to overseas markets. In addition, the opening of the Trans-Caprivi and Trans-Kalahari highways are expected to result in more efficient trade and improved export markets for marine products to landlocked country’s within the SADC region. In addition there is considerable potential for expanding mariculture and diversifying the marine resources sector. In particular, nature centred tourism activities (for example, low impact whale/seal watching and visits to the offshore islands for birdwatching) provide ideal opportunities for economic growth (Figures 1.2 and 1.3).
EFFORTS TO MITIGATE MARINE ENVIRONMENT DEGRADATION AND TO ENHANCE THE VALUE OF MARINE RESOURCES

Since independence in 1990 considerable improvements have been made regarding the monitoring and regulation of Namibia’s fish stocks. Unlike the agricultural sector the fishing industry enjoys no subsidies, tax breaks or market interventions. Access is regulated by quota allotments and fishing rights.

After independence a 200-mile exclusive economic zone (EEZ) was declared, prohibiting fishing by foreign trawlers except under licence. The GRN has also set conservative Total Allowable Catches (TAC’s) in order to promote the sustainability of resources and to enhance the recovery of anchovy, pilchard and hake stocks after decades of overexploitation. In 2001 fishing rights were extended from four, seven and ten years to seven, ten, 15 and 20 years. It is expected that this change in policy will provide an incentive for companies to adopt more sustainable fishing practices. In order to discourage the targeting of bycatch species by-catch fees have been introduced.

- In an attempt to limit unnecessary coastal degradation without restricting coastal development an Integrated Coastal Zone Management Plan (ICZMP) has been adopted. Namibia’s ICZMP aims to reduce conflict of interests in resource utilisation and ensure co-ordination and co-operation between the many stakeholders involved with coastal development including sectors involved with fishing, urban development, tourism, offshore oil and shipping and industry (J. Henschel, pers comm., McGann et al 2001.)

- In order to improve the accuracy of setting TACs and reduce pressure from the industry to have them increased, it is now agreed that Government fisheries scientists are assisted by outside consultants in setting their estimates regarding TACs for certain species. These estimates are peer reviewed by a panel of outside internationally acknowledged stock assessment experts in a workshop environment in which representatives from South Africa and Angola are also present. The consultants are paid on a 50/50 basis by the Government and the fishing industry.

- In order to counteract marine pollution Namibia does not allow dumping and has an almost 100% observer coverage on the fishing vessels to enforce the regulation. In response to the regulations set by the International Convention on the Prevention of Pollution from Ships (MARPOL) all port authorities are expected to provide facilities for the retrieval and correct disposal of oily ballast water and other waste matter that accumulates on board ships.

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8 This procedure is currently in place for seals, hake and orange roughy harvesting and will soon be implemented for monkfish.
Figure 1.3. THE NAMIB COAST – IMPACTS AND OPPORTUNITIES

Depicting areas that currently experience environmental impacts and areas with potential for future natural resource-based industries (excluding commercial fishing)

- Guano harvesting
- Mariculture
- High-volume tourism (current)
- Low impact eco-tourism
- Shore-based angling
- Whale and dolphin watching
- Recreational boating
- Exclusive coastal lodge
- Diamond mining
- Important bird areas

Main causes of current environmental impacts

- Mining
- Coastal Development
- High impact Tourism
2. FRESHWATER AND FRESHWATER RESOURCES

WATER SCARCITY – NAMIBIA’S PRIMARY LIMITING FACTOR FOR DEVELOPMENT

Namibia suffers from extreme water scarcity. The only permanently flowing rivers lie near to, or form part of, the countries international boundaries. The lack of readily available freshwater in the interior of the country remains the most important limiting factor for development. Using Falkenmark’s indices for estimating water scarcity and water stress, Namibia is classified as being subject to absolute water scarcity and high water stress (Box 2.1)

<table>
<thead>
<tr>
<th>LEVEL OF SCARCITY</th>
<th>WATER AVAILABILITY m³/person/a</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>&gt; 2 000</td>
</tr>
<tr>
<td>Occasional</td>
<td>2 000 – 1 700</td>
</tr>
<tr>
<td>Periodic</td>
<td>1 700 – 1 000</td>
</tr>
<tr>
<td>Chronic</td>
<td>100 – 500</td>
</tr>
<tr>
<td>Absolute</td>
<td>&lt; 500</td>
</tr>
</tbody>
</table>

Water scarcity in Namibia = 660 /2,1 = 314 m³/person/annum = Absolute water scarcity

<table>
<thead>
<tr>
<th>LEVEL OF STRESS</th>
<th>withdrawal/availability X 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>&gt; 10</td>
</tr>
<tr>
<td>Moderate</td>
<td>10 to 20</td>
</tr>
<tr>
<td>Medium</td>
<td>20 – 40</td>
</tr>
<tr>
<td>High</td>
<td>40 – 60</td>
</tr>
<tr>
<td>Catastrophic</td>
<td>&gt; 60</td>
</tr>
</tbody>
</table>

Water stress in Namibia = 300/600 = 50 % = High water stress

THE CRITICAL IMPORTANCE OF FRESHWATER AND FRESHWATER ECOSYSTEMS

Water is our most valuable natural resource. It sustains every plant and animal and without it, there would be no life on Earth. In addition to its vital life sustaining properties freshwater is essential for cooking, maintaining personal hygiene, removal of sewerage and almost all economic activities. Consequently, the amount, availability and quality of a country’s water reserves, and how these are managed, helps to determine the health of its human population and its environmental and economic characteristics.

In addition to the water needed for our domestic, industrial and agricultural activities, the naturally occurring aquatic ecosystems from which all our water is derived provide humans with many other valuable goods and services (Table 2.2). Because we seldom have to pay for these resources we generally take them for granted. Despite this, their combined annual global value is estimated to be worth several billion dollars.
Table 2.1 Goods and hidden services provided by natural aquatic ecosystems

**VALUABLE GOODS**

- Freshwater. Essential for life processes, maintaining human health, agriculture and industry.
- Riverine and wetland vegetation. Can be used for grazing, building materials, fuel and food.
- Aquatic animals. Fish and other edible aquatic animals provide a valuable source of income and protein to rural subsistence communities.
- Wild birds and terrestrial animals concentrate around natural water bodies. These rich and varied wildlife populations can be used by communities for food and help to attract tourists to an area.
- Fertile soils. Floodplains associated with the seasonal flooding of rivers contain organically rich silt and other sediments that provide a rich substrate for cultivation.

**VITAL SERVICES (INDIRECT-USE VALUES OF AQUATIC ECOSYSTEMS)**

- Rooted aquatic plants (like reeds and rushes) reduce floods by regulating stream flow. In addition aquatic plants improve water quality by recycling excess nutrients.
- Many small water animals are detritivores. By breaking down and consuming dead and decaying plant and animal matter these animals play a vital role in aquatic food chains and help to keep natural water sources clean.

BROAD OVERVIEW OF NAMIBIA’S WATER RESOURCES AND CONSUMPTION

**Hydrology**

Water in Namibia is scarce due to low and highly variable rainfall (Figures 2.1 and 2.2). This leads to a corresponding variability in runoff, stream flow and infiltration into underground aquifers. High rates of evaporation (Figure 2.3) ensure that, of the rain that falls over most of Namibia, no more than 2% is likely to end up as runoff and less than 1% is available to recharge underground aquifers (Box 2.2)

**Box 2.2 Namibia’s water balance and estimated resource availability** (Source: DWA unpublished data)

**Water Balance**
Average rainfall = 250 mm/annum (Range < 20 mm - 700 mm) Area of Namibia = 824 300 Km²
Total precipitation = 824 300 x 250 x 10^-6 km³/a = ± 200 km³/a

<table>
<thead>
<tr>
<th>USE</th>
<th>BALANCE</th>
<th>VOLUME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Evaporation</td>
<td>83%</td>
<td>166</td>
</tr>
<tr>
<td>Evapotranspiration</td>
<td>14%</td>
<td>28</td>
</tr>
<tr>
<td>Runoff in rivers</td>
<td>2%</td>
<td>4</td>
</tr>
<tr>
<td>Recharge to groundwater</td>
<td>1%</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>100%</td>
<td>200</td>
</tr>
</tbody>
</table>

**Estimated resource availability**

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>VOLUME</th>
<th>REMARK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater</td>
<td>300</td>
<td>Long term sustainable safe yield</td>
</tr>
<tr>
<td>Ephemeral Surface Water</td>
<td>200</td>
<td>Full development at 95% assurance of supply</td>
</tr>
<tr>
<td>Perennial Surface Water</td>
<td>150</td>
<td>Installed abstraction capacity</td>
</tr>
<tr>
<td>Unconventional</td>
<td>10</td>
<td>Reclamation, re-use, recycling</td>
</tr>
<tr>
<td><strong>Available Resources</strong></td>
<td><strong>660</strong></td>
<td></td>
</tr>
</tbody>
</table>
Rainfall variability (represented as the standard deviation as a percentage of average annual rainfall) measures how much rainfall in an area is likely to deviate from the average amount of rain that is expected to fall (Figure 2.1). It provides a useful measure for assessing the reliability of rainfall in an area.

In general, rainfall over most of Namibia is not only sparse but also extremely variable. Only in the very wettest parts of the country does rainfall become fairly predictable with a variation of < 30%. Rainfall is least predictable in the driest areas where variation from the average can exceed 70%. In these areas it is common for some seasons to record far less than half or much more than double the average rainfall. Consequently droughts are common in Namibia and below average rainfall over most of the country for periods of 2 years or longer can often be expected.
Figure 2.3. NAMIBIA'S HIGH WATER DEFICIT
(average annual rainfall minus average annual evaporation)

The amount of water that evaporates is generally greater than the amount that falls as rain each year, and the difference between total annual rainfall and evaporation provides a measure of water deficit. The higher the water deficit in an area, the lower the amount of water available for rain fed agriculture, water storage in open dams and plant production.

In Namibia, the southern areas of the inland plateau (within the Karas and Hardap regions) are subjected to the highest water deficit. These areas suffer extremely high evaporation rates that can exceed the average rainfall 20 fold. Water deficits decline from the Keetmanshoop area towards the north and southwest, but can still be considered high over most of the country, as a result of high daytime temperatures and low atmospheric humidity.
Water resources

Water is supplied to Namibian consumers from groundwater reserves, perennial surface waters and storage dams on ephemeral rivers (Box 2.2). Water from these sources is unevenly distributed across the country. Consequently some of the areas of highest demand (for example, the rapidly growing urban centres of Windhoek, Swakopmund and Walvis Bay) are placed geographically far from the country’s water rich areas (on the northern and southern borders alongside the perennial rivers) (Figure 2.4). This poses considerable problems regarding water supply and management.

Perennial Rivers are rivers that flow all year round. Approximately 26% of Namibia's water demand is currently supplied from perennial rivers. Although these rivers have the greatest potential as water resources, they are located far from the areas of highest demand (the city of Windhoek and other main commercial and industrial centres). Sustainable management of perennial rivers in Namibia is difficult because several countries share them. Flow and water quality in the Kunene and Orange Rivers are affected by dams, water transfer schemes and other activities in neighbouring countries.

Seasonal Rivers may flow for several months each year. The Cuvelai drainage (Oshana) system occupies a plain between the Kunene and Okavango rivers. During the rainy season, this plain becomes an interconnecting mesh of water channels that drain into several small interlinking pans. These pans can contain water for up to six months after the channels have stopped flowing. The Oshana system depends on local rainfall and annual floods from upstream in Angola. They provide a valuable source of food and vegetation (for grazing, basketry and construction) to local communities during the rainy season.

Ephemeral Rivers are usually dry, flowing only briefly with characteristic ‘flash floods’ when enough rain has fallen over their catchment areas. All rivers that originate within Namibia’s borders are ephemeral. The water table associated with these rivers is high and their banks characteristically support large trees and other vegetation that provide important resources for people and wildlife living in the arid areas of Namibia. Due to unpredictable rainfall conditions in Namibia, ephemeral river flow is unreliable. Water in these rivers remains on the surface for such a short time and can only be used if impounded in storage dams. A major constraint of these dams is that the stored water is subject to high losses through evaporation. Currently 23% of the water used in Namibia originates from ephemeral sources. Although necessary for water supply to farms and towns, the impoundment of ephemeral river flow has serious environmental and social implications as it causes a lowering of the water table and reduces downstream underground aquifer recharge. This is particularly evident in the lower reaches of the Swakop River, which supplies both the Swakoppoort and Von Bach Dams.

Underground water. Due to shortages in surface water, Namibia relies heavily on groundwater reserves. These reserves are subject to low recharge rates from rainfall and periodic ephemeral floods. Despite this, groundwater is vital for farmers and most towns throughout western and central Namibia. Groundwater in the late 1990s accounted for 51% of Namibia’s water supply. By 2000 this figure had dropped to 45% due to good rains that had recharged the ephemeral dams in 1999/2000. Groundwater extraction is the cheapest

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Walvis Bay, Swakopmund, Arandis, Henties Bay, Lüderitz, Uis, Karibib, Usakos and Omaruru are all supplied with water from aquifers that are recharged by ephemeral rivers. Tsumeb, Grootfontein and Otjiwarongo depend on fractured and karst type aquifers. Windhoek, Mariental, Keetmanshoop and Rehoboth and Gobabis are supplied mainly from ephemeral dams with standby capacity from groundwater supplies.
Figure 2.4. NAMIBIA'S RIVERS

Rivers and drainage

- Perennial rivers
- Ephemeral rivers
- Cuvelai Drainage System

Skeletal map of Namibia showing the major rivers and drainage systems.
available source of water in Namibia but is vulnerable to overexploitation. Some aquifers in the Namib may be as much as tens of thousands of years old and long since cut off from recharge. Dependence on these resources is obviously not sustainable. It is difficult to set exact estimates on the quantity of groundwater that is available in Namibia. This poses a problem for setting rates of abstraction that are sustainable and for assessing the extent to which Namibia may or may not be overexploiting these vital sources.

**Water consumption and income generation**

Recent estimates from the DWA show that in 2000, 45% of the water consumed in Namibia was being used for irrigation, 24% for domestic consumers (and urban industries), 26% by livestock and 5% by mines, rural dwellers, wildlife and tourism. Although agriculture accounts for over 70% of the water used, it contributes little more than 10% to GDP. The value added to the water used for agricultural activities in Namibia (especially irrigation) is very low (an estimated N$7.2/m³) when compared to that used for manufacturing (N$272/m³) or tourism and other service sectors (N$574/m³) (R. Blackie *pers comm.*).

**Table 2.2 Water demand per source and per sector (2000) in Mm³/annum** *(Source: Department of Water Affairs, unpublished data 2001)*

<table>
<thead>
<tr>
<th>CONSUMER</th>
<th>DEMAND (Mm³)</th>
<th>PERENNIAL RIVERS</th>
<th>EPHEMERAL RIVERS</th>
<th>GROUNDWATER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mm³</td>
<td>%</td>
<td>Mm³</td>
</tr>
<tr>
<td>Domestic</td>
<td>73</td>
<td>18</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>Stock</td>
<td>77</td>
<td>14</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>Mining</td>
<td>14</td>
<td>9</td>
<td>57</td>
<td>1</td>
</tr>
<tr>
<td>Irrigation</td>
<td>136</td>
<td>60</td>
<td>44</td>
<td>41</td>
</tr>
<tr>
<td>TOTAL</td>
<td>300</td>
<td>100</td>
<td>33.0</td>
<td>65.0</td>
</tr>
</tbody>
</table>

**IMPORTANCE OF INLAND FISHERIES TO SUBSISTENCE LIVELIHOODS**

Approximately 50% of Namibia’s total population live in the proximity of the northern perennial and seasonal rivers. Although the country’s freshwater fish resources contribute little directly to GDP, they play a vital role in enhancing the livelihoods of many of these people through informal employment and subsistence fishing.

Fishing opportunities in the Cuvelai Drainage System, the most densely populated in Namibia (Figure B), rely on sufficient rains falling in the Angolan highlands and are highly episodic. Approximately 2 800 tonnes of freshwater fish (estimated to be worth N$1.8 million annually) are caught in Kavango and Eastern Caprivi each year, directly supplying some cash and a valuable supplementary food supply to 79% of rural Caprivians and 90% of all households in Kavango. In total, more than 50% of Namibia’s population fish and 45% derive some income from the sale of fish (Hay *et al* 2000).

Fish numbers in the Okavango River have declined dramatically since 1984. This has been accompanied by a noticeable decline in the average size of individual fish that are caught and a diminishing proportion of long-lived species in the total catch. The major cause for declining freshwater fish populations in Namibia is over fishing (Table 2.3).
IMPLICATIONS OF FRESHWATER DEPLETION AND DEGRADATION

Future water demand and freshwater depletion

While high rainfall variability and the accompanying threat of drought are the most critical constraints facing Namibia’s water resources, water demand continues to rise. As a consequence, water scarcity has become a problem for all areas that are placed geographically far from the perennial water sources. The DWA has estimated that the country’s developed water sources are able to supply a total of 600Mm³ per annum. Based on projections for future water demand (estimated to grow at 2.2% per annum) these developed sources are likely to be fully exploited by 2016. Even if stricter Water Demand Management practices are enforced, the central areas of Namibia (in particular the high growth points in the Khomas Region) are expected to experience full use of currently developed sources by 2012. The rate at which water demand is estimated to rise from 2000 to 2030 is given in Table 2.3 and Figure 2.5 (DWA, unpublished data, 2001).

Table 2.3 Estimated future water demand in Namibia (2000 – 2030) (Source: DWA, 2001)

<table>
<thead>
<tr>
<th>CONSUMER</th>
<th>ANNUAL DEMAND (Mm³)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td>67</td>
</tr>
<tr>
<td>Stock</td>
<td>77</td>
</tr>
<tr>
<td>Industry</td>
<td>6</td>
</tr>
<tr>
<td>Mining</td>
<td>14</td>
</tr>
<tr>
<td>Irrigation</td>
<td>136</td>
</tr>
<tr>
<td>TOTAL</td>
<td>300</td>
</tr>
</tbody>
</table>

* Estimates

Irrigation: Increase with 1 000 ha/a @ 15 000 m³/ha/a = ± 15 Mm³/a
Mining: Increase with two new mines every 5 years using ± 2,5 Mm³/a each
Industry: Increase with ± 1 Mm³/a each year
Population: Increase at an average of 1,96%/a due to HIV/AIDS effect between 2000 and 2030

Figure 2.5 Estimated water demand per sector (2000 –2030) in Mm³/annum (Source: DWA, 2001)
Over the next 30 years, water demand in Namibia will increase rapidly in some areas (in particular, all expanding urban areas) and only moderately in others. The current problem of distributing the available water to where it will be most needed will be exacerbated and, due to full exploitation of developed resources, expensive new water sources (for example desalination plants, new dams, long pipelines and water from foreign countries) will need to be developed. From Figure 2.5 it is evident that water demand for irrigation, currently the main water consumer, is expected to increase considerably in future decades.

**Causes of freshwater depletion**

Freshwater depletion is occurring as a result of several combined impacts. These include:

- **Low rainfall.** Due to frequent and prolonged periods of low rainfall in Southern Africa, regional water resources have diminished since 1980. Periods of low rainfall reduce the amount of surface water available. This places added strain on groundwater reserves, which become threatened by overabstraction. Flow rates in northern perennial rivers have also declined in recent years (Mendlesohn and Roberts 1997). Emergency boreholes, for example those established during the 1992/93 drought, were supplied without forward planning or consideration for the socio-economic and ecological problems they could incur (UCT, 1997).

- **Growing demand.** Population growth, rapid urbanisation and economic development increase demand for domestic, agricultural and industrial water.
  - Projections estimate that by 2020 population growth rates are likely to have dropped to as low as 1.2% (from an average 3.1% between 1981 and 1991) due improved education levels, economic growth and the impact of the HIV/AIDS epidemic.
  - Demand for household water increases with increasing development, urbanisation and wealth. The rate of urban population growth is high in Namibia (an estimated 5.5% per annum), which means that about 85% of Namibia’s population could be living in towns by 2021.
  - Irrigation, which accounted for 45% of all the water consumed in Namibia in 2000 (P. Heynes, *pers comm*). Based on current trends there is likely to be an increase in this water intensive activity in the short to medium future (The National Agricultural Policy aims for a five fold increase in irrigation).
  - Increases in livestock numbers.

- **Government subsidies.** In the past, overgenerous Government subsidies and fixed price policies led to the inefficient use of water and encouraged extremely wasteful practices. For example, the water used for water intensive irrigation of low value crops like maize was provided at extremely low rates. In Namibia’s National Agricultural Policy reference is still made to the possibility of subsidies for water.

- **Limited recognition of the total economic costs of water supply** which include the financial costs of capital development and maintenance as well as the costs relating to the non-use values of Namibia’s natural aquatic ecosystems (Table 2.1).

- **The impacts of global warming.** Under climate change conditions Namibia may experience decreased rainfall, runoff and groundwater recharge over most of the country and an increase in year-to-year runoff variability.

**Freshwater degradation**

Superimposed over Namibia’s water scarcity is a decline in water quality - a disturbing trend that is linked to increasing population and pollution levels. Once it has been contaminated,
groundwater is almost impossible to clean up. Consequently, Namibia is extremely vulnerable to the effects of water pollution — mainly because of the country’s limited supply of surface water and high dependency on groundwater sources. Being the shared end user of two of its major perennial rivers also makes Namibia highly vulnerable to pollution. Ultimately, the quality of the water that reaches Namibia from these important sources is largely dependent on the activities that occur upstream in Lesotho and South Africa (in the case of the Orange) and Angola (in the case of the Kunene). In turn, Namibia has a responsibility to ensure that we do not pollute the Okavango, Kwando-Linyanti-Chobe and Zambezi rivers that flow into other countries.

Major causes of water degradation
- **Poor land management.** Increasing rates of devegetation within catchment areas, along floodplains and a loss of upstream riparian vegetation increase sediment transport in downstream areas. This is directly responsible for an increase in flood severity during periods of high rainfall, dam siltation, reduced rates of aquifer recharge and reduced water quality.
- **Pollution.** As populations in Namibia and her neighbouring countries grow, become more urbanised and industrialised they have to cope with greater volumes of polluting waste, and more dangerous polluting substances entering the environment. Water pollution levels in Namibia are still relatively low, but a growing population and expanding development will create increasing volumes of more complex polluting waste, which can easily enter water sources. With the exception of Walvis Bay and Windhoek, waste management in Namibia is generally poorly planned and under funded. Most of the small, rapidly expanding urban centers lack adequate facilities to cope with the collection and disposal of both general and hazardous wastes. There is a severe shortage of people with technical and managerial skills, and low levels of public education and involvement regarding littering and pollution. In general, major water pollutants include: agrochemicals (fertilisers, pesticides)\(^5\), leachate from rubbish dumps and poorly designed landfill sites; leakage from buried fuel tanks or containers holding hazardous waste; mining or industrial waste; and salt water intrusion into coastal aquifers that are subject to overabstraction.

**Trends in surface water quality**
Development in the catchments of the Kunene, Kwando and Okavango Rivers is still limited, largely because of the war in Angola. Consequently, the quality of water that reaches Namibia from these sources is still good and relatively unpolluted. Despite this, human impacts on these rivers once they reach Namibia, are increasing\(^6\) - mainly as a result of a loss of riparian vegetation, cultivation along river banks, biodiversity loss and reduced productivity.

In contrast to the northern perennial rivers, water quality in the Orange River has been severely affected for decades by large numbers of dams and irrigation schemes upstream in South Africa and Lesotho. Pollution from densely populated South African cities and agricultural activities within the catchment area has also had a detrimental effect on the water

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\(^5\) Pesticide and fertiliser usage is highest in Caprivi, Kavango, the maize triangle and the Hardap Dam area. An estimated 20% of the agrochemicals and fertilisers used by farmers in the Hardap Dam area are washed into the Fish River basin from where they are seasonally flushed into the Orange River (Kohler 1997). Signs of agrochemical pollution have been detected in the Kwando River and underground aquifers in the Maize Triangle.

\(^6\) Recent studies on aquatic invertebrates that inhabit the Kwando River show that they have declined in recent years. This could be a sign that the river is being affected by pollution. A major cause of pollution in the Kwando River is pesticides (mostly the persistent organic pollutant, DDT) that are used by Ministry of Health and Social Services to help control malaria. The insecticide, Lindane, is also regularly used in the Eastern Caprivi to control periodic outbreaks of locusts and other crop pests.
quality of the Orange. Trends regarding surface water resource degradation in Namibia are summarised in Table 2.3.

**Trends in ground water quality**

Once contaminated, groundwater is extremely difficult and expensive to clean. Several important aquifers in Namibia are particularly vulnerable to contamination including those that are used to provide water to Windhoek, Tsumeb and Maltahöhe. Examples of polluted groundwater in Namibia include: petrol seepage from underground tanks in Aroab and the Etosha National Park; the presence of chromium, a poisonous heavy metal found in tannery effluent, detected in borehole water at Brakwater (P.Heynes, *pers comm.*); and traces of fertilisers and other agrochemicals detected in the important Karstveld aquifers (Kohler 1997). Regulations are in place for water quality control in Namibia and there are wastewater discharge permits issued by the DWA to all effluent producers. Despite this, human resources within the DWA are limited and water-monitoring activities are currently considered to be inadequate.

Table 2.3. Trends in surface water resource degradation in Namibia

<table>
<thead>
<tr>
<th>POLLUTANTS</th>
<th>TREND</th>
<th>Direct cause</th>
<th>Indirect cause</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pesticides</td>
<td>Increasing</td>
<td>Control of mosquitoes; irrigated crop pest control.</td>
<td>Disease control (malaria, bilharzia; sleeping sickness) crop pests</td>
<td>Long term toxic effects which threaten ecosystem and human health and rural livelihoods.</td>
</tr>
<tr>
<td>Fertilisers</td>
<td>Increasing</td>
<td>Agricultural Enhancement</td>
<td>The need for increased food production.</td>
<td>Eutrophication, Disturbed nutrient cycling. Damage to fish and other aquatic populations (creation of “dead zones”). Threats to rural livelihoods.</td>
</tr>
<tr>
<td>Salinisation</td>
<td>Likely to increase with an increase in irrigation activities.</td>
<td>Irrigation</td>
<td>Aridity; growing population.</td>
<td>Damage to water quality. Loss of land for future agricultural activity.</td>
</tr>
<tr>
<td>Freshwater</td>
<td>Declining availability</td>
<td>Overabstraction and pollution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Riverine vegetation</td>
<td>Declining</td>
<td>Grazing livestock; use of trees for fuel, construction, carving, land clearing for cultivation.</td>
<td></td>
<td>Reduced flood control, water purification. Reduction in fish populations and rural livelihood options. Increasing poverty. Loss of reeds and other valuable aquatic resources. Increased turbidity reduced water quality and a loss of biodiversity.</td>
</tr>
<tr>
<td>Riverine fish populations</td>
<td>Declining</td>
<td>Overfishing; use of inappropriate equipment; damaged wetland habitats; pollution.</td>
<td>Growing population and poverty leading to an unsustainable increase in the use of resources; loss of traditional management practices; lack of education.</td>
<td></td>
</tr>
<tr>
<td>Fertile soils associated with floodplains</td>
<td>Declining</td>
<td>Dams that prevent natural flooding and the deposition of organically rich silt in floodplains; barriers that prevent floodwaters from entering flood plains; pollution, clearing too close to rivers edge</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*In recent years more efficient, less sustainable methods for catching fish have been adopted (such as the use of mosquito nets that remove young fish as well as adults from the population). Overgrazing is also blamed for the declining health of wetlands and the freshwater fisheries in Caprivi where human and cattle population density, especially in the eastern floodplain, is very high. Consequently, some fish species in the northern perennial waters have been identified as endangered (Hay *et al* 2000)*
Consequences of freshwater depletion and degradation

Freshwater depletion and degradation threatens human and livestock health, and socioeconomic development. It threatens biodiversity, damages the functioning of wetland ecosystems and limits their ability to provide goods and services. It reduces livelihood options and exacerbates rural poverty (Figure 2.6).

Figure 2.6 The ultimate consequences of declining freshwater quality and quantity

Increasing costs of supply – how will this affect Namibia’s future?
Increasing costs of supply are inevitable as expensive new infrastructure (eg desalination plants) need to be developed for the rapidly expanding urban populations that live far from the cheapest water sources. As water in some areas becomes more scarce and expensive, development options become increasingly limited. Cost recovery of the capital spent on developing expensive new water resource infrastructure is likely to become more and more difficult – especially as the number of teenage headed households are set to increase dramatically over the next few decades, as a direct result of the growing HIV/AIDS epidemic.

EFFORTS TO REDUCE RATES OF FRESHWATER DEPLETION AND DEGRADATION AND TO ENHANCE THE VALUE OF WATER

Our ability to mitigate freshwater depletion and degradation is essential to sustainable development. It is now recognized that the enforcement of Integrated Water Resource Management and Water Demand Management strategies are essential if our goals regarding social well-being, economic development and environmental health are to be realized. To date, efforts to reduce the threats to water resources in Namibia have been extensive and include:

- Water conservation initiatives.
  - In order to reduce losses from evaporation, water supplied to Windhoek and the central areas of Namibia is always transferred from dams with large surface areas to dams with smaller surface areas. In addition water from surface sources is used before underground sources. In years of very good rain, underground aquifers may be artificially recharged with surface water from dams – helping to reduce runoff losses and losses from evaporation.

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8 Peter Ashton, CSIR (pers.comm.)
9 The combined economic, technological and legislative policies that have been adopted as part of Namibia’s Water Demand Management strategy has meant that water consumption in Windhoek has remained at 1987 levels despite a 43% increase in population (DEA 1999).
Significant amounts of water are conserved through water re-use and reclamation. Windhoek, Swakopmund, Walvis Bay, Arandis, Tsumeb and Otjiwarongo all have water reclamation plants\(^{10}\). The development of alternative water sources i.e. desalination, fog and water harvesting are being investigated. A water desalination plant is planned for coastal towns and should be operational by 2004.

Adopting a stricter economic approach to water pricing. Through this approach subsidies for industry, irrigation schemes and middle income to upper income domestic users are gradually being phased out and consumers are eventually expected to pay a realistic price for the water they use – one that reflects its true economic value.\(^{11}\) This is likely to lead to a reduction in wastage in households and will encourage industries and farmers to embrace water saving, recycling and reclamation technologies where appropriate. The block tariffs introduced to homes in Windhoek ensure excessive consumers subsidise lower volume (and lower income) users. This has reduced overall consumption and has helped to supply low-income citizens with reliable sources of clean water. However, it must be mentioned that increased water prices could have a negative effect on Namibia’s competitiveness in the region for attracting investment.

- **Using water in the most economically viable and ecologically sound manner.**
  Namibia’s Natural Resource Accounting (NRA) programme provides valuable information that can be used to help guide policies for future development. By assessing the amount of water used by different economic sectors and their contribution to GDP, natural resource economists can assess which economic activities provide the best economic returns for water used. In planning for allocation of water, these factors will increasingly be considered. In the case of irrigating cash crops it is advised that high value crops (e.g. grapes and dates) are grown rather than low value ones (e.g. maize). Tools such as Strategic Environmental Assessment are being adopted in order to identify conflicts regarding water use and to prevent impacts on freshwater ecosystems and the resources and services that they provide.

- **Improved catchment, river and aquifer management.** An integrated and multi-sectoral approach to water management is essential. In particular, land-use management must be linked to sustainable water resource management.
  - Cooperation and co-ordinated planning between Governments that share water resources is essential. Several agreements (Appendix 2) have been established between Namibia and her neighbors regarding their shared river basins. However, all planning should extend beyond agreements on water use, and include treaties relating to land use in catchment areas, pollution control and reducing opportunity costs through inappropriate upstream activities.
  - Rural communities are expected to become increasingly responsible for their own water points and to ensure cost recovery for operation and maintenance. Water Point committees have been established to oversee these responsibilities. Tenure over water resources in rural areas will help to reduce water wastage and degradation. Water management is closely linked to livestock, wildlife and other natural resource management. Consequently, it is essential that full devolution of tenure over all natural resources should take place to appropriate community levels, so that integrated management can be practiced for sustainable rural development.

- **Improvements in waste management**
  Two laws of particular importance regarding improved pollution control are the Environmental Management Act and the Pollution and Waste Management and Control Act that will be introduced in 2001. These Acts will help to lay a foundation for reducing negative impacts on Namibia’s limited water resources.

\(^{10}\) In Windhoek the only water that is not recycled is that which has been used to water gardens. About 20% of the water that enters the Windhoek reclamation plant is purified to drinking water quality. The rest is not suitable for human consumption and is used to help damp down gravel roads and for the irrigation of public gardens and sports fields. The solid sludge that is left over after this treatment process can be converted into fertiliser or used to create methane gas. At the reclamation plant in Windhoek, this gas is used to supply 40% of the electricity needed to operate the plant.

\(^{11}\) Ideally this price should include the financial costs of supplying the water (capital, operational and maintenance costs of the water supply system), opportunity and environmental costs.
3. WILDLIFE, FORESTRY AND TOURISM

NAMIBIA’S BIODIVERSITY AND WILDLIFE RESOURCES

Biological diversity (biodiversity) is defined as the variety and variability among living organisms and the natural environments in which they occur. Namibia’s biodiversity includes innumerable species of wild plants and animals, collectively called ‘wildlife’, which inhabit the country’s hyperarid deserts, semi-arid savannahs, sub-humid woodlands, inland and coastal wetlands, and the various habitats that comprise Namibia’s marine environment. Namibia’s major terrestrial vegetation types are depicted in Figure 3.1. Each of these can be divided into a larger number of habitats and vegetation types, based on climatic and physical conditions (e.g. soil type), dominant plant and animal assemblages.

Species richness is lowest in the dry Namib Desert and highest in the wetter northeast where there are large, perennial tropical river systems. Only a small number (possibly as little as 20%) of Namibia’s wildlife species have been described to date. Of the 13 637 species that have been described, almost 19 % are endemic. This high prevalence of species that are largely unique to Namibia is most pronounced in the Namib Desert and pro-Namib transition zone (Figure 3.2)

THE CRITICAL IMPORTANCE OF NAMIBIA’S WILDLIFE RESOURCES

Despite the fact that only some species are directly useful to humans as sources of food, fibre, medicine or tourism, all species are of ecological importance. For example, fungi and moulds play a fundamental role in ecosystem functioning and their potential economic importance is immense. Similarly, essential processes within savannahs and woodland ecosystems depend largely on healthy insect populations in the soil, and snakes and other reptiles play a vital role in controlling the spread of rodent populations. In addition, natural ecosystems provide essential life sustaining services (e.g. the breakdown of animal wastes and the recycling of dead animal and plant matter), and genetic material - an invaluable resource that is regularly required to enhance domestic crop and livestock resistance to pests and diseases, tolerance to drought and other characteristics.

BIODIVERSITY LOSS

Although it may not always be obvious, no environmental crisis will have a more lasting impact on future generations than the widespread loss of biodiversity. As a result of increasing human impacts on natural ecosystems the rate at which species are being lost from the world today is estimated to be approximately 1000 times greater than natural rates of extinction. Not all species are equally vulnerable to extinction due to human impacts. Microbes and many types of insects, small rodents and weedy plants are able to adapt quickly to environmental changes created by humans. Unfortunately many of these species cause disease and pestilence and have a low economic value.

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1 In reality, the term biodiversity incorporates not only the different habitats and species that make up the living world, but also the genetic variability (diversity) that occurs within each species.
2 Only some taxa are well studied (e.g. birds; mammals). Others have been neglected and require extensive research (e.g. bacteria, rotifers, nematodes, arthropods, algae and mycorrhizal fungi).
3 Endemic species are broadly described as being “unique to an area /region and occurring nowhere else”.
4 Termites and beetle larvae dominate the soil fauna in arid environments and termites and dung beetles are possibly the most important decomposers in Namibia’s savannah ecosystems (Barnard (ed) 1998)
FIGURE 3.1 MAJOR VEGETATION TYPES

The natural vegetation in Namibia varies noticeably with the west-east precipitation gradient - from the sparsely vegetated coastal desert terrain to the woodlands that predominate in the wetter north east. The remainder of the country is characterised by different types of savannah.

The Namib Desert and The Succulent Karoo vegetation covers an estimated 16% of the country. In some parts of these hyper-arid and arid areas, the gravel plains support lichens and almost no other vegetation, while in others (particularly in the western part of the Karas region), unique succulent flora predominate. The Nama Karoo areas support a high diversity of plant species and also many endemic species which occur nowhere else.

Tree and shrub savannahs (covering an estimated 64% of the land) are comprised of grasslands interspersed with a variety of trees and shrubs (predominantly acacias) in the more semi-arid areas, while the more humid areas are dominated by denser and taller stands of trees (predominantly broadleaf species).
Figure 3.2. HIGH SPECIES ENDEMISM IN THE NAMIB

Although species richness is comparatively low in the Namib Desert many of the species found in this area display a high degree of endemism and specialisation. Most of Namibia's endemic species are arid-adapted and are associated with escarpment, inselburg or dune habitats. Two important hotspots of endemism can be identified in Namibia (Simmons et al 1998) :-

a) The succulent steppe vegetation belt in the winter rainfall area of the Karas region which supports a high degree of endemic plants, reptiles and invertebrates.

b) The Namib escarpment which forms a transition zone between the Namib Desert in the west and the central highland plateau in the east. This semi-desert/savannah zone supports many endemic plant, invertebrate, amphibian, reptile mammal and bird species.

The endemic hotspots are very poorly represented in Namibia's protected areas network. These areas must be prioritised for future park proclamation.
Endemic plants and animals

Amphibians

Number
0
1
2
3

Birds

Number
0
1-3
4-5
6-7
8-10

Reptiles

Number
1-4
5-8
9-12
13-16
17-20
21-24
25-28

Mammals

Number
0
1-2
3-4
5-6
7-8
9-10
The consequences of biodiversity loss
Although some animals and plants provide humans with food, fibres and medicine, most species have no obvious value for mankind. Consequently, their loss should not matter. Unfortunately this is far from true. It is the interaction of a diverse number of species functioning together that keeps our world stable and our natural systems productive. Every time a species is lost, our ecosystems become less complex, outbreaks of pests and disease become prevalent and essential ecological functions become disrupted. Ultimately, the loss of wild species increases vulnerability to drought, floods and other extreme events like global climate change. In turn, these impacts threaten food supplies, sources of wood and medicines, and the sustainability of the tourism industry. In rural Namibia losses in biodiversity exacerbate an already declining economy.

Threats to biodiversity in Namibia
The major causes of biodiversity loss are summarized in Table 3.1. Of these, habitat destruction resulting from activities such as agricultural expansion is undoubtedly the most important.

Table 3.1 The direct and indirect causes of biodiversity loss in Namibia

<table>
<thead>
<tr>
<th>Direct causes</th>
<th>Indirect causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The loss, fragmentation and conversion of natural habitats as a result of deforestation, agricultural and urban expansion and strip-mining activities.</td>
<td>• Human population pressure resulting in increasing demand for natural resources (land, wood, water, minerals).</td>
</tr>
<tr>
<td>• Poor and inappropriate management, resulting in all forms of land degradation including soil erosion, desertification and bush encroachment.</td>
<td>• Economic development built on shortsighted decisions and the unsustainable use of resources. The long-term benefits of protecting natural areas are seldom considered in economic decision-making.</td>
</tr>
<tr>
<td>• Pollution of air, soil and water. Pesticide residue in particular can be responsible for threatening many aquatic species.</td>
<td>• Poverty. In the absence of education, technical aid, credit or employment poor subsistence communities have no choice but to depend on natural resources for their livelihoods. This leads to increasing rates of soil erosion, deforestation and overexploitation of wild plants and animals.</td>
</tr>
<tr>
<td>• The introduction of alien invasive organisms that threaten the survival of indigenous species.</td>
<td>• Lack of secure and exclusive tenure. Although rural communities have been afforded limited user rights over some natural resources through the establishment of conservancies and waterpoint committees, communities still do not have property rights over land itself.</td>
</tr>
<tr>
<td>• Water transfer and storage schemes and the regulation of perennial river flow by dams and weirs.</td>
<td>• Insufficient intersectoral co-ordination between the MAWRD, MFMR, MET and MLRR.</td>
</tr>
<tr>
<td>• The illegal and unsustainable harvesting of wild plants and animals and wildlife products.</td>
<td>• The future impacts of global climate change (Appendix 4).</td>
</tr>
</tbody>
</table>

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5 The effect of pollution is not yet widespread in Namibia but it is reported to have begun to have a localised effect in some areas (S.Bethune pers. comm.) In the north central and north east of the country pesticides, sprayed directly onto standing water to control malaria, and the use of biocides by the agricultural sector are expected to result in the localised extinction of certain frogs and other organisms that feed on aquatic invertebrates and agricultural pests. Pollution from fertilisers used in the Hardap Irrigation Scheme enter the Fish River Basin adding to the pollution that enters the Orange River.
6 Since its completion 15 years ago, the open canal section of the eastern national water carrier has caused the death of vast numbers of wild animals. These mortalities include at least 50 000 reptiles per annum. The establishment of the Lesotho Highlands Hydro Scheme is expected to reduce fish populations and threaten the livelihoods of fish and birds at the Orange River mouth.
7 In addition to the poaching of rhino and elephant, illegal trade in many of Namibia’s succulent plant species, insects, reptiles, birds (particularly parrots) and unusual small mammals like pangolins is believed to be considerable.
Figure 4.2) are those that have suffered the highest losses in biodiversity. The causes of biodiversity loss summarised in Table 3.1 result from a combination of many factors, the most important of which are discussed below.

**Policy failure.** Biodiversity loss is closely linked to inappropriate, economically unsound policies, which have prevented the sustainable use of water, land and wildlife. These include inappropriate livestock subsidies, drought aid, inappropriate price support for commercial maize and wheat producers, unrealistic water pricing policies and the lack of land and natural resource tenure in communal areas. Policy contradictions and omissions are also prevalent.⁸ Although efforts are being made to address most of these issues, their continuation will exacerbate poverty, cause additional pressure on wild habitats and increase Namibia’s vulnerability to the effects of drought.

**Limitations of Namibia’s protected areas network.** Despite their contributions to nature conservation and revenue generation through tourism Namibia’s parks and reserves face many challenges (Box 3.1)

**Box 3.1 Challenges facing Namibia’s protected areas**

- Lack of linkages to local, regional, and national planning and management systems can lead to inappropriate development within protected areas.
- Some of Namibia’s protected areas are being placed under increasing pressure to be used for emergency grazing or reallocation due to land reform.
- Communities generally see parks as land that only benefits government and foreign visitors, especially if park management deprives them of access to resources that they previously used and does not offer any comparable benefits in return.
- Parks are expensive to run and maintain. The funds generated by Namibia’s national parks are added to government revenue and only a small percentage is put back into park management and maintaining tourist facilities. Consequently, institutional arrangements for managing parks and enforcing the protection of wild plants and animals are becoming increasingly inefficient.

Namibia’s national parks and reserves were not designed for biodiversity conservation. As a result, the country’s ecological diversity is not evenly represented within the 14% of the landmass that represents the country’s protected areas network. Current Protected areas (Figure 3.4) incorporate only nine⁹ of the 14 vegetation types described for Namibia, and, although 30%

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⁸ Under the Regional Planning and Development Policy, regional and local councils are given authority over the administration and management of natural resources including rural water development, management and control of communal lands, conservation and forest development and management. Priority is given to agriculture, development of small-scale industries and the linking of rural and urban areas within regions. However this policy has no clear commitment to the protection of biological diversity and it is strongly recommended that regional bodies develop management plans for protected areas which are then integrated into the regional development plan, the land policy and the national land policy.

⁹ Namibia’s mountain savannah, thornbush savannah, highland savanna, camelthorn savannah, mixed tree and shrub savannah have virtually no representation within the protected areas network. Only 1.9% of the dwarf shrub savannah, Namibia’s second most predominant vegetation type, is represented within protected areas.
Figure 3.3. LAND CLEARING
of the Namib Desert biome falls within protected land, less than 9%, 8% and 2% of the
Woodland, Savannah and Karoo biomes respectively are currently protected (Barnard et al 1998).

Rivers and riparian vegetation act as important natural corridors, especially for aquatic species,
avifauna and wide ranging large mammals. Virtually all wetlands, although identified as the
country’s most threatened habitats, are severely under protected. While a number of wetland
sites of international importance have been proclaimed as RAMSAR sites (Etosha Pan, Orange
River Mouth, Walvis Bay Lagoon and Sandwich Harbour), these are all parts of larger systems,
usually with significant components in unprotected areas (e.g. the Cuvelai) and in other countries.
This means that transboundary and multi-sector approaches are usually needed for effective
management of wetland systems.

The centre of plant and animal endemism along the pro-Namib desert (Figure 3.2) is also poorly
represented with the protected areas. In addition Namibia has no proclaimed marine reserves.
This poses a problem regarding the protection marine life in areas that will be subjected to the
likely future expansion of tourism and shore and offshore mining activities.

Lack of biodiversity information. A large number of gaps exist in both information and action
with respect to biodiversity conservation in Namibia. Although the government institutions
involved with research10 are committed to improving the knowledge base, a lack of trained
manpower, inadequate financial resources and poor coordination and planning, restrict progress
in improving biological diversity information in Namibia. It is important the Biodiversity
information is made accessible to all mangers, planners and decision makers.

Cross boundary conservation challenges. In southern Africa the extensive wildlife herds that
migrate seasonally between northern Botswana, northeastern Namibia, Zimbabwe and parts of
Zambia and Angola must be considered as valuable shared resources – together with certain
ecosystems (particularly those associated with rivers and wetlands). The successful conservation
of this entire area within SADC, and the ultimate survival of its booming tourism industry, will
depend on the establishment of a cross-boundary conservation zone linking unspoiled habitats
and some of the established parks in these five countries.

The status of biodiversity in Namibia

The lack of baseline data on much of Namibia’s biodiversity means that the conservation status
of most groups of wild plants and animals remain unclear. Despite this, the following information
provides some insight into the country’s biodiversity status.

- Extensive deforestation has occurred in the Cuvelai delta area, along the Okavango River and
  around some urban areas.
- Natural wetlands and their accompanying flora and fauna are considered to be the country’s
  most threatened ecosystems. Consequently, the species that are most vulnerable are those
dependant on, or confined to, aquatic and riparian habitats.

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10 Including the MET, the National Museum of Namibia and the National Botanical Research Institute.
- Freshwater fish are threatened mainly by overexploitation and the loss of riverine vegetation\(^1\). Between 1992 and 1994 there was a decline of almost 50\% of fish caught using.
- There is a lack of formal protection for many endemic reptile species. 34 species are considered to be threatened (Barnard 1998).
- 86 bird species are considered to be threatened at the national level. Over 50\% of the bird species that are restricted to the riparian belt habitats are threatened. Ornithologists have identified 21 areas as Important Bird Areas (IBAs) in Namibia – 8 of which currently have no protected status (Barnard 1998).
- There has been a noticeable disappearance of most large wildlife from the Omusati, Oshana, Ohangwena and Oshikoto regions. Despite this, Namibia still supports healthy populations of certain large mammal species in other areas. Currently, approximately 90\% of all large mammals are found outside formal conservation areas\(^2\) but data on the biogeography and conservation status for many species (particularly the rich fauna of small, lesser-known mammals) are poor (Barnard 1998).
- Approximately 100 of Namibia’s mammal species are provisionally considered to be of conservation concern and in recent historical times some species have experienced dramatic range reductions\(^3\). Sixteen of Namibia’s mammal species have been assigned definite threat categories\(^4\) but only a few of the larger species (including those that enjoy secure conservation status) have been the focus of research efforts\(^5\). The 10\% of all mammal species that are either dependent on, or restricted to, wetlands are at risk due to deterioration in many of these habitats (Barnard 1998).

**SUBSISTENCE HARVESTING OF WILD PLANTS AND ANIMALS**

**The importance of wildlife harvesting to subsistence economies**

Currently about 62\% of Namibia’s population live in rural areas (J. Mendlesohn pers. comm.). At a national level it is estimated that 33\% of total household consumption in rural areas comes from wild foods. Households in the Omusati, Ohangwena, Oshikoto and Okavango regions are the most dependent on wild products while those in the Khomas, Erongo and Karas regions are the least dependent (Table 1). In parts of Caprivi rural communities rely on wild products for at least 50\% of their sustenance. The most important wild products that are harvested include: firewood\(^6\), wood for construction and wood carvings; thatching grasses; medicinal products and veld foods (from nuts, fruits, leaves, roots and bark); meat (from game animals and fish).

**Threats to the sustainable harvesting of wildlife resources**

**Overutilisation and lack of tenure.** There is very little control over subsistence fishing, hunting and other harvesting activities in the communal areas and some of these activities are becoming increasingly unsustainable. Freshwater fish are particularly threatened and wildlife populations in

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\(^1\) Fish stocks in the Okavango River in particular have deteriorated significantly since 1984 due to both overexploitation and devegetation. It is reported that, even if overexploitation of the fish is curtailed, it will be difficult for the depleted fish populations to recover due to the loss of habitat.

\(^2\) About 80\% and 9\% of the larger game species are found on freehold farms and communal areas respectively.

\(^3\) In particular the plains zebra, lion, buffalo rhino, wildebeest, eland and wild d

\(^4\) Included amongst these are black rhino, cheetah and wild dog.

\(^5\) For example, economically valuable springbok, kudu and gemsbok.

\(^6\) 93\% of all rural households use firewood as their primary source of energy.
some areas have declined at an alarming rate in recent years. Despite the new developments that have accompanied the establishment of rural conservancies, communities in Namibia still do not have any ownership rights over many resources, or over the land itself. This lack of tenure is given as the most important constraint regarding the sustainable use of resources. Due to rapid rates of urbanisation, only 15% of the population may be living in rural areas by 2020\(^\text{17}\). Despite this, Namibia’s population may have doubled to 3.6 million by 2023 (at a growth rate of 2.2% per annum). This means that by that year, 500 000 people may still be dependant on the subsistence harvesting of wildlife products for part of their livelihoods.

**The loss of biodiversity** (see previous section) poses a major threat to subsistence livelihoods.

**LEGAL HARVESTING OF WILD PLANTS AND ANIMALS**

The direct use of biodiversity in Namibia contributes to over 30% of our GDP (C.Brown *pers com.*). The indirect uses of natural ecosystems, e.g. ecosystem functions that provide us with clean air, water and productive soils, are of even greater value and underpin our very survival. There is no conflict between using natural resources and the notion of conservation, provided that resources are used sustainably and equitably. To achieve this, policies with appropriate incentives and regulations need to be in place. Many policies existing in Namibia are inappropriate in this regard – either they deprive people access to resources or they allow their over-use.

**TOURISM**

Tourism is currently the world’s fastest growing industry. Since the 1980s there has been a noticeable shift in tourist destinations from developed to undeveloped countries and increased interest in visiting natural settings, undisturbed areas and unusual destinations.

**Namibia’s unique tourism product**

A survey conducted in 1997 showed that almost all tourists visiting the country expect a wildlife-centred experience – either through game viewing, bird watching, hiking, sport fishing or trophy hunting. Namibia’s biggest attraction is undoubtedly its sparsely populated, spectacular arid scenery and wide-open spaces. In today’s overcrowded, rapidly developing world, natural environments are disappearing fast. Consequently, the solitude, silence and natural beauty that many areas in Namibia provide are becoming sought after commodities that must be regarded as valuable natural assets. Preserving these assets is fundamental to developing tourism as a sustainable economic sector and helping Namibia to maintain a comparative advantage within the global market.

Tourism has more potential as a sustainable industry than virtually any other form of economic development in Namibia. The same product, be it scenery, wildlife or open spaces (provided it remains unspoiled) can be sold repeatedly, without being depleted. In addition to its contributions to the national economy Namibia’s tourism industry is capable of:

- Contributing to wildlife conservation and biodiversity protection.
- Contributing to poverty alleviation, particularly in rural areas, through direct and indirect employment; and

\(^{17}\) Estimated from figures provided by J. Mendelsohn at RAISON

36
• Improving the earning ability of rural women and enhancing traditional Namibian culture by stimulating trade in basketry, pottery and other traditional crafts.

Contributions of the tourism sector to the national economy

• Namibia’s tourism sector grew by an estimated 14% per annum between 1990 and 1996 (H.Suich pers com.)

• Tourism is an important employment generator, particularly in the rural areas where most tourism activities occur. The estimated 25 000 jobs provided by the tourism sector in 1998 represented about 15% of private sector employment (Anon c. 1999).

• Tourism contributes to Namibia’s national economy through the provision of many diverse services including: accommodation, restaurants, transport, entertainment and financial services. As the incremental expenditure by tourists circulates through the economy, they create a total impact that is far greater than the initial expenditures. Currently there are limited data available in Namibia to analyse the ‘multiplier’ economic impact of tourism. Consequently the full contribution of this sector to the national economy is underestimated. Certainly, the annual growth rate of hotels and restaurants, which are generally referred to in the National Accounts as an indicator of tourism growth\(^{18}\), provide only part of the picture.

• Hunting is one of Namibia’s most popular tourism activities. The total value derived from trophy hunting alone is estimated to be N$ 130 million per annum. This industry employs approximately 3 000 people, both directly and indirectly through related activities (DEA 2000a)

• It is not easy to accurately assess the real value of Namibia’s parks and reserves. The wildlife resources that are protected in these areas are used directly for tourism, capture for resale and restocking in other areas, research and education. In addition, their contribution includes the role they play in maintaining essential ecological functions and preserving biodiversity.

• Many areas in Namibia do not benefit from tourist revenue and jobs. Figure 3.5 highlights the fact that Namibia’s tourism accommodation facilities are clustered within certain areas and that there are still large areas that could benefit from tourism (Figure 3.5).

Contribution of the tourism sector to wildlife conservation and biodiversity protection

Biodiversity conservation efforts were formally introduced to Namibia during the colonial period, when legally defined protected areas were created and human exploitation within them was restricted to non-consumptive tourism activities. Namibia’s national parks and reserves remain the principal means of conserving biodiversity and scenic areas in the country. Despite this, the protected areas network in Namibia faces many challenges (Box 3.1) and it is now accepted that to make conservation efforts sustainable, they must contribute in some meaningful way towards rural development.

Land-use for tourism in parts of Namibia outside protected areas has extremely high economic potential. Tourism activities in these areas provide financial incentives for investment in wildlife on private, state and communal land. Consequently the GRN, in close co-operation, with various NGOs, is encouraging rural communities to form conservancies through its Community Based Natural Resource Management (CBNRM) and conservancy programmes. Research has shown that the national CBNRM programme is economically sound (J.Barnes pers comm.). Through this program communities in communal areas invest in wildlife and benefit from the resulting tourism development opportunities. The incentives for community investment in conservancies are largely due to the high value of nature-based tourism.

\(^{18}\) In 1998 the contribution to the GDP from hotels and restaurants was estimated to be N$1300 million. Projections show that these sources are likely to be contributing N$2 billion to the GDP by 2002.
In addition to the development of tourism activities on communal land, several privately owned nature reserves, some rich in endemic species, have been developed. Neighboring freehold farmers have begun to form conservancies allowing better management of wildlife and more sustainable off-takes. Wildlife generally utilise water more efficiently than domestic stock—displaying lower drinking frequency and consuming less water per day. Unlike cattle, Namibia's wild mammal species are more tolerant of saline water and can feed off a wider variety of vegetation. By diversifying into mixed game/livestock farming, farmers reduce risks and create a valuable buffer against drought. These wildlife-based tourism and farming enterprises have increased the amount of land allocated to wildlife and have helped to conserve certain key species and have introduced more sustainable and productive land-use options.

**Contribution of the tourism sector to poverty alleviation in rural areas**

In 1996 legislation was passed that declared rights to communities that had registered conservancies for the management of wildlife and tourism. Earning from these activities have increased almost seven fold between 1996 and 2000 - from N$mill 0.5 to N$mill3.4 (C. Brown pers comm.)

**Figure 3.5 (a) Earnings from wildlife tourism related activities in rural conservancies (1996-2000)**

![Diagram showing earnings from wildlife tourism related activities from 1996 to 2001.](image)

**Threats to growth within Namibia’s tourism industry**

The World Tourism Organisation estimates that tourism in Southern Africa will grow at a rate of 7.5% per annum (in DEA 2000a). However, several factors will challenge this rate of growth:

- **Maintaining high standards.** High standards of service and a high quality of experience received by tourists must be maintained. Tourists will not visit Namibia if they feel that their safety will be compromised. Consequently, political stability and low levels of crime are paramount to growth within the tourism industry.

- **Poor planning and mass tourism.** Many developing countries have allowed their high earning tourism sector to develop in an ad hoc way. In time the tourism product is spoiled by visible impacts that result from poorly controlled mass tourism and badly managed tourism activities. Although the situation in Namibia has not yet reached this point, signs of serious
impacts have begun to emerge in some areas. The lack of adequate infrastructure and the absence of a clear vision, cohesive policy and strategic planning have been largely to blame.

- **Preventing “leakage” of tourism-generated foreign exchange** which benefits foreign, owned service providers, suppliers, tour operators, hotels and airlines.

**EFFORTS TO MITIGATE BIODIVERSITY LOSS AND TO ENHANCE THE VALUE OF WILD SPECIES, WILDLIFE PRODUCTS AND TOURISM**

- **The establishment of an Environmental Investment Fund (EIF).** Currently, the revenue generated in Namibia’s national parks and reserves goes back to central government. Once established, Namibia’s EIF will ensure that at least part of the revenue generated from these tourism activities will be used to help conserve the environmental resource base upon which tourism depends.

- **Extending conservancies to new areas.** To date CBNRM activities have focussed on communal land where healthy wildlife populations still exist or where good habitat offers opportunities for re-establishing wildlife, mainly in the northeastern parts of the country. Re-introduction of wildlife and the establishment of conservancies in the north-central and other regions is planned (Figure 3.4).

- **The soon to be implemented Environmental Management Act** specifies that environmental issues must be properly considered in the development of all future policies, plans, programs projects and new legislation. This offers opportunities for preventative management and will help to avoid future damage to Namibian ecosystems and resources supporting human livelihoods.

- **The new Park and Wildlife Bill,** currently under discussion is exploring ways of creating incentives for landowners and managers to diversify into wildlife and tourism in more efficient and cost effective ways.

- **Improving knowledge.** The MET has begun a quantitative assessment of woodland resources that will aid in the development of an important database for forestry, biodiversity, desertification monitoring and future climate change monitoring. Similarly the national aerial survey and complimentary ground game counts conducted in the Kunene region in 2001 by NGOs, conservancies and MET staff have provided valuable information regarding wildlife numbers and distribution. These efforts must continue, particularly if trends are to be established. Many other studies are in progress including the forest fire monitoring system, Namibia’s tree atlas project and the NBRI’s Vegetation Mapping project and the NRA programme.

- **Improved pollution control through the introduction of the Pollution and Waste Management Control Act.**

- **Improved supply of electricity to rural areas,** which will help reduce rates of deforestation and dependence on firewood for energy.

- **Development plans and capacity building.** There have been concerted efforts to integrate national development plans (for example NDPII) and to improve the capacity of conservancies to manage their wildlife resources. Land-use plans for many of Namibia’s regions, including the Sperrgebiet, the Kunene Region, Caprivi, Bushmanland and the central coastal area aim to guide sustainable development. In addition, promising initiatives are emerging regarding the transboundary management of the Namib Desert.

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19 Many examples exist. Inadequately controlled tourism near Sesriem/Sossusvlei has resulted in unsightly off-road driving, a build up of litter, excessive collection of firewood and too many cars which reduce the quality of the product and result in tourist dissatisfaction. Despite a complete lack of tourism facilities and limited control in the area, film makers and journalists have been encouraged to create enticing films and articles on the wilderness area that incorporate the spectacular Hoanib River Valley and other parts of the Skeleton Coast. The outcome has been a tremendous increase in the number of uncontrolled tourists in search of a wilderness experience. This has resulted in escalating impacts on the terrain and increasing stress on the remaining herds of wildlife in the area.

20 A survey conducted in 1995 showed that Namibian and foreign tourists were willing to pay (in aggregate) N$ 151 million more per annum than they did actually pay for wildlife viewing. This extra revenue could be used directly for investment in the wildlife sector through the EIF and/or investment in community development (Barnes et al 1997).
4. LAND CAPABILITY, RANGELANDS AND AGRICULTURE

LOW LAND CAPABILITY - A SEVERE CONSTRAINT TO SUSTAINABLE AGRICULTURE

Most of Namibia is characterised by low, highly variable rainfall and poor soils that contain low levels of moisture. Due to erratic rainfall the availability of grazing on rangelands is variable and, even in years of good rain, livestock carrying capacity is low\(^1\). Readily available surface water is only found on the northern and southern borders of the country, alongside the perennial rivers. These environmental constraints severely limit the development of rain fed cultivation and commodity (or commercial) farming throughout most of the country.

Previously, when population densities were much lower, traditional subsistence agro-pastoralism practices (nomadic pastoralism in the semi arid and arid areas, and slash and burn cultivation with pastoralism in the higher rainfall areas of the Kavango and Caprivi regions) were well suited to these limiting factors and caused little harm to the environment. Small bands of traditional hunter-gatherers that utilised wild animals and plants for food also existed in small family groups and spent only a short time in a particular area before moving on.

Today, despite the country’s severe climatic and topographical constraints, a large percentage of the land is used for agricultural purposes (Figure 4.1). Most of this land is used for livestock farming as a lack of precipitation restricts rainfed arable farming to mainly north of the 20\(^\circ\) latitude. As a result of population expansion and the erection of fences, traditional agricultural methods are either no longer viable (as in the case of nomadic pastoralism\(^2\)) or have become increasingly unsustainable (as in the case of slash and burn cultivation\(^3\)). Regardless of these constraints many thousands of families still “live off the land” for their livelihoods, and will continue to do so for many years to come.

Considering the low capability of the land for husbandry, it is not surprising that Namibia’s agricultural sector is subject to uncertain output, regular crop failure and a drain on state finances, through heavy subsidies and drought relief.

INEQUITABLE LAND DISTRIBUTION AND USE

German colonial policies and the South African apartheid administration laid the foundation for the way in which Namibia’s land is currently divided and utilized (Figure 4.1). As a result:-

- Close to 70% of Namibia’s population (approx. 1.24 million people) practice subsistence agro-pastoralism on communal land\(^4\) that is State owned, and constitutes approximately 41% of the total land area.
- 159 000 people live in the freehold farming areas. This privately owned land constitutes approximately 44% of the total land area.

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1 Stock carrying capacity is often quoted as varying between 8 ha/large stock unit in the northeast to 24 ha/large stock unit in the south. Despite these figures stock carrying capacity must be considered as a highly variable and not a constant threshold, one that is dictated by the amount of rain that falls each year. Due to land degradation (Mainly bush encroachment) these potential carrying capacities are currently much lower than in the mid 1960s when the estimates were made.

2 Nomadic pastoralism is still practiced by the OvaHimba people in north western Namibia, but their traditional way of life is severely threatened.

3 In 1996 a total of 1719 km\(^2\) had been cleared in Caprivi, an activity that has increased at a rate of about 4.1% each year since 1943 (Mendelssohn and Roberts 1997). Today, due to increasing population pressure more farmers clear bigger areas of woodland and grassland and are forced to reduce the fallow period considerably. Consequently, the cycle of woodland regeneration and land degradation has been broken and the centuries old traditional practice of slash and burn cultivation has become unsustainable, causing excessive loss of soil nutrients and increased rates of deforestation.

4 This figure is still based on the 1991 census. Today, 10 years later, it is likely that this figure is more in region of 60%, due to rapid rates of migration into urban areas.
• 1.5% of the total land area is comprised of exclusive diamond concession areas.
• 13.5% has been proclaimed as conservation areas.

Over the past 10 years the two agricultural sub-sectors, communal and freehold, have jointly contributed between 6% and 10% to the GDP. Despite this fairly modest contribution to the national economy, almost 60% of the Namibian labour force is employed by the agricultural sector.

Freehold farming
• Livestock production currently contributes about two-thirds to the total agricultural output in Namibia. In 1998 freehold agriculture contributed only 3.8% to the GDP (this included meat processing) and 27% of exports. Meat and meat products, live cattle and other stock (mainly for the South African market) make up 90% of all agricultural exports.
• Rainfed and irrigated commercial crop production occurs on 25,000 hectares in the Karst area (the Tsumeb, Otavi, Grootfontein ‘maize triangle’), on small plots at the Hardap scheme, near Stampriet, and along some of the perennial and ephemeral river courses.
• Since the 1970’s many freehold livestock farmers have moved towards mixed game/livestock farming. This diversification helps to create a valuable buffer against drought because, unlike cattle, wild animals are extremely well suited to Namibia’s harsh environmental conditions. Many species (especially springbok, wildebeest and zebra) are able to migrate considerable distances for water without losing condition. Furthermore they are more tolerant of saline water and can feed off a wider variety of vegetation.

Communal farming
• In the south and western communal areas, smallstock predominate. In the north and north-east mixed subsistence farming is practised but livestock farming is the major agricultural activity. Currently, communal livestock production contributes about one quarter to the total agricultural output of Namibia.
• Although subsistence agriculture in the communal areas makes a limited contribution to Namibia’s GDP (2.2% in 1998), its value is underestimated and it is vital for the livelihood of most rural households. Distant markets limit the development of farming in the communal areas and agricultural incomes are low and variable. Livestock supply many non-marketed products and services, the value of which is not fully reflected in the national accounts. These include draught power, milk, hides, meat, manure and a traditional form of savings for rural communities.
• Possibilities for appropriate animal husbandry practices in communal areas are reduced as the number of absentee farmers investing in livestock grows. In recent years traditional authorities have begun to lose their influence and illegal fencing of prime land by wealthy individuals and small groups has become common (Box 4.1).
• Veterinary fences that prevent the spread of contagious livestock diseases have limited the export marketing opportunities of communal farmers but have been essential for the maintenance of livestock exports from herds south of the fence, the majority of which are from freehold farms.
• In recent years Community Based Natural Resource Based Management (CBNRM) initiatives have encouraged the establishment of rural conservancies which offer some opportunities for developing non-agricultural employment opportunities (mainly through tourism) in rural areas. In addition SARDEP (the Sustainable Animal and Rangel Development programme) and similar initiatives have helped to promote sustainable husbandry practices in the communal areas.

Namibia has many absentee farmers, in both the communal and freehold areas - a situation that is not conducive for optimal agricultural productivity and sustainable development (Box 4.1).
Figure 4.1. LAND USE

Land use
- Commercial agriculture, tourism and mining
- Small-scale communal agriculture
- Large-scale communal agriculture
- Government agriculture
- Other government and parastatal farms
- Resettlement farms
- National parks
- Mining concessions
- Urban areas

Regional boundaries
Box 4.1 Serious farmers, absentee farmers and subsistence farmers in Namibia

There are three categories of farmers in Namibia. The first are “serious” farmers who make productive use of their land to generate revenue that contribute to large proportions of their incomes. Such farmers are to be found in both communal and freehold areas. Typically, their crop harvests are consumed at home or sold, and part of their livestock herd is likewise used for domestic food production or sold regularly.

The second group consists of farmers who invest their savings in farmland and large herds of cattle. However, they make little productive use of their farms or livestock. These farmers “own” significant areas of the country, both in communal and freehold areas. Most of them earn their money from other sources, often as businessmen or well-paid employees. Their savings are invested in farmland and livestock as capital investments and some of their taxable incomes can be offset against their farming enterprises. These people are called “absentee” farmers in freehold areas, while much of the land occupied by such people in communal areas is labelled as “illegally fenced farms”. These fenced farms occupy large areas of prime communal land. For example, an estimated 25% of the northern communal areas has been fenced off into very large farms (J. Mendelsohn, pers comm.). In addition, these wealthy people tend to use more water and wood for construction and fuel than their neighbours, and they also clear bigger areas to cultivate mahangu, thus leaving fewer areas with good soils available to people who really have to “eat off the land”. Increasing consumption by these wealthy farmers ultimately leads to growing poverty amongst the poor who have no choice but to depend on natural resources for their livelihoods.

The impoverished communal farmers make up the third group. They have no choice but to live off the land and are unable to farm productively - mainly because their small farms are badly degraded and they have no access to better land.

Agricultural and resettlement policies and programmes should concentrate on supporting the first and third groups, while providing incentives and disincentives to persuade the second group to make their land available for other users and other purposes.

LAND DEGRADATION – threatening future agricultural output

Land degradation, or desertification\(^5\), reduces the production potential of the land. It occurs when there is a decline in plant cover or when one type of vegetation is replaced with other, often less productive, species. Soils in arid, semi-arid and sub-humid areas are inherently vulnerable to desertification processes (soil erosion, bush encroachment, crust formation and salinisation) since they have low levels of biological activity, organic matter and aggregate stability.

Shifts in the balance of perennial to annual grasses, palatable to non-palatable plant species and the domination of one or two woody species (in the case of bush encroachment) are usually signs that degradation has begun to occur and that the land has declined in productivity and diversity.

Causes of desertification in Namibia

The reduction of perennial plant cover that accompanies the desertification process in Namibia is usually attributed to overgrazing, land clearing for crop farming (Figure 3.4) or inappropriate cultivation techniques. Ultimately, however, desertification occurs as a result of the policy framework and incentives and regulations that encourage inappropriate management practices (Table 4.1).

\(^5\) The accepted definition of desertification is: land degradation in arid, semi-arid and sub humid areas resulting from various factors including climatic variations and human activities.
Figure 4.2. STOCK DENSITIES

Cattle

Cattle/km²
- 0
- 0-1
- 1-5
- 5-10
- 10-20
- 20-30
- >30

Goats

Goats/km²
- 0
- 0-1
- 1-10
- 10-20
- 20-50
- 50-100
- >100

Donkeys

Donkeys/km²
- 0
- 0-1
- 1-2.5
- 2.5-5
- 5-10
- 10-15
- >15

Sheep

Sheep/km²
- 0
- 0-1
- 1-10
- 10-20
- 20-35
- 35-50
- >50
Although the interlinked factors summarised in Table 4.1 are all responsible in one way or another for causing the unsustainable use of Namibia’s land resources, issues concerning land tenure, land accessibility and integrated planning require more in depth discussion, as they are likely to have the greatest influence over the way in which the land will be used during the next 30 years.

### Table 4.1. Causes of land degradation and unsustainable agricultural practices in Namibia.

<table>
<thead>
<tr>
<th>Immediate causes</th>
<th>Ultimate causes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population growth</strong></td>
<td><strong>Lack of tenure over land and resources.</strong></td>
</tr>
<tr>
<td><strong>Poverty (poor subsistence farming communities have few alternatives but to “live off the land”)</strong></td>
<td><strong>Inequitable access to land due to power and wealth.</strong></td>
</tr>
<tr>
<td><strong>Increasing wealth (Box 4.1)</strong></td>
<td><strong>Lack of policies supporting strategic cross-sectoral planning and implementation.</strong></td>
</tr>
<tr>
<td><strong>Climatic factors</strong></td>
<td><strong>Failure to appreciate the total economic value of land and rangelands</strong></td>
</tr>
<tr>
<td><strong>Namibia’s natural climatic regime (periodic periods of low rainfall)</strong></td>
<td><strong>Poorly designed agricultural and other land-use projects that show little understanding of the socio-economic conditions of the population and the dynamics and sustainability of the natural resource base.</strong></td>
</tr>
<tr>
<td><strong>Cyclic variations in the climate</strong></td>
<td><strong>Agricultural development projects and extension services that benefit the wealthy and their exploitative investments in agriculture and land</strong></td>
</tr>
<tr>
<td><strong>Land-use practices and inappropriate rangeland management</strong></td>
<td><strong>Inadequate alternatives for many people to invest their surplus earnings</strong></td>
</tr>
<tr>
<td><strong>Overgrazing</strong></td>
<td><strong>Inappropriate and unsustainable drought relief and resettlement policies.</strong></td>
</tr>
<tr>
<td><strong>Deforestation</strong></td>
<td><strong>Inappropriate production incentives. For example, government subsidies for pesticides and scarce water resources, which encourage wastage and overuse.</strong></td>
</tr>
<tr>
<td><strong>Excess vegetation burning.</strong></td>
<td><strong>Production of cash crops that do not enhance food security, demand the use of polluting pesticides and fertilisers and force traditional farmers and herders onto marginal land that is vulnerable to degradation.</strong></td>
</tr>
<tr>
<td><strong>Poorly managed irrigation programmes</strong></td>
<td><strong>Wood is the primary energy source for at least 60% of Namibia’s population. In Caprivi 96% of all households use wood for fuel and 80% of all dwellings are made from wood (Ashley and La Franchi 1997; Mendelsohn and Roberts 1997). Most deforestation results from land clearing for agriculture.</strong></td>
</tr>
<tr>
<td><strong>Overabstraction of ground water resulting in decline water tables</strong></td>
<td><strong>If carefully managed, fire can be an appropriate tool for rangeland management. However, repeated fire at high temperatures result in large losses of organic matter and soil nutrients. The exposed soil is particularly susceptible to erosion.</strong></td>
</tr>
<tr>
<td><strong>Other human impacts</strong></td>
<td><strong>Irrigation projects in Namibia require enormous subsidies and are capable of accelerating land degradation through pollution (the need to use pesticides and fertilisers) and soil salination. Their high water demands are also cause for concern and there is no advantage to growing crops in Namibia that have high opportunity costs, are not arid adapted and are unable to carry the full price of their demand for water.</strong></td>
</tr>
<tr>
<td><strong>Soil pollution</strong></td>
<td><strong>Currently, compared to other countries in sub-Saharan Africa, this is only a small problem in Namibia.</strong></td>
</tr>
<tr>
<td><strong>Human induced global warming and climate change</strong></td>
<td></td>
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backgrounds will have different expectations from the land. This fact is highlighted by the unexpected, but growing trend of wealthy Namibians who use their disposable income to invest in large herds of livestock on marginal rangelands in the communal areas, a trend that is cause for considerable concern (Box 4.1).

Although future focus should be placed on employment in the non-agricultural sectors (for example, tourism) that hold the greatest promise for economic growth, income generation, and poverty reduction, in practice this is difficult to achieve. While issues relating to the inequitable access to land in Namibia must be addressed as soon as possible, the MLRR’s resettlement programme has been criticised for its lack of forward planning and its potential to accelerate land degradation (Dewdney 1996; UCT 1997). Box 4.2 highlights certain recommendations regarding resettlement that could help prevent future conflict and environmental degradation, whilst improving equity.

Box 4.2 Recommendations for resettlement in Namibia
(Extract from Dewdney, 1996)

- A definite decision must be made between “commercialising” and “communalising” communal and resettled land. The communalising option, which involves the removal of fences and purchasing freehold farms that border on communal areas, is recommended – both to sustain and resettle the greatest number of people in communal areas, and to minimise the potential for land degradation.
- Secure tenure over all natural resources should be assigned to communities and a major capacity building programme should be undertaken in order to develop community institutions capable of allocating land rights and managing natural resources sustainably.
- Wealthy farmers in the communal areas who currently occupying large areas of illegally fenced off land should be moved onto freehold land.
- Land that is considered “agriculturally under utilised” for sound environmental reasons (for example, protection of rare endemic species or threatened wetlands) should not be the target of resettlement schemes.
- CBNRM activities should be extended into all areas that have high potential for tourism and low potential for farming.

Lack of coordinated planning and policy failure. Land and water management, agriculture, forestry, poverty, population growth rates and economic policies are all related to each other and, either directly or indirectly, to desertification in Namibia. In the absence of integrated, cross sectoral planning, policy contradiction is common and the outcome easily threaten sustainable land use and economic development. For example, in the past, subsidies paid out to farmers as part of poverty reduction and drought relief strategies created unrealistic expectations and exacerbated desertification.

The extent of land degradation in Namibia

In order to be able to assess and plan for economically and ecologically viable agricultural and other land-use options in Namibia, it is important to identify which parts of the country are particularly vulnerable to desertification, where degradation is currently occurring and to quantify the rate at which it may be spreading. Desertification is most likely to occur in areas where
- The productivity of the land is naturally highly variable (e.g. Namibia’s arid savannah systems);
- Extensive deforestation has caused dry woodland areas to revert to savannah–type systems.

Figure 4.3 depicts variation in green vegetation biomass. Areas that display high variability in green vegetation biomass (most noticeably the semi arid savannah areas) can be considered the most vulnerable to desertification. Land-use practices in these areas must take this into account.
Figure 4.3. VARIATION IN GREEN VEGETATION BIOMASS

Variation in green vegetation biomass

- Very low (0–5%)
- Low (6–10%)
- Medium (11–15%)
- High (>15%)

Regional boundaries
Rivers
Unfortunately, areas affected by desertification in Namibia have not yet been fully mapped although this work is currently receiving some attention under the NAPCOD programme. Despite this lack of information the following summaries give some indication of the current prevalence of desertification in the country.

**Prevalence of land degradation freehold farm land**

- Bush encroachment, believed to result from mismanagement and overstocking of domestic livestock and the absence of browsers, causes the replacement of palatable perennial grass species by dense thickets of bush which are unpalatable to cattle and sheep. Bush encroachment is most prevalent on freehold land and is estimated to cover between 12 –14% of the country, affecting 8-10 million hectares of land in the northern areas (Quan 1994).
- Farming areas in the south east are reported to be badly degraded due to high livestock densities and over-grazing by sheep, although little data exists to clarify the extent of the degradation (Figure 4.2).
- Soil salinisation occurs when precipitation is exceeded by evapotranspiration. It results in a concentration of salts near to the soil surface rendering it difficult for the plant roots to absorb water. Irrigated soils, particularly in the Stamppriet and Hardap areas and the Swakop River valley are highly susceptible to the effects of salinisation (Kohler 1997)

**Prevalence of land degradation in the communal areas**

- Population pressure on the land (due to sedentarism, poverty amongst many but also an increasing wealthy class, and the lack of effective systems of local resource management) can be considered the most important immediate causes of soil erosion and other types of land degradation in the communal areas of Namibia.
- Rates of deforestation are cause for concern in the more heavily settled communal areas (Figure B). Land clearing for expanding cultivation (Figure 3.3). and the use of wood for fuel by rural communities are the two major causes of deforestation.
- Erosion is most noticeable around water points and settlements and sedentarism, which has replaced the nomadic pastoralism of the past, results in excessive numbers of livestock grazing for too long in the same place. Sedentarism is also to blame for accelerated rates of devegetation as wood is harvested to supply energy and land is cleared for cultivation. Inappropriate response to drought has also been responsible for land degradation in the communal areas. During past dry periods, boreholes were sunk without any consideration for spacing and the capability of the surrounding land.
- Soil salinisation is a problem in the north central parts of Namibia where soils are naturally shallow and saline (UNEP 1997)

**The consequences of land degradation**

Land degradation threatens sustainable economic development, limits opportunities for other forms of land-use and is a major cause of biodiversity loss in Namibia. The environmental manifestations of desertification in Namibia - soil erosion, bush encroachment and soil salination can have severe social, economic and environmental implications.

- Desertification is a major cause of economic loss and escalating poverty for the majority of Namibia’s population through declining agricultural production and a loss of food security. This leads to human migration, rapid urbanisation and an increased need for the government to import food.
- Desertification alters natural habitats and threatens biodiversity.
- Land degradation impairs aquatic ecosystems through sediment pollution and salt intrusion. Increased rainfall runoff and silt deposition into rivers (as a result of soil erosion) is a major cause of increasing flood severity in areas susceptible to seasonal flooding.
TRENDS IN AGRICULTURAL GROWTH AND RURAL HOUSEHOLD FOOD SECURITY

Trends in agricultural development

Although Namibian producers currently supply all of the nations red meat requirements, the country has not been self-sufficient in grain production since 1964. Crop output fluctuates considerably in response to the country’s highly variable rainfall and in good rain years (roughly 4 years in ten). Namibia manages to produce only half of her grain consumption needs – a proportion that will continue to diminish as the country’s population grows. The grain deficit is due to the generally very low agronomic potential in the country, with the exception of a few localities where remoteness from markets and the high cost of irrigation make investment in commercial grain production economically unsound.

Through its National Agriculture Policy government aims to expand irrigation activities up to five fold. Although the government has pledged to promote the use of environmentally friendly technologies (through being a signatory to the Convention on Biological Diversity), the agricultural policy makes no mention of strategies needed to reduce environmental impacts associated with soil salinisation, pesticide run-off and control over the use of potentially polluting fertilisers that are likely to accompany irrigation expansion. Increasing pollution from these substances could threaten Namibia’s future economic growth, particularly regarding important food exports (Box 4.3) In addition this policy does not reject the use of subsidies for any products that may enhance agricultural production.

**Box 4.3 Namibia’s meat trade and pesticide pollution**

Many Persistent Organic Pollutants (POPS), in particular DDT and other insecticides, have been banned in several countries but are still being used to control mosquito and other pest populations in Namibia. The exportation of meat and fish products is critical to Namibia’s economic well-being and, during the late 1990s, almost 55% of the country’s exports were comprised of meat, meat products, livestock, marine fish and fish products. In recent years many OECD countries have become extremely strict about the quality of food imports they will accept. Even tiny traces of POPs and poisonous metals such as cadmium and mercury found in Namibian meat and fish could jeopardise future trade with these products.

While it is generally accepted that there is no potential to intensify veld grazing without increasing land degradation in the country, the National Agricultural Policy also proposes the expansion of livestock production onto under-utilised land north of the Veterinary Cordon Fence.

Trends in food security

Although 94% of rural households identify agriculture as their main activity it is has begun to make a declining contribution to communal farmers’ household income. In most years, households are unable to produce enough grain for the family’s requirements. Similar trends regarding food security are experienced throughout most of sub-Saharan Africa where the per capita food supply declined by 15% between 1960 and 1996. Reasons for declining food security within the region include: prolonged periods of low rainfall; land degradation; high average population growth rates; inappropriate food production with the best land being used to produce cash crops (e.g. coffee, sugar, cotton) and subsistence farmers being forced onto marginal land; inadequate storage;
growing numbers of crop pests that remain untreated or have developed resistance to pesticides; and civil wars.

MITIGATING LAND DEGRADATION AND ENCOURAGING SUSTAINABLE LAND-USE

Considering Namibia's low land capability for intensive agriculture, future focus should be placed on employment in the non-agricultural sectors that hold the greatest promise for economic growth, income generation, and poverty reduction. Agricultural and resettlement programmes should concentrate on supporting the serious farmers who make productive use of their farms and impoverished communal farmers who have other choice but to live off the land. Incentives and disincentives should be developed to persuade the wealthy absentee freehold and communal farmers to make their land available for other users and other purposes.

Combating land degradation and encouraging sustainable land-use practices demands interlinked political, social, economic and educational approaches. These include:

- Providing incentives for family planning and education services combined with appropriate and diversified land-use options.
- Integrating anti-land degradation schemes into national environment and development planning.
- Recognising the interdependence between agriculture and other issues in particular, water management, biodiversity conservation and human well-being.
- Providing appropriate, effective decentralised and integrated support services (extension, research, education, credit, marketing, etc.).
- Providing incentives for people to protect themselves against present and future extreme events e.g. incentives to encourage rapid destocking and marketing of livestock to reduce pressure on rangelands during times of drought.
- Developing effective and sustainable uses of land and natural resources that do not threaten their future productivity. For example:
  ♦ Adopting more adaptive and responsive agricultural methods that are sustainable. For example, replacing monoculture of food and cash crops with viable intercropping systems, crop rotation or agro forestry.
  ♦ Ensuring that irrigated land is well drained, practicing nighttime irrigation and leaving land fallow for part of the year in order to reduce the chances of soil salinisation.
  ♦ Apply appropriate rangeland management and avoid overstocking and overgrazing of livestock, on rangelands that are susceptible to desertification.
  ♦ Ensure that all woodlands are used sustainably in order to prevent rapid deforestation.
  ♦ Adopting integrated pest management (IPM) in an attempt to reverse the trend of rising pesticide use, which threatens human health and the survival of other species. 10
  ♦ Maintain the genetic integrity of Sanga cattle and other indigenous livestock and crop gene pools.
  ♦ Encourage research, development and testing of new CO₂ responsive, heat and drought resistant crop cultivars (in preparation for future climates that could become hotter and drier).

Since independence several projects, programmes and policies have been put in place which are helping to achieve the national goal of sustainable development.

- Local initiatives like CBKRM, NAPCOD, SARDEP and the development of rural water committees that represent partnerships between government, NGO's and communities aim to promote rural development, enhance livelihoods, promote drought preparedness and improve flexibility to a changing environment. In addition, the National Drought Policy and Strategy developed by MAWRD in 1997 aims to ensure that long-term sustainable drought mitigation replaces the short-term, inefficient drought relief efforts of the past. It aims to provide a social safety net to farmers in times of drought while promoting a responsible and sustainable approach to natural resource management. In addition this policy aims to give more responsibility for drought management to the farmers themselves. If

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10 IPM involves many methods including practising multicropping, crop rotation and biological control, which are sometimes used with selected low impact pesticides. When properly implemented, IPM can result in substantial economic, environmental and health benefits for a country.
The potential for energy conservation and the use of environmentally friendly solar and wind energy is being investigated by the Ministry of Mines and Energy. Solar energy in particular has tremendous potential for reducing rates of deforestation and meeting energy demand in rural areas cost effectively.

The country's National Programme to Combat Desertification (NAPCOD) has made a first approximation of the areas affected by desertification in Namibia. NOAA NDVI data provides a continuous source of information regarding the occurrence of green vegetation across Namibia and will be used to evaluate the results of the first approximation of desertification in Namibia.

Since independence, the GRN has redirected development efforts towards farmers in the previously neglected communal areas. This has led to an increase in the number of cattle slaughtered and marketed north of the veterinary fence. The conservation of indigenous (Sanga) livestock, which display high tolerance to dry environments and have developed good resistance to tick-borne and other endemic diseases, has become a priority in the MAWRD's National Research Policy. Furthermore a number of NGO and government sponsored programmes have been developed in support of the policy to focus efforts on improving animal health in the communal-tenure areas. Included amongst these programmes are those focussed on implementing sustainable rangeland management practices (e.g. SARDEP and NOLIDEP).

Wood from the most prevalent bush encroachment species in Namibia (sickle bush, D. cinerea and blackthorn acacia A. mellifera) is suitable for conversion into charcoal. Depending on whether markets can be found, charcoal production could provide a financially viable means of bush encroachment control in the future.

Despite its modest contribution to GDP, agriculture accounts for over 60% of the water used in Namibia. In recent years there has been a move towards diversifying into high value cash crops for export. These include products like table grapes, melons and dates. When compared to maize and other cereals, these products have high value adding for the resources (water, soil) required to grow them.

Farming with wildlife or utilising wildlife for tourism activities (mainly hunting and game viewing) both on freehold and communal land has grown in the western Kunene, Caprivi, north western Erongo and eastern Otjozondupa regions in recent years. These non-agricultural land-uses have the potential to contribute significantly to economic growth and, if properly planned for and controlled, should not be accompanied by excessive impacts on the environment.

The implementation of Namibia's EA policy will help to guide future agricultural development and other land-use activities, since the soon to be promulgated Environmental Management Act requires that all policies and major projects undergo Environmental Assessment as part of their planning process.
5. MINING

AN OVERVIEW OF MINING IN NAMIBIA

Namibia is endowed with a rich variety of mineral resources, and has a long tradition of mining that dates back more than 400 years when the local inhabitants discovered copper in the Otavi area and used this for weapons and jewellery (Chamber of Mines, 2000). Copper was mined commercially in southern Namibia as early as 1854, and large copper mines were subsequently developed in the central region and the Tsumeb area. The discovery of diamonds in the Namib Desert towards the end of the 19th century, proved to be a significant event in the history of Namibia, and diamonds remain the country’s premier mining commodity. Uranium, gold, copper, salt, zinc, lead and fluorspar, semi-precious stones, industrial minerals and dimension stone are also produced.

Currently there are only 15 active mines in Namibia (Figure 5.1). Other mining related activities include mining claims, non-exclusive prospecting licenses (NEPLs) and exclusive prospecting licenses (EPLs).

Mining claims allow small-scale operators and individuals a maximum of ten claims per person for three-year periods (renewable), where they may prospect and mine. A Non-Exclusive Prospecting License allows a person to prospect for a one-year period only, but usually they peg a claim and continue prospecting or mining thereafter.

An Exclusive Prospecting License confers exclusive rights to a company to prospect for defined minerals in a specific area whilst still allowing someone an EPL for a different mineral on the same land at the same time. Other types of licenses include Mineral Deposit Retention Licenses (MDRL) and Reconnaissance Licenses (RL). A RL restricts the licensee to short periods of airborne mapping while a MDRL allows a prospector to retain a deposit that cannot, for economic or technical reasons, be exploited at the time. Once technological or economic improvements are realised, the MDRL falls away and the licensee is obliged to develop the resource. Long term Mining Licences are issued to companies who intend developing a mine in a specific area, and usually represent the culmination of many years of prospecting, laboratory and market analysis, and financial and technical planning.

Namibia’s mines include:
- Large-scale offshore diamond dredging;
- Small-scale inshore diamond dredging and coastal diamond mining;
- Large terrestrial mines (uranium, gold, copper, fluorspar, dimension stone and zinc);
- Small-medium scale terrestrial mines (diamonds, zinc and semi precious stones); and

THE IMPORTANCE OF MINING TO NAMIBIA’S ECONOMY

Mining is often referred to as the backbone of Namibia’s economy, with virtually all mining output being exported. In 1998, minerals represented approximately 36% of Namibia’s merchandise exports but contribution to GDP has fallen from approximately 28% in the 1980’s, to current levels of between 12%-14% (Tarr 1999). In addition to its national importance, mining has stimulated significant infrastructure and socio-economic development in the Erongo, Karas,
Figure 5.1. MINES AND PROSPECTING LICENCES

Mines and prospecting licences
- Mines
- Mineral and diamond licences
- Petroleum licences
- Trunk roads
- Rivers

50 0 100 200 300 km

Panther Beach Saturation
Walvis Bay Salt Works
Kudu Gas Field
Swartbooisdrif
Kombat
Okorusu
K والس
Citruswes
Township
South Panhandle
Diamond Concessions
Offshore
Otjozondjupa, Oshikoto and Khomas regions. Towns such as Tsumeb, Oranjemund, Rosh Pinah, Karibib, Arandis and Kombat rely disproportionately on mining for their existence, while major upgrading to the ports of Lüderitz and Walvis Bay has been justified to a large extent on the basis of increased traffic related to mining. Similarly, the construction and/or upgrading of a number of new powerlines, water pipelines, roads and railway lines has become necessary because of the development of mines. Moreover, mining companies have been responsible for establishing a number of schools and clinics throughout the country, as well as supporting a variety of community initiatives, conservation projects, training and skills-development programmes and various other social causes.

In spite of rising costs, uncertain prices and variable labour relations, mining is likely to maintain its significant contribution towards Namibia’s socio-economic development over the next three decades.

OPPORTUNITIES FOR FUTURE GROWTH

While investment in the mining industry has declined in relative terms, the development of the Skorpion Zinc mine, the revival of the former TCL mines (by Ongopolo), and the growth in offshore diamond mining are encouraging trends. The opening up of the previously restricted Spergebiet area will result in increasing prospecting activities over the next decade, but unfavourable market conditions (including a possible resistance to nuclear power in Europe), fluctuating exchange rates and a world economic recession are likely to suppress the viability of low-grade copper deposits (e.g. Haib) and may delay the exploitation of undeveloped uranium deposits in the Namib.

The small-scale mining sector is expected to grow in relative terms, as many unemployed people who formerly worked in the mining industry, strive to make a living as self-employed entrepreneurs. By maintaining low overheads, it should be possible for small operators to successfully exploit deposits that are not attractive to bigger companies. Another possibility for the future, is the development of “mining tourism”, where operating mines provide tourism experiences, such as going underground or searching for diamonds. In the case of the Swakopmund salt mine, the idea of mining-linked tourism can be developed further – to embrace a nature centred experience. This mine is also a registered private nature reserve and one of the best localities in Namibia for observing waders and other shorebirds. Moreover, a number of the prime tourism products in the southern Namib are in fact, abandoned mines. However, these were all turn-of-the-century mines, and it is unlikely that a recently abandoned modern operation can be transformed into a tourism attraction.

ENVIRONMENTAL IMPACTS OF MINING AND MITIGATION MEASURES

Impacts

If managed badly, mining in Namibia can result in a great variety of environmental impacts (Table 5.1). However, with modern assessment and management tools at our disposal, mines are increasingly better planned, and negative impacts can usually be mitigated and localised.
Table 5.1 Direct negative impacts of mining.

<table>
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<th>Type of mining</th>
<th>Impacts</th>
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| Large-scale offshore diamond dredging      | • Disturbance to seabed and associated biodiversity  
• Increased turbidity to water column due to disposal of tailings into the ocean  
• Conflicts with fishing industry (mostly as a result of perceptions that seabed mining is negatively affecting fishing)  
• Waste disposal into the ocean                                                                   |
| Recovery of diamonds from intertidal and subtidal zones | • Removal of intertidal and subtidal habitat and associated biodiversity  
• Increased turbidity and inshore sediment loads due to the disposal of sand tailings into the ocean  
• Visual impact of huge mounds of overburden  
• Noise and dust created by earthmoving equipment and machines  
• Accumulation of vehicle, machinery and building waste since, for security reasons, no waste may be removed from the security area  
• Habitat destruction during construction and maintenance of permanent road network within mining area  
• Visual impact of extensive, multiple, barbed wire security fences  
• Visual impact of treatment plants and other buildings  
• Practice of migrant labour (and all-male hostels) results in social tensions, prostitution, and spread of sexually-transmitted diseases |
| Medium-large terrestrial mines              | • Vehicle tracks, trenches, shafts and dumps  
• Noise and dust created by earthmoving equipment and machines  
• Accumulation of vehicle, machinery, building and household waste  
• Habitat destruction during construction and maintenance of mining area and road network within mining area and accompanying loss of biodiversity, including rare and endangered species. Strip-mining operations are particularly destructive.  
• Disposal of tailings, which may enter the soil and water bodies  
• Visual impact of mine, treatment plants and other buildings  
• Alienation of land and conflicts with other land use (e.g. agriculture and tourism)  
• High water consumption  
• Practice of migrant labour (and all-male hostels) results in social tensions, prostitution, and spread of sexually-transmitted diseases  
• Poaching and illegal collection of rare species (e.g. succulent plants and reptiles) |
| Small-scale terrestrial mines (including mining claims) | • Vehicle tracks, trenches, holes and dumps  
• Accumulation of vehicle, machinery, building, household and human waste  
• Tree-felling, firewood collection and illegal hunting  
• Visual impact of dwellings and other buildings  
• Conflicts with land owners and other land use (e.g. farming and tourism) |

A century of mining with little or no planning to reduce environmental damage, has impacted heavily upon large areas in Namibia, especially the Namib Desert where valleys of bare rock, piles of abandoned mining equipment, vehicles and tracks, trenches and entire villages, are testimony to an era when rehabilitation was ignored. There are currently approximately 40 abandoned, unrehabilitated mines in Namibia, of which 40% are in nature reserves (Tarr 1999). In some cases, these remnants are regarded as tourist attractions (e.g. Kolmanskop) but in others
(e.g. mines in the Skeleton Coast Park) they have resulted in significant opportunity costs. At least one abandoned mine (Oamites) has resulted in health problems for nearby communities.

Because the mines are generally located in isolated areas, they require substantial infrastructural development such as housing, recreational facilities, roads, airfields, maintenance facilities, waste disposal, water and power supply and administrative and other buildings.

Mitigation measures

The mining industry has in the past ten years, made considerable efforts to reduce environmental impacts through the application of Environmental Assessments during planning, and the implementation of Environmental Management Plans (EMP) during the operational phase. EMP’s establish procedures for the decommissioning of mines that have either reached the end of their lifespan or proved un-viable, such that the area is rehabilitated and restored to as near a natural state as possible (e.g. Okanjande graphite mine in northern Namibia). In accordance with the Mining Act and Namibia’s Environmental Assessment Policy, EA’s are now standard procedure for prospecting and mining and the application of best practice should ensure that the mining industry can pursue its sectoral objectives without causing unreasonable impacts upon the environment. Moreover, mines are under increasing pressure to comply with the requirements of International Standards Organisation (ISO) and to obtain ISO certificates that will enhance their chances of selling their commodities to Western markets.

A greater challenge is the application of EA to the small mining sector, which is often informal and difficult to regulate and monitor. In recent years, government has implemented an experimental “fast-track” EA system, where small miners completed simple environmental questionnaires in which they provided basic information and commitments towards environmental management. This was translated into simple environmental contracts that were an integral part of the Mining Claim License. These attempts to introduce “fast-track” EA should be intensified, but the lack of human resources within government to monitor compliance with environmental contracts and to assess the effectiveness of mitigation measures, remains cause for concern. Consideration should be given to the creation of an Environment Agency that could perform some of these functions on behalf of government.

A key tool in addressing the problem of cumulative impacts of small-scale mining is the use of Strategic Environmental Assessments (SEA). An assessment of expected impacts over a specific geographic area is made, and a broad range of conditions are proposed to ensure that the environment is not adversely affected by development activities. Such assessments also allow for the parallel evaluation of other land uses, diversification and value adding activities. Thereafter, the individual small mines that locate themselves in this area can be subjected to a “fast-track” EA system, and the subsequent monitoring should be done for the whole area and not separately for each mine. Areas where SEA for mining should be applied include the lower reaches of the Orange River, Spitzkoppe and Brandberg. The SEA enables the authorities to establish Limits of Acceptable Change (LAC) and to define indicators that will be useful for the monitoring of impacts. A key strategy in the use of fast-track EA (indeed all EA’s) is the involvement of the miners throughout the process of planning and implementation so that they develop a “feeling of ownership” and thus become partners in the process.
6. SITUATION ANALYSIS

Section A of this report highlights Namibia’s strong dependence on renewable and non-renewable natural resources. It also emphasizes the complexity of managing these resources sustainably because of unpredictable fluctuations in marine resources, water scarcity, high rainfall variability and low capability of the land to support intensive forms of agriculture. In addition to these constraints several other cross-cutting issues limit sustainable development within Namibia’s natural resource sectors. The situation analysis that follows summarizers these cross-cutting issues and assesses whether certain policies are addressing them sufficiently and whether there are not policy gaps that are resulting in lost opportunities. In addition it highlights certain economic themes that recur within most of the natural resource sectors and summarises the broad trends and uncertainties regarding Namibia’s future.

CROSS-CUTTING ISSUES

It is important to recognise the close linkages that exist between the major environmental issues (desertification, biodiversity loss, global warming and deforestation) and how their cumulative impacts can affect (and in turn, are affected by) political goals such as economic development, poverty amelioration and attaining food security. The most important cross cutting issues within the natural resource sectors, options for addressing them and the organisations responsible, are summarised in Table 6.1 (Tarr, 2000a). This summary, initially developed during the development of NDP II, lays a foundation for identifying the key challenges we face, the strategies we must adopt in order to attain our ideals of high capacity, equity, sustainability and wealth and the key actors involved in this process.

AN OVERVIEW OF CURRENT POLICIES - Helping or hindering progress towards sustainable development?

Since 1990, the Namibian government has adopted a number of policies that promote sustainable development. Most of these have their roots in clauses of the Namibian Constitution, particularly Article 95(1), which commits the State to “actively promote and maintain the welfare of the people by adopting … policies aimed at……the maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and the utilisation of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future…”.

While many policies have been a step in the right direction, some have been developed in isolation, resulting in omissions of key issues or even contradictions with other policies. Moreover, in some cases the implementing agencies continue to pursue practices that are contrary to their own policies.1 Appendix 3 provides a brief analysis of some of the more important policies relevant to natural resources; especially those relating to future trade in meat and fish products and productivity from agriculture, tourism, fisheries and wildlife. Attention is brought to those aspects of each policy that promote sustainable development as well as the policy omissions or contradictions that could hinder our progress towards achieving the Ideal Vision for 2030.

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1 An example is the MET that developed the Environmental Assessment Policy in 1994 but does not commission EAs for major development activities such as infrastructure development and tourism concessions in parks. Similarly government, in general, applies this particular policy inconsistently.
IMPORTANT ECONOMIC THEMES REGARDING THE FUTURE OF NAMIBIA'S NATURAL RESOURCE SECTORS

From an economic viewpoint an analysis of the past five chapters highlights three important themes regarding Namibia’s future. These include:

a) The need for economic diversification within the natural resource sectors.
Examples of diversification include: complementing domestic livestock production with mixed game/livestock farming; developing high quality, low impact nature centered tourism activities on communal, freehold and state owned land and; value adding to livestock, fish and tourism and other natural resource based products.

b) The need to implement development plans that take into account the Total economic Value for all the resource sectors.
Economically rational development plans are essential for sustainable development. These aim to make a positive net contribution to the economy in terms of Total Economic Value (TEV). TEV embraces direct use values (income derived from actual use of natural resources - for example, income from fishing), indirect use values (the value of conserving/preserving a resource because of its indirect effect on direct use values – for example, the flood control value of a wetland) and non-use values (the values perceived in the preservation of a resource either for later use (the option value) or to hand down to future generations (bequest value) or just to know it exists (existence value).
It is essential for decision makers to recognise, not only the direct values, but also all the other “values” associated with natural resources in Namibia. This is because these values are associated with people's willingness to pay. With the right mechanisms in place, all values associated with natural resources could be captured as income by those investing in the resource (i.e. the nation and local communities of Namibia). Focussing only on the direct values of a resource, as governments have tended to do in the past, can mean the loss of unknown amounts of potential non-use income. Planning must take this into account, and research should seek to measure and find ways of capturing these values.

c) The need to develop and maintain economically sound systems of tenure over all natural resources.
There is good evidence to illustrate that when communities (or other resource users) have rights over their resources and are legally able to exclude others from utilisation, the economic benefits are significant (J.Barnes pers comm.). The "open access" problem leads to dissipation of net benefits and a reduction in production to levels that are economically unsound. Ultimately, the power of exclusion (for example, the ability of a conservancy to prevent a wealthy farmer from fencing off part of the conservancy and using it for grazing) allows the conservancy to increase production and net benefits.

LAYING A FOUNDATION TO DEVELOP AN IDEAL VISION FOR NAMIBIA'S NATURAL RESOURCE SECTOR TO 2030

Before creating the Ideal Vision it is useful to consider some broad trends, key certainties and uncertainties regarding Namibia’s future to 2030.

Broad trends include:
• Increasing population, poverty and unemployment
• Increasing demand for natural resources
• Probable increase in the frequency and severity of droughts and floods (as a result of global warming)
• Increasing pressure to expand irrigation
- Increasing loss of biodiversity
- Increasing land degradation
- Increasing costs of water supply
- Increasing pollution (particularly the accumulation of toxic chemicals) throughout the southern African sub-region
- Increasing temperatures (in response to global warming)
- Increasing pestilence and crop infestations
- Increasing spread of known diseases (e.g. HIV and malaria) and the likelihood of new, emerging diseases (e.g. Congo fever in northern Namibia)
- A decline in freshwater fish stocks
- A decline in rural food security
- A decline in economic development options

Key certainties, that must be considered an integral part of Namibia’s future include:

- High variability within the marine environment (which makes it difficult to predict annual availability of fish stocks)
- Poor and fragile soils that are easily degraded.
- Highly variable rainfall, rangeland carrying capacity and rain fed crop production (in areas where this is viable).
- Increasing water scarcity (and it’s accompanying economic consequences).
- The effect of HIV/AIDS on Namibia’s labour force and society

Key uncertainties regarding Namibia’s future include:

- Political stability and governance. Changes in political stability and governance can have a dramatic effect on the country’s future prosperity and development within the natural resource sectors.
- Poverty mitigation, equitable income distribution and access to land is fundamental to sustainable natural resource management. Poverty mitigation demands the redistribution of productive land, the establishment of tenure over natural resources, the promotion of “off-the-land” employment opportunities. The degree to which this will occur by 2030 is uncertain.
- Impacts of climate change. Although it is agreed that climate change poses a major problem for Namibia’s socio-economic and environmental future (Appendix 4), the inability of experts to accurately quantify the timing, magnitude and nature of the expected changes, limits our vision regarding biodiversity loss, food security, land degradation and other impacts related to global warming.
- The lack of knowledge regarding livelihood strategies and how people will adjust to environmental trends and issues.
- The impact of the environmental information explosion. It is not possible to ascertain the extent to which improved education and growing awareness will influence political will, institutional commitments, policy development, public participation and programme implementation in Namibia during the next 5-10 years. However these factors are crucial in determining Namibia’s social and environmental future.
- Changes in the global economic arena and other international factors. Namibia’s economy and the environment is affected by development loans and trade barriers. Ultimately, political and economic interactions with other countries will have an impact on poverty in Namibia. In addition, the way that developed and rapidly developing economies respond to international agreements on environment and trade will affect the rate of global environmental change and Namibia’s environmental conditions in 2030.
- Improvements in technology and new scientific discoveries. These may either worsen or improve the impacts of current environmental and social problems in Namibia. Ultimately,

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2 OFDA database information from: http://www.Tulane.edu/~inhl/crisis/class.htm
the use of more efficient, non-polluting alternative technology (for example, solar and wind power, agroforestry, alternative but effective sanitation services designed for water conservation and Namibian conditions etc.) will help improve the prospect of the country’s environmental future. On the other hand, the adoption of some modern technologies, for example the use of genetically modified crops, while improving productivity, could be detrimental in the long run.³

Each of the uncertainties mentioned above, with the exception of the impacts of global warming and the changes in the global economic arena and other international factors can be categorised as factors that can be controlled by the Namibian government through the development and implementation of key strategies.

³ Several risks could be associated with the use of genetically modified crops. For example, genes resistant to herbicides could cross into other plants and create unstoppable plagues of “superweeds”; modified plants containing new proteins could exacerbate allergic responses; plants containing unknown toxins could end up producing poisonous foods (Le Page, 2000).
B. THE IDEAL VISION FOR NAMIBIA'S NATURAL RESOURCE SECTORS
1. THE IDEAL VISION

SUSTAINABLE DEVELOPMENT – THE CORNERSTONE OF NAMIBIA’S IDEAL VISION FOR 2030

The concept of sustainable development arises from the realization that it is impossible to separate economic and social issues from environmental issues. Consequently, sustainable development is most often described as "development that meets the needs of the present, without limiting the ability of future generations to meet their own needs". In order to pursue sustainable development, strategies that result in a minimum amount of damaging impacts but promote social and economic development must be adopted. Namibia’s Ideal Vision for 2030 is one that fully embraces the idea of sustainable development.

RESULTS FROM THE CONSULTATIVE WORKSHOPS

Five consultative workshops, which drew on the expertise of government, non-government and private sector technical experts, were held in order to establish Ideal Visions for Namibia’s different natural resource sectors. The resulting “Visions” (Table 7.1) echo Namibia’s constitutional aim of ensuring environmental integrity, maintaining essential life support systems and providing a foundation for livelihoods, human health and well-being.

In constructing these visions, it became clear that by 2030 Namibia should have become far less dependent on using the land for low value agricultural activities that exacerbate land degradation. Rather, there should be a strong move towards capitalizing on the country’s comparative advantages within the global market. Consequently, an overall vision for the natural resource sectors for 2030 was formulated (Box 7.1).
Table 7.1 The Ideal Visions to 2030 for Namibia’s natural resources sectors
(Defined by the participants at the consultative workshops for Namibia’s natural resource sectors)

| IDEAL VISION FOR 2030 | Fisheries and other marine resources | Freshwater And freshwater resources | Biodiversity Wildlife & tourism | Agriculture | Mining

Namibia’s marine species and habitats significantly contribute to the economy and equitable socio-economic development whilst maintaining biodiversity and the functioning of natural ecosystems in a dynamic external environment.

Freshwater resources are available to support sustainable socio-economic development for improved standards of living, and to maintain natural habitats.

The integrity of ecological processes, natural habitats and wildlife populations throughout Namibia is maintained whilst significantly supporting national socio-economic development through sustainable low-impact, high quality consumptive and non-consumptive uses as well as providing diversity for rural and urban livelihoods.

Land is used appropriately and equitably, significantly contributing towards food security at household and national levels, and supporting the sustainable and equitable growth of Namibia’s economy whilst maintaining and improving land capability.

Namibia’s mineral resources are strategically exploited and optimally beneficiated, providing equitable opportunities for all Namibians to participate in the industry, while ensuring that environmental impacts are minimised, and investments resulting from mining are made to develop other, sustainable industries and human capital for long term national development.

Box 7.1 OVERALL VISION FOR THE NATURAL RESOURCE SECTORS FOR 2030

Namibia shall develop its natural capital for the benefit of its social economic and ecological well-being by adopting strategies that:

- Promote the sustainable, equitable and efficient use of natural resources;
- Maximise Namibia’s comparative advantages; and
- Reduce all inappropriate resource use practices.

However, natural resources alone cannot sustain Namibia’s long-term development, and the nation must diversify its economy and livelihoods.

1 There was no workshop held for the mining sector. This Vision was formulated by Namibia’s Natural Resource Consortium.
NAMIBIA'S COMPARATIVE ADVANTAGES WITHIN THE GLOBAL MARKET

- **Vast wide-open spaces and relatively uninhabited wilderness areas.** These are increasingly valuable commodities in today's rapidly developing, hectic, overpopulated world;

- **Abundant and diverse wildlife populations** that are well adapted to Namibia's harsh climatic and physical conditions, and have extremely high direct and indirect use value. Some species of wildlife in Namibia also have high non-use value which include the values perceived in their preservation for later use (their option value) or their value as resources to be handed down to future generations (their bequest value). Included among these species are a large number of endemic species that are unique to Namibia (for example, the *Welwitschia* and many other desert adapted plants and animals);

- **Relatively uncontaminated, free-range meat and fish products.** Over the years, meat produced in many developed countries (mainly within the EU and USA) has become increasingly contaminated with hazardous substances associated with high pollution levels diseases and modern methods of intensive livestock and fish farming. Provided Namibian beef, game and fish products remain free of contamination, they will have a comparative advantage on the global market.

- **Well-adapted indigenous domestic species (crops and livestock)** that contain valuable genetic material that can be used to help scientists develop new crop and livestock strains that are able to cope with changing climates, pestilence and other types of environmental stress.

By 2030 agricultural activities should focus on the cultivation of high value crops and there should have been a strong move towards improved value adding to meat and fish products. In addition, there should be appropriate development of high quality, low impact consumptive and non-consumptive tourism. A good example of how Namibia could capitalise on its comparative advantage, is through the rational economic development of the Namib Desert - development that takes into account the Total Economic Value of this seemingly barren and unproductive tract of land (Box 7.2).

**Box 7.2 Capitilising on comparative advantage – the sustainable development of the Namib Desert through the recognition of Total Economic Value**

The Namib Desert spans a great diversity of habitats that incorporate spectacular tracts of natural scenery including well-wooded ephemeral rivers, the Fish River Canyon, extensive sand dunes and vast open plains.

In today's overcrowded, rapidly developing world, natural environments which provide solitude; silence and natural beauty have become sought after commodities. In this light the Namib Desert must be regarded as a valuable national asset unique to Namibia and, to a much lesser extent, Angola and South Africa. Consequently, Namibia must create a vision for the sustainable development of the Namib. It must set clear guidelines and parameters of how it should be developed and zoned, so that some areas support mining, others agriculture, or tourism. The guidelines must stipulate, for example, that off-road driving and high-volume tourism can be allowed only in certain areas, but definitely not in others – particularly those areas that support a high degree of endemism. Moreover, the vision must encourage the active participation of various landowners and natural resource managers, who individually and collectively are part of a "Greater Namib Desert Management Scheme". This should include communities that have formed conservancies, private landowners adjoining the game parks, local authorities, mining companies, and of course, Angola and South Africa, who are joint custodians of the Namib Desert.

The above illustrates that, although largely useless in terms of direct value from land use activities like agriculture, the *Total Economic Value* of the Namib Desert is immense. With careful planning and the right mechanisms in place, all values associated with this unique piece of land could be captured as income on a sustainable basis.
2. KEY CHALLENGES

During the preparation for NDP II, the key cross-cutting challenges to sustainable development in Namibia were identified and analysed (Table 6.1). In addition, the consultative Vision 2030 workshop participants brainstormed their ideas regarding the major challenges that will hinder progress towards reaching the Ideal Vision in 2030. These challenges, summarised below, are the frame conditions around which strategies to help Namibia achieve the Ideal Vision should be developed.

THE KEY THREATS TO SUSTAINABLE DEVELOPMENT IN NAMIBIA

- **Population growth and settlement patterns.** Population growth directly affects future demand for natural resources, rates of urbanisation and poverty (figure 8.1).
- **Increasing water stress.** Namibia’s limited freshwater resources are being placed under increasing stress due to population growth, rapid urbanisation and economic growth.
- **Poorly planned development and inappropriate industrialisation.** A lack of strategic planning can lead to inappropriate developments that do not make optimal use of Namibia’s comparative advantages, and place unnecessary pressure on limited resources such as water.
- **The loss of biodiversity** impacts on our development options. It disrupts ecosystem stability and the functions that underpin our very survival (e.g. the provision of clean air and water, the control of soil erosion and floods, and the assimilation of wastes).
- **Land issues.** Low land capability means that Namibia’s soils are easily degraded. In addition, the unequal distribution of land, if not resolved in the near future, will lead to conflict that could destabilise our entire society and economy. The lack of secure group tenure does not provide incentives for people to care for the land and invest in its improvement. The “open access” problem in Namibia is economically and environmentally unsound as it leads to environmental degradation, dissipation of net benefits and reduced production.
- **Poverty and inequality.** Namibia has one of the most highly skewed income distributions in the world. This means that there is significant poverty and inequality in the country. Poor people have few options but to depend on primary production for food and energy and therefore can place tremendous strain on natural resources.
- **Consumption patterns.** Wealth can also threaten sustainable development. Wealthy people and communities often choose to have resource intensive lifestyles. If they do, they become responsible for high rates of energy and raw material consumption and for producing large amounts of polluting waste. Policy incentives are vitally important to dissuade the wealthy members of society to reduce their excessively consumptive lifestyles.
- **Poor governance.** Governance affects efficiency within the civil service, equity, political stability and democracy. Equity and transparency have been highlighted as the most important aspects of governance that needs to be addressed in Namibia. In addition, the slow adoption of decentralisation, the lack of intersectoral planning and co-ordination between ministries and stakeholders, and low levels of public participation in decision-making on some key issues, threaten good governance in Namibia.
- **Increasing competition with neighbouring countries for shared natural resources.** Improved and sustained co-operation and co-ordination regarding policies and policy implementation is essential to avoid future inequitable use, pollution and conflict over shared water, marine fisheries and wildlife resources.
- **A lack of human resources.** Inequalities in education levels, skills training and capacity building still exist in Namibia, despite efforts to redress past injustices. The resulting lack of skilled labour and limited human resources restricts private sector development and
public sector functioning. Current trends of a declining skills-base (e.g. parks and wildlife management) are of great concern and Namibia needs to decide on the road ahead in terms of management systems and partnership arrangements. While the creation of parastatals and agencies is based on sound principles and should continue, in some cases they have not performed well and have resulted in negative perceptions.

- **The HIV/AIDS epidemic.** The prevalence of the HIV/AIDS epidemic undermines human well-being and economic prosperity by reducing the quantity and quality of the labour force. In addition it wipes out past investments in education and training and places a strain on communities and households that need to care for orphaned children, the sick and dying.

- **The need to improve access to existing knowledge and fill knowledge gaps.** Rapid modernisation threatens the survival of valuable traditional knowledge and practices in Namibia. Traditional knowledge is seldom acknowledged as providing any contribution to development - despite the fact that it is often better suited than Eurocentric technology to conditions in Namibia. Even though a lot of useful information currently exists, there are significant gaps in our knowledge regarding many issues relating to sustainable development and environmental issues.

- **The need for a stable macroeconomic environment.** A stable macroeconomic environment is vital for economic growth and poverty reduction. Despite some positive macroeconomic trends since the early 1990s (for example, a steady reduction in the inflation rate [Mudenda & Sherbourne 2001]), Namibia’s macroeconomic environment is not yet considered stable.

- **The adverse impacts of global atmospheric change.** Under climate change conditions there is the possibility that Namibia’s climate will become hotter and drier with increased variability and more frequent and prolonged periods of drought. These conditions will exacerbate current problems regarding water management, food production and human health (Appendix 4).

**The need to create a shared vision amongst all Namibians.**

Sustainable development and the Ideal Vision to 2030 demand a shared vision - one that will foster harmony, commitment and unity. A shared vision requires agreement on common values and attitudes regarding equity and environment. These values include:

- Maintaining human rights, democracy, social and gender equality and justice;
- Preserving biodiversity and wildlife for sustainable use;
- Avoiding the wasteful use of natural resources and resource intensive lifestyles;
- Ensuring economic stability and growth by using resources wisely and sustainably, and optimising Namibia’s comparative advantages;
- Building skills and capacity and promoting a culture of integrity, responsibility and commitment.

Superimposed over the major issues that threaten sustainable development in Namibia are the country’s harsh climatic conditions, which increase vulnerability to land degradation, water resource depletion and restrict development activities (Figure 8.1).

**ENVIRONMENTAL THREATS ASSOCIATED WITH RAPID URBANISATION**

**Causes of migration from rural areas**

Namibia’s current rates of urban population growth are high (an estimated 5.5% per annum) (J.Mendlesohn, *pers comm.*). Based on these figures, about 85% of Namibia’s population could be living in towns by 2021. Rapid urbanisation occurs largely as a result of high rates of population
growth, persistent drought, a decline in the ability of the land to support growing populations through agriculture and the perceived idea that there is an easier and better life in towns and cities.

**Environmental consequences of rapid urbanisation**

The environmental consequences associated with rapid urbanisation in Namibia can be both positive and negative. While direct pressure on the land in rural areas is reduced as a result of urban migration, rapidly growing informal settlements on the outskirts of Namibia’s towns are generally associated with localized deforestation, increasing waste management problems (Tarr 1996), increasing crime and poverty, limited access to adequate sanitation and isolated incidents associated with the spread of communicable, waterborne diseases.¹

**Figure 8.1 Some of the interlinked issues that threaten sustainable development in Namibia**

(Source: Tarr 1997)

¹ Although the spread of waterborne diseases in Namibia’s growing squatter areas are low, problems have begun to emerge even in the countries dry, desert towns. For example, during May 2001 an outbreak of diarrhoea in the squatter area outside Swakopmund caused 25 people to be hospitalised during the east wind period.
### 3. KEY STRATEGIES

#### SUMMARY OF KEY STRATEGIES

Table 9.1 provides a list of key strategies that need to be adopted in order to achieve the ideal vision to 2030 for Namibia’s natural resource sectors.

<table>
<thead>
<tr>
<th><strong>Table 9.1 Key strategies that should be adopted in order to achieve the Ideal Vision</strong></th>
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<tbody>
<tr>
<td><strong>MARINE FISHERIES</strong></td>
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<tr>
<td>1. Harvesting on a sustainable basis</td>
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<tr>
<td>2. Further develop and implement an appropriate legislative, policy and management framework for the marine environment.</td>
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<tr>
<td>3. Diversify and improve the utilisation of marine resources through adopting more efficient harvesting and processing techniques, as well as through mariculture and marine-based tourism (research and development is needed to guide this).</td>
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<tr>
<td>4. Secure skills for achieving all aspects of the vision (i.e. through training, outsourcing, research and development).</td>
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<tr>
<td><strong>FRESHWATER</strong></td>
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<tr>
<td>1. Create an economically rational water development plan</td>
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<td>2. Develop and implement appropriate policies and laws</td>
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<td>3. Develop adequate levels of skilled human resources</td>
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<td>4. Develop a strong national economy</td>
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<tr>
<td>5. Secure regional cooperation that enables access to shared water resources.</td>
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<td>6. Adopt an integrated approach towards water management and land use, using planning tools such as Environmental Assessments</td>
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<tr>
<td><strong>LAND AND AGRICULTURE</strong></td>
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<tr>
<td>1. Promote the development of off-farm livelihoods.</td>
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<td>2. Develop and implement an appropriate land resettlement system.</td>
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<tr>
<td>3. Improve the understanding, knowledge and awareness of land capability (through research and education).</td>
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<tr>
<td>4. Implement appropriate and sustainable land use management (through integrated land use planning and monitoring).</td>
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<tr>
<td>5. Develop and implement a conducive policy and legislative framework that addresses land tenure and property rights.</td>
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<td>6. Review system of communal land</td>
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<tr>
<td>7. Develop economically rational/efficient national, regional and local land use rural development plans.</td>
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<td>8. Develop and exploit favourable markets that maximise Namibia’s comparative advantage.</td>
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<tr>
<td>5. Inform and sensitise politicians and all-levels of decision makers on the key issues, trends and consequences relating to the management and exploitation of the marine environment and its resources.</td>
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<tr>
<td>7. Maintain investor confidence within the marine development sector.</td>
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<tr>
<td>8. Improve and maintain a healthy human population through education and medical care.</td>
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<tr>
<td>9. Species and habitats that are threatened should be protected within marine reserves. The establishment of such reserves could aid research and generate funds from tourism activities, sport fishing and sight seeing.</td>
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<tr>
<td>7. Improve our knowledge of the extent and dynamics of our water resources – especially groundwater.</td>
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<td>8. Establish and maintain appropriate and efficient institutions that will manage the water sector</td>
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<tr>
<td>9. Establish and maintain appropriate and efficient infrastructure for the water sector</td>
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<tr>
<td>10. Acknowledge the role of women as water managers and promote gender balance</td>
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<tr>
<td>11. Understand and act upon the impacts that the HIV/AIDS epidemic may have on the water sector</td>
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<tr>
<td>12. Ensure that the proper value is attached to water and financial costs of supply are met</td>
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<tr>
<td>9. Develop and implement an equitable, economically efficient and appropriate land re-distribution system.</td>
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<tr>
<td>10. Rehabilitate and improve degraded land.</td>
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<tr>
<td>11. Encourage high quality, low impact tourism activities on land that is vulnerable to desertification if it is used for agricultural activities.</td>
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<tr>
<td>12. Improve the productivity of the land through promoting higher quality outputs.</td>
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<td>13. Supply effective decentralised services to land users.</td>
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<tr>
<td>14. Maintain sustainable human population growth rates with the aim to reach demographic transition.</td>
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<td>15. Develop systems of accountability for proper land – use</td>
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<td>16. Provide alternative capital investment and security options for non-farmers</td>
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<tr>
<td>17. Ensure that people who really need to live off the land are supported</td>
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<tr>
<td>18. Promote “serious, productive” farmers</td>
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</table>
### WILDLIFE AND TOURISM

1. Develop and implement appropriate and consistent policies and legislation.
2. Promote high quality, low impact tourism projects
3. Establish a national planning system (and individual land use plans) that promotes an integrated approach and that reduces intersectoral conflicts.
4. Establish mechanisms and systems that provide enough information for enabling adaptive management within the sector as well as for monitoring the impacts of other activities upon the sector.
5. Create incentives for investment in priority projects and areas.
6. Build and enhance skills (human resources) within the MET and partners (NGO’s, CBO’s, private sector, communities, parastatals, agencies, other government departments) so that the sector can be better managed.
7. Improve conditions of employment to reduce rapid staff turnover (especially within government).
8. Increase awareness of the value of the sector amongst decision makers and the general public
9. Empower communities and provide incentives that promote sustainable natural resource management at local levels.
10. Promote sustainable harvesting of wild resources that produce high returns.
11. Ensure that top decision-makers (public and private sector) are held accountable for their decisions and actions.
12. Improve our awareness of market requirements within the tourism sector and monitor market responses to Namibia’s tourism products.
13. Promote high quality low impact tourism activities especially in areas that are vulnerable to land degradation resulting from agricultural activities.
14. Promote partnerships and collaboration in strategic planning and natural resource management. Examples include transfrontier conservation and park/neighbor relations in freehold, communal and protected areas.

### MINING

1. Prospect for new mineral deposits
2. Maintain technical, financial and management efficiency and cope with volatile markets through securing long-term contracts
3. Reduce labour disputes through greater participation by labour in setting rules and standards, and in monitoring progress
4. Ongoing capacity building through formal training and skills development programmes
5. Health awareness programmes (especially related to STDs)
6. Apply EA and SEA, and encourage mines to obtain ISO certificates
7. Invest in mineral beneficiation to add value to commodities wherever possible
8. Re-invest profits from mining, into secure investments, the development of human capital and other industries, especially those that promote the sustainable utilisation of renewable natural resources
9. Outsource non-core functions to local service providers

The strategies identified above and those mentioned from the NDP II consultative process (Table 6.1) can be grouped into the following sub-headings and, as such, are summarised in Table 9.2.

- **Peace, stability, political commitment and governance**
- **Diversification**
- **Transboundary arrangements**
- **Health and human resources**
- **Investment incentives**
- **Institutions and partnerships for environmental protection and management**

### KEY TOOLS AND ACTIONS FOR ACHIEVING SUSTAINABLE DEVELOPMENT

Developing countries like Namibia are in an excellent position to avoid the damaging impacts of development that other nations have suffered in the past. In order for this to occur, the government must establish domestically determined procedures to integrate environment and development issues into decision-making at all levels. In addition there must be the political will to develop or improve mechanisms that facilitate the involvement of all concerned individuals, groups and organisations in decision-making. This requires a shift in national focus with the aid of many political, economic and technical tools some of which are discussed below.
<table>
<thead>
<tr>
<th>Table 9.2 KEY STRATEGIES FOR IMPLEMENTING VISION 2030 FOR THE NATURAL RESOURCES SECTOR (Workshop results)</th>
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</thead>
<tbody>
<tr>
<td><strong>PEACE, STABILITY, POLITICAL COMMITMENT AND GOVERNANCE</strong></td>
</tr>
<tr>
<td>1. Secure political and financial commitment for the implementation of the vision</td>
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<tr>
<td>2. Develop &amp; implement equitable &amp; appropriate land re-distribution &amp; resettlement systems that significantly reduce conflicts over land &amp; resources</td>
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<tr>
<td>3. Ensure that top decision-makers (public &amp; private sector) are held accountable for their decisions &amp; actions</td>
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<tr>
<td><strong>TRANSBOUNDARY ARRANGEMENTS</strong></td>
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<tr>
<td>4. Secure regional cooperation that enables access to shared water resources and that promotes joint management of wildlife, fisheries and tourism</td>
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<tr>
<td>5. Participate in practical ways (especially at the programme and project level) in activities related to the major international environmental treaties</td>
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<tr>
<td><strong>INVESTMENT INCENTIVES</strong></td>
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<tr>
<td>6. Create incentives for investment in priority projects &amp; areas (e.g. agriculture, tourism, aquaculture) so that Namibia pro-actively sets the development agenda.</td>
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<tr>
<td>7. Give security of tenure so that communal &amp; freehold farmers, concessionaires &amp; other investors have incentives to invest in the country &amp; the future</td>
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<tr>
<td><strong>DIVERSIFICATION</strong></td>
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<tr>
<td>8. Promote off-farm livelihoods so that a lower proportion of Namibian’s rely on subsistence livelihoods than is the case at present.</td>
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<tr>
<td>9. Develop &amp; exploit favourable markets that maximise Namibia’s comparative advantage (e.g. high-value agricultural produce, tourism, fish, game)</td>
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<tr>
<td>10. Improve our awareness of market requirements (e.g. tourism, agricultural produce, fish, minerals) &amp; monitor market responses to Namibia’s products</td>
</tr>
<tr>
<td>11. Diversify and improve the utilisation of marine resources through adopting more efficient harvesting and processing techniques, as well as through mariculture and marine-based tourism (the last mentioned are regarded as having significant growth potential)</td>
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<tr>
<td>12. Improve the productivity of the land through higher quality outputs &amp; value-adding to increase employment and income generation</td>
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<tr>
<td><strong>HEALTH AND HUMAN RESOURCES</strong></td>
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<tr>
<td>13. Understand the impacts of HIV/AIDS on the management of Namibia’s natural resources at local and national levels, and on the implications for full-cost recovery of natural-resource based goods (especially water and electricity).</td>
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<tr>
<td>15. Reduce the prevalence of HIV/AIDS and other diseases (i.e. maintain a healthy population)</td>
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<tr>
<td><strong>INSTITUTIONS AND PARTNERSHIPS FOR ENVIRONMENTAL PROTECTION AND MANAGEMENT</strong></td>
</tr>
<tr>
<td>16. Increase awareness of the value of natural resources to Namibia’s economy and human health, amongst decision makers and the general public.</td>
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<tr>
<td>17. Develop and implement an appropriate and consistent policy, legislative and planning framework, that promotes an integrated approach, thus reducing intersectoral conflicts whilst maximising synergy.</td>
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<tr>
<td>18. Within the above framework, use sustainable development planning tools that include Environmental Assessment, especially at the strategic level</td>
</tr>
<tr>
<td>19. Rehabilitate and improve degraded habitats, including land and water bodies.</td>
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<tr>
<td>20. Build &amp; enhance skills in government &amp; partners (NGO’s, CBO’s, private sector, communities, parastatals) so that natural resources can be better managed.</td>
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<tr>
<td>21. Improve the understanding, knowledge and awareness of land and natural resource capability (through research and education) to enabling adaptive management within the sector as well as for monitoring the impacts of other activities upon the sector.</td>
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<tr>
<td>22. Acknowledge the role of women as natural resource managers &amp; promote gender balance at all levels of management</td>
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<tr>
<td>23. Establish and maintain appropriate and efficient infrastructure (e.g. roads, dams, pipelines etc.)</td>
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<tr>
<td>24. Supply effective decentralised services to land users.</td>
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<tr>
<td>25. Improve conditions of employment to reduce rapid staff turnover (especially within government).</td>
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<tr>
<td>26. Expand the protected areas network (game parks) to include more habitats and endemic species, and implement a parks and neighbours policy that encourages joint management of natural resources between State-owned parks, conservancies and private land.</td>
</tr>
</tbody>
</table>
Political tools for achieving sustainable development

a) Developing local Agenda 21 initiatives

UNCED (The UN Conference on Environment and Development held in Rio de Janeiro in 1992) resulted in the adoption of Agenda 21. Agenda 21 stresses the links between poverty and consumerism on the one hand, and environmental degradation on the other. It highlights the need for integrating environment and development at the policy, planning and management levels with the overall objective being to improve the decision making process so that consideration of socio-economic and environmental issues is fully integrated, and a broader range of public participation is assured regarding environmental issues. Agenda 21 gave rise to the development of several important Multilateral Environmental Agreements (MEAs), most of which have been acceded to or ratified by Namibia (Appendix 5).

Despite some efforts1, there is a need to further develop local Agenda 21 initiatives in Namibia. These initiatives should aim to develop and implement sustainable development policies by involving both communities and political agencies in decision making.

b) Improving national policies, institutions and agencies

Taking an integrated approach. As highlighted in Table 6.1, most of the key strategies needed to enhance sustainable development demand an intersectoral management approach. Of top priority is the integration of land-use, agriculture and water policies. The aim is to develop integrated policies that optimise the combination of economic and environmental benefits that the land, water and oceans can provide, without limiting their future productivity.

Creating policies and plans that recognise the Total Economic Value (TEV) of Namibia’s natural resources. As highlighted in the situation analysis (Chapter 6) it is essential for the government to recognise the TEV and not just the direct value of its natural resources. Focussing only on the direct values of a resource can mean the loss of large amounts of potential non-use income.

Regular policy review. Ideally, all new economic and environmental policies should undergo thorough review and line ministries should report annually on the extent to which their activities are contributing to environmental degradation or improvement.

Tackling the root causes of environmental problems. Many of the root causes of environmental problems may not be affected by environmental policies. For example, policy measures that aim to improve equity and education, particularly amongst women, can dramatically reduce fertility and population growth. These policy measures and others (e.g those that aim to develop economically sound systems of tenure over all natural resource, increase resource use efficiency and re-orientate consumption patterns) will contribute to addressing environmental degradation, poverty, rapid urbanisation and economic decline in Namibia.

Improving institutions. Even where the policy environment is conducive, Namibia must maintain (and diversify) its institutions and management capacity. Ultimately, there is more scope for diversifying and improving professionalism, and the creation of a “Namibia Environment Agency” should be considered. Similarly, government should more actively seek the contribution of civil

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1 Windhoek and Walvis Bay have compiled their own structure plans for strategic development. These plans include zonation for various types of land use and address issues regarding the sustainability of energy and water supply, waste management, recreation and open space networks, and the maintenance of ecological systems such as wetlands. In Walvis Bay the structure plan process solicited public input and a review of the plan by specialists and specific interest groups before it was finalised.
society in the field of natural resource management and environmental protection, so that a truly national “critical mass” is achieved. There is also a need to open up to international participation to bring in required skills and enhance capacity building.

c) Improving co-ordinated transboundary planning and management for all shared resources.

The Ideal Vision requires that transboundary agreements on issues relating to land-use in catchment areas and shared ecosystems, the prevention of transboundary water, air and soil pollution, joint exploitation of migratory marine species and the management of shared wildlife populations are fully developed and implemented. In addition, agreements must be drawn up regarding the exploitation of shared economic opportunities e.g tourism and trade.

Technical tools – transforming political ideals regarding sustainable development into reality

a) Environmental Assessment (EA)

Namibia is subject to constant development demands and initiatives, most of which are politically driven or profit motivated. EA, which provides decision makers with an indication of the likely social, environmental and economic consequences of any new policy, plan, programme or project is essential tool to evaluate the development initiative against general principles of sustainability. Ultimately Environmental Assessment should extend beyond the project level to policies and programmes.

b) Improving environmental education at all levels of society

The environment is generally considered a low priority on personal and political agendas in Namibia. Until this changes there is little hope for improving the state of the environment and preventing an increase in the many interlinked economic and human health impacts that threaten sustainable development. Institutional structures must be strengthened to allow for the full integration of environmental and developmental issues at all levels of education (pre-school to university) and public access to environmental information must be improved. A well educated and well informed public is essential for active public participation in decision making and the media must be encouraged to devote as much attention to environmental issues as they do to crime, politics and sport.

c) Acquiring and preserving knowledge

*Capitalising on indigenous knowledge.* Local communities can use indigenous knowledge to stimulate investment and encourage private sector development and economic growth. Sustainable development requires intellectual property protection (through legislation and international agreements) so that benefits to local communities are maximised.

*Filling knowledge gaps* regarding livelihood strategies, climates, soils, biodiversity and pollution. Reliable datasets that provide both quantitative and qualitative information need to be developed. Managers should ensure that time series data is collected, as this is necessary for pollution and other trend detection. Capacities must be developed to gather and handle statistical and geographical data, and assessment results must be made easily accessible to policy makers and the general public.

*Improving access to modern computer-based information and communication technologies (ICTs)* contribute to sustainable development and the democratisation of political structures by providing a greater range of people and organisations with equal access to information. The ideal
vision requires the government to develop policies that promote the use of ICTs in urban and rural areas.

d) Monitoring progress towards sustainable development
In order to successfully monitor Namibia’s progress to sustainable development and the Ideal Vision, reviews on the state of the environment must be conducted at five-year intervals.

Economic tools that can enhance sustainable development

In order to avoid the escalating ecological, social and financial costs that result from the unsustainable use of natural resources, several economic instruments can be adopted to facilitate a move towards a more sustainable future. Examples include:

- The adoption and enforcement of strict polluter pays policies and reduced duties and tax credits for the importation of environmentally sound technologies.
- Reducing ill-considered market-based incentives, particularly subsidies for inappropriate land, water and agrochemical use. These market-based incentives should be replaced by incentives for environmentally friendly practices in order to slow down rates of environmental degradation and the unsustainable loss of natural resources.
- Ensuring, wherever possible, payment for the use of resources (water, land, grazing).
- Applying natural resource economics and the construction of Natural Resource Accounts (NRA) as mainstream economic tools to help planners and decision makers to assess the real value of natural resources and to determine the costs of environmental degradation or natural resource loss. Ideally, the EA process should take NRA’s into consideration in order to better inform decision makers of the financial costs and benefits of policies, plans, programmes and projects. In addition NRA principles should be used to develop Sustainable Development Accounts (SDA). These accounts incorporate indicators to measure a country’s natural resource capital, economic performance and the value of its human capital. Once a sound process is in place to complete SDA’s for Namibia, a high level Sustainable Development “think tank” of ten people could be established to meet annually and report to cabinet on Namibia’s progress towards sustainable development.

In summary, the actions that can effectively reverse unwelcome trends and reduce threats to Namibia’s natural resource capital should be focussed in the following broad areas:

- Filling in the gaps in our knowledge regarding natural resources;
- Tackling the root causes of the key issues that threaten sustainable development through the adoption of integrated political, technical and economic measures.
- Improving public access to environmental information
- Educating all Namibians with respect to environmental and development issues and the total economic value of Namibia’s natural resources
- Capitalising on Namibia’s comparative advantages, promoting diversification, “off land” economic opportunities and value adding to natural resources.
- Maintaining freedom of the press – in order to keep the public well informed regarding the facts associated with environmental and developmental issues.
- Opening up decision making processes to all stakeholders and providing more opportunities for the private sector, NGOs and community groups to participate in environmental action.
4. KEY INDICATORS

In recognition of the fact that there is a need to monitor progress towards sustainable development, Namibia’s Ministry of Environment and Tourism initiated a national State of Environment Reporting (SoER) in 1998. An integral part of this project has been an attempt to define a national core set of environmental indicators – one that can be used to help simplify and streamline future SoE reporting. These indicators should feed into the Vision 2030 process. However this important exercise is not yet complete and the list of prioritised indicators still requires considerable refinement (Nakanuku et al 2001).

As part of the consultative process in developing this report, participants at the Vision 2030 workshops on Namibia’s natural resource sectors drew up a list of indicators for each sector. However most of these indicators (Table 9.1) are extremely broad and require clarification and refinement.

**Table 9.1 RESULTS FROM THE VISION 2030 WORKSHOPS**

<table>
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<tr>
<td>1.</td>
<td>The state of Namibia’s fish stocks.</td>
<td>1.</td>
<td>Appropriate policies and laws are in place and are implemented.</td>
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<tr>
<td>2.</td>
<td>The contribution of fisheries to GDP and employment creation.</td>
<td>2.</td>
<td>Agreements exist with neighbours that allow Namibia equitable access to shared water.</td>
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<tr>
<td>3.</td>
<td>The extent of marine reserves as a percentage of the EEZ and the existence of functional management plans within these reserves.</td>
<td>3.</td>
<td>Adequate and appropriate water storage and transfer infrastructure exists and is operational.</td>
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<tr>
<td>4.</td>
<td>The extent to which sustainable development planning tools (e.g. Environmental Assessments) are being applied, especially in relation to mining in the marine environment, coastal development and mariculture.</td>
<td>4.</td>
<td>Water demand management practices are in place in all the water sub-sectors.</td>
</tr>
<tr>
<td>5.</td>
<td>The ratio of farmed seafood products to those harvested from the open sea.</td>
<td>5.</td>
<td>Ecological reserve requirements are known and met (i.e. for key aquifers and perennial and ephemeral rivers).</td>
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<tr>
<td>6.</td>
<td>The extent to which the allocation of fishing quotas is based on the recommendations of fisheries scientists.</td>
<td>6.</td>
<td>All the major river catchments have management plans that are implemented.</td>
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<tr>
<td>7.</td>
<td>The average sizes of fish landed by anglers.</td>
<td>7.</td>
<td>Water accounts are developed and are incorporated within national accounting.</td>
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<tr>
<td>8.</td>
<td>An adequate (but still undefined) percentage of Namibia’s GDP is allocated for the development of the water sector.</td>
<td>8.</td>
<td>8.</td>
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<tr>
<td>9.</td>
<td>All the water sub-sectors have their own performance indicators that are measured regularly.</td>
<td>9.</td>
<td>All Namibians have continuous access to adequate and safe water.</td>
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<tr>
<td>10.</td>
<td>Appropriate and efficient management, research and training institutions are in place</td>
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<td>11.</td>
<td>Human resources are skilled.</td>
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<td>12.</td>
<td>Gender balance in all levels of management.</td>
<td>12.</td>
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<td>13.</td>
<td>All Namibians have continuous access to adequate and safe water.</td>
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## AGRICULTURE

| 1. National accounts (e.g. the contribution of agriculture to GDP, the Social Accounting Matrix, employment, etc.) |
| 2. Poverty Index |
| 3. Production per hectare (of various commodities) |
| 4. Production output ($ per hectare of various commodities) |
| 5. The percentage of degraded land (e.g. through bush encroachment or soil erosion) |
| 6. The agriculture food balance (exports vs. imports) |
| 7. The number of conflicts over access to land. |
| 8. Income inequality |
| 9. The extent to which government relies on relief programmes to provide people with basic needs |
| 10. Economic efficiency of land use practices |

## WILDLIFE AND TOURISM

| 1. The contribution of wildlife and tourism to GDP and employment creation. |
| 2. The percentage of land under formal conservation |
| 3. The percentage of conservation areas that have functional management plans |
| 4. The size and diversity of the registered (and thus regulated) tourism and wildlife trading operations in the country |
| 5. The number of functional integrated land use plans (outside conservation areas). |
| 6. The extent to which sustainable development planning tools (e.g. Environmental Assessments) are being applied nationally. |
| 7. Various biophysical indicators (e.g. bush encroachment, water quality, soil degradation etc. that have already been identified within the MET’s State of Environment reporting [INFOCOM] project). |
| 8. The extent to which natural resources contribute towards enhancing rural livelihoods. |

## MINING

| 1. Contribution of mining to GDP |
| 2. Number of active mines |
| 3. Prospecting expenditure as a % of investment in the minerals sector |
| 4. Number of labour disputes |
| 5. Number of accident-free hours |
| 6. Formal and informal employment in the mining industry |
| 7. % of mines with functional Environmental Management Plans |
| 8. Investment (measured in NS) of income from mining into secure investments, human capital and other sustainable activities. |

Efforts are currently being made at an international level to select an aggregated group of indicators that will form the environmental equivalent of UNDP’s *Human Development Index*. However, defining such a broad subject as Sustainable Development through quantitative measures is extremely difficult. Current studies in OECD countries are seeking to identify concise economic, social, environmental and institutional indicators that cover the driving forces and responses to broad issues like global warming and environmental degradation, as well as the less tangible aspects of development - including individual welfare, community cohesion, institutional development, acquisition of knowledge and culture (UNEP1999).

An answer to this challenge may be to develop one unifying indicator - a *Sustainable Accounting indicator* that will draw on a country’s Sustainable Development Accounts (SDA). The SDA process will assess national human capital, natural resource capital and economic growth. This will eventually become the most important indicator regarding Namibia’s performance and progress.

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1 There was no consultative workshop held for the Mining sector. These indicators were formulated by the Namibia Natural Resource Consortium.
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**APPENDIX 1.**

**NATURAL RESOURCES**

**VISION 2030 WORKSHOPS INVITATION AND ATTENDANCE LISTS**

(✓ Indicates those who attended)

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**Freshwater resources and inland fisheries (Monday 9 July 2001)**

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**Wildlife, Forestry and Tourism (Tuesday 10 July 2001)**

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Land Capability, Rangelands and Agriculture (Wednesday 11 July 2001)

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<tr>
<td>Mr Leon Lubbe</td>
<td>Neudamm Agric. College</td>
<td>2064029</td>
<td>2064028</td>
</tr>
<tr>
<td>Mr Olaf Munjanu</td>
<td>NNFU</td>
<td>271155</td>
<td>271117</td>
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<tr>
<td>Mr Gert Grobler</td>
<td>NAU</td>
<td>220193</td>
<td>237838</td>
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<tr>
<td>Mr Jan De Wet</td>
<td>NAU</td>
<td>220193</td>
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<tr>
<td>Mr Ibo Zimmerman</td>
<td>Polytech</td>
<td>2072444</td>
<td>2079111</td>
</tr>
<tr>
<td>Mr Leon Hugo</td>
<td>MAWRD</td>
<td>2087518</td>
<td>2087478</td>
</tr>
<tr>
<td>Mr Norbet Neumann</td>
<td>SARDEP</td>
<td>2087023</td>
<td>222427</td>
</tr>
<tr>
<td>Mr Chris Hines</td>
<td>Private Consultant</td>
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<tr>
<td>Dr John Mendelsohn</td>
<td>DEA-MET</td>
<td>240339</td>
<td>249015</td>
</tr>
<tr>
<td>Mr Gideon Shilongo</td>
<td>O&amp;L</td>
<td>260229</td>
<td>260234</td>
</tr>
<tr>
<td>Mr Rod Davis</td>
<td>NRC</td>
<td>227406</td>
<td>230679</td>
</tr>
<tr>
<td>Dr Jom Fitter</td>
<td>GTZ</td>
<td>222427</td>
<td>222447</td>
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<tr>
<td>C. Mujetenga</td>
<td>MLRR</td>
<td>257104</td>
<td>257104</td>
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<tr>
<td>L. Hugo</td>
<td>MAWRD</td>
<td>2087478</td>
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<tr>
<td>L.G. Lubbe</td>
<td>Neudamm Agric. College</td>
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<tr>
<td>B. Strohbach</td>
<td>MAWRD -NBRI</td>
<td>2022016</td>
<td>258153</td>
</tr>
<tr>
<td>P. Tarr</td>
<td>Facilitator</td>
<td>220579</td>
<td>259183</td>
</tr>
<tr>
<td>Name</td>
<td>Organisation</td>
<td>Fax</td>
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<tr>
<td>Dr Burger Oelofsen</td>
<td>MFMR</td>
<td>220558</td>
<td>2053114</td>
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<td>Mr P. Kawaria</td>
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<tr>
<td>Mr Steven Ambabi</td>
<td>MFMR</td>
<td>064-404385</td>
<td>064-405744</td>
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<tr>
<td>Mr Eckardt Klingenhoven</td>
<td>MFMR</td>
<td>064-404385</td>
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<tr>
<td>Dr Ben Van Zyl</td>
<td>MFMR</td>
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<td>064-405744</td>
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<tr>
<td>DR Jean-Paul Roux</td>
<td>MFMR</td>
<td>063-202495</td>
<td>063-202415</td>
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<tr>
<td>Mr Dave Boyer</td>
<td>MFMR</td>
<td>064-404385</td>
<td>064-405744</td>
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<tr>
<td>Dr Rob Simmons</td>
<td>DEA-MET</td>
<td>237553</td>
<td>237552</td>
</tr>
<tr>
<td>Dr Hu Berry</td>
<td>DSSS-MET</td>
<td>064-4043236</td>
<td>064-404576</td>
</tr>
<tr>
<td>Mr Tony Raw</td>
<td>Namport</td>
<td>064-2082318</td>
<td>064-2082111</td>
</tr>
<tr>
<td>Ms Cathy Noli-Peard</td>
<td>MFMR</td>
<td>063-202495</td>
<td>063-202415</td>
</tr>
<tr>
<td>Mr Kieth Wearne</td>
<td>CETN</td>
<td>064-200728</td>
<td>064-205057</td>
</tr>
<tr>
<td>Mr Rod Braby</td>
<td>MET</td>
<td>064-4043236</td>
<td>064-404576</td>
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<td>U Ivory</td>
<td>MFMR</td>
<td>064-2016111</td>
<td>064-205008</td>
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<td>A Uulenga</td>
<td>MFMR</td>
<td>064-2053911</td>
<td>064-224566</td>
</tr>
<tr>
<td>A Burger</td>
<td>Fishing Industry</td>
<td>064-20219200</td>
<td>064-202525</td>
</tr>
<tr>
<td>H Viljoen</td>
<td>Fishing Industry</td>
<td>064-203436</td>
<td>064-203436</td>
</tr>
<tr>
<td>P Tart</td>
<td>facilitator</td>
<td>220579</td>
<td>239183</td>
</tr>
</tbody>
</table>
APPENDIX 2

WATER CONVENTIONS, PROTOCOLS AND AGREEMENTS RATIFIED BY NAMIBIA


APPENDIX 3
AN OVERVIEW OF SELECT POLICIES
Helping or hindering our progress towards the IDEAL VISION for 2030?

Policies from the Ministry of Agriculture, Water and Rural Development

<table>
<thead>
<tr>
<th>Positive signs for sustainable development towards 2030</th>
<th>Policy contradictions and omissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>⏩ Recognises that water resources in Namibia are limited.</td>
<td>☹️ Policy promotes the five fold expansion of irrigated areas in the country but makes no mention of strategies needed to reduce the negative impacts associated with irrigation (high water demand, agrochemicals and soil salinisation). No mention of promoting the use of environmentally friendly technologies to mitigate these impacts e.g. the use of Integrated Pest Management and mulches etc. rather than chemical fertilisers.</td>
</tr>
<tr>
<td>☹️ Recognises that growth within the agricultural sector should not be at the expense of the natural environment.</td>
<td>☹️ Promotes irrigating low value crops, e.g. cereals and fodder.</td>
</tr>
<tr>
<td>☹️ Recognises that drought is a normal phenomenon and that drought management should be in the form of long-term preparedness and planning.</td>
<td>☹️ Promotes the expansion of livestock production onto under utilised land in northern Namibia despite low carrying capacity and high vulnerability to desertification.</td>
</tr>
<tr>
<td>☹️ Recognises the need to investigate water tariffs for agricultural activities, which will reflect the full cost of water.</td>
<td>☹️ No guarantee that soils and critical wetland systems will be protected against overexploitation or damage by irrigation and livestock expansion.</td>
</tr>
<tr>
<td>☹️ Recognises the need for cost effective irrigation systems.</td>
<td>☹️ Implies that when socially and economically justified, water and agro chemicals will be subsidised, despite the fact that subsidies encourage wastage and do not necessarily help to alleviate poverty. Subsidies and tax breaks should be orientated only towards those activities that will not threaten future agricultural production.</td>
</tr>
<tr>
<td>☹️ Recognises the interdependence between agriculture and other economic sectors and resources (especially water).</td>
<td>☹️ Makes no reference to the illegal fencing off and overstocking of prime veld by wealthy farmers on communal land or how to control this growing trend.</td>
</tr>
<tr>
<td>☹️ Recognises the need to research the restoration of degraded land and the use of indigenous, drought tolerant crop varieties.</td>
<td>☹️ Aims to import genetic material to promote livestock breeding but no reference is made to importation, trade and use of Genetically Modified Organisms and the effects they may have on human health, indigenous stocks and the environment.</td>
</tr>
<tr>
<td>☹️ Encourages the use of Environmental Assessment for agriculture projects.</td>
<td></td>
</tr>
<tr>
<td>☹️ Proposes a review of legislation related to agrochemical use.</td>
<td></td>
</tr>
<tr>
<td>☹️ Encourages sustainable land use based on geographic and climatic conditions.</td>
<td></td>
</tr>
<tr>
<td>☹️ Aims to remove trade barriers that restrict development of informal and small business sectors.</td>
<td></td>
</tr>
<tr>
<td>☹️ Promotes improved standards for imported and exported food products, which will help protect public health and prevent the trade in alien invasive organisms.</td>
<td></td>
</tr>
<tr>
<td>☹️ Recognises that subsidies for agrochemicals and water distort prices and markets and serve as a disincentive for private sector investment.</td>
<td></td>
</tr>
</tbody>
</table>

1 The main beneficiaries of subsidies are most often middle income and high income farmers who can afford the infrastructure for irrigation and other types of agriculture and therefore are able to take advantage of cheaper water, GM seeds and agrochemicals.
# The National Water Policy (Draft Version MAWRD 2000)

<table>
<thead>
<tr>
<th>Positive Signs for Sustainable Development Towards 2030</th>
<th>Policy Contradictions on the Sustainable Use of Water and Biodiversity Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smiley face</td>
<td>Smiley face</td>
</tr>
<tr>
<td>Recognises water as being essential for human life, economic development and environmental integrity.</td>
<td>No mention made of assessing or monitoring biological resources within wetlands or the course of action that will be taken if a wetland system is found to be in need of protection.</td>
</tr>
<tr>
<td>Recognises the need for inter-sectoral coordination between all stakeholders involved in using and managing water resources.</td>
<td>No requirement for projects that aim to develop new boreholes, dams or alternative water sources to undergo Environmental Assessments.</td>
</tr>
<tr>
<td>Adopts a cost effective approach to water pricing that will help to limit water wastage and reduce environmental impacts.</td>
<td>No strategy or plan to protect wetlands and associated biodiversity. No reference is made to the Biodiversity or Ramsar conventions, both of which are important international conventions to which Namibia is a signatory.</td>
</tr>
<tr>
<td>Proposes to protect water resources from pollution through enforcing polluter pays principles and regular water quality monitoring on all proposed projects.</td>
<td></td>
</tr>
<tr>
<td>Proposes to develop alternative water sources (including opportunities for waste water reuse, water reclamation and recycling and desalination), which will relieve pressure on the environment.</td>
<td></td>
</tr>
<tr>
<td>Proposes to improve knowledge on the vulnerability of critical wetland ecosystems and to develop strategies for their management.</td>
<td></td>
</tr>
<tr>
<td>Respects international laws regarding shared water.</td>
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</tbody>
</table>

# Policies from the Ministry of Fisheries and Marine Resources

## The Inland Fisheries Bill (MFMR Draft 1999)

<table>
<thead>
<tr>
<th>Positive Signs for Sustainable Development Towards 2030</th>
<th>Policy Contradictions Regarding the Sustainable Use of Water, Poverty Alleviation and Biodiversity Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smiley face</td>
<td>Smiley face</td>
</tr>
<tr>
<td>Allows for the updating and development of new policies for the conservation and sustainable utilisation of inland fisheries.</td>
<td>No reference to the threats of agricultural expansion, exploitation of wetlands and the development of dams and water transfer schemes. Does not require that EA’s be done before these developments are allowed to proceed.</td>
</tr>
<tr>
<td>Encourages cooperation with neighbouring countries regarding the management and conservation of shared waterways.</td>
<td>No provision for extensive protection of biodiversity or threatened wetland habitats. Adequate protective measures must be included in the policy and legislation.</td>
</tr>
<tr>
<td>Will prohibit the use of destructive fishing methods including the use of explosives, chemicals and electrical devices.</td>
<td>Whilst aquaculture is promoted in northern Namibia the draft Bill ignores the environmental impacts associated with fish farming (e.g. over-enrichment of water due to a build up of fish faeces, and water pollution from harmful algal blooms) nor how these would be prevented.</td>
</tr>
<tr>
<td>Will prohibit the introduction and/or the transfer of non-indigenous fish species.</td>
<td></td>
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</tbody>
</table>

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1. *The Minister of Fisheries and Marine Resources has said the Namibian Government intend to set up fish farming in the northern part of the country to promote aquaculture (NAMPA report August 6 2001).*

2. *Harmful algal blooms (HAB’s) are on the increase globally and are closely linked to fish farming activities and increasing agricultural runoff containing fertilisers. They threaten human and environmental health and between 1972 and 1998 economic losses from aquaculture enterprises in northern Europe, North America, Asia and South America totalled more than 300 million US dollars directly as a result of this polluting source (Brown et al 1999).*
### THE SEA FISHERIES ACT (MFMR 1992)

<table>
<thead>
<tr>
<th>Positive signs for sustainable development towards 2030</th>
<th>Policy contradictions or omissions regarding biodiversity protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>😊 Provides for the conservation, protection and utilisation of fish and marine resources within Namibia's territorial waters.</td>
<td>❗ Although this law makes provision for the establishment of marine reserves none have been created to date.</td>
</tr>
<tr>
<td>😊 Provides for the establishment of permanent marine reserves and areas for the protection of fish and aquatic plants or regeneration of aquatic life. These reserves cannot be abolished or have their boundaries altered without approval by resolution of the National Assembly.</td>
<td>❗ Relevant provisions from important International Conventions (i.e. the Convention on Biodiversity, The Ramsar Convention on wetlands and the Law of the Sea Convention) have not been incorporated into the Sea Fisheries Act. These provisions would aid efforts to enforce protective mechanisms for marine biodiversity and regulate mining of the seabed within the EEZ and the Benguela ecosystem (shared with Angola and South Africa).</td>
</tr>
<tr>
<td>😊 Provides for the incorporation of international conventions to which Namibia is a party.</td>
<td></td>
</tr>
</tbody>
</table>

### Policies from the Ministry of Environment and Tourism

### ENVIRONMENTAL ASSESSMENT POLICY AND THE DRAFT ENVIRONMENTAL MANAGEMENT ACT (MET 1995)

<table>
<thead>
<tr>
<th>Positive signs for sustainable development towards 2030</th>
<th>Problems and weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>😊 Recognises that Namibia's high dependence on natural resources makes the country vulnerable to environmental degradation.</td>
<td>❗ The EMA is rather weak, since neither the SDC nor the EC can actually veto a development that they consider to be environmentally unsound. Instead, they will provide advice and try to persuade other government departments to adopt the principles of sustainable development.</td>
</tr>
<tr>
<td>😊 Recognises that in order to ensure sustainable water supplies, food production, health and tourism, Namibia must maintain and look after its natural ecosystems and related ecological processes.</td>
<td>❗ Whilst this important &quot;umbrella&quot; Act lays the foundation for sustainable development, its passage through the process of multi-stakeholder consultation has been extremely slow because of sectoralism. The EMA will, however, strengthen many other policies that promote sustainable development. In the interests of achieving sustainable development, the EMA must be passed soon.</td>
</tr>
<tr>
<td>😊 Requires adherence to the principle of optimal sustainable yield in the exploitation of natural resources, the maintenance of biodiversity and the protection of critical natural habitats.</td>
<td></td>
</tr>
<tr>
<td>😊 Once enacted, the Environmental Management Act (EMA) will promote inter-generational equity in the utilisation of land and other natural resources.</td>
<td></td>
</tr>
<tr>
<td>😊 The EMA will establish a Sustainable Development Commission (SDC) to monitor compliance by Government, Private Sector, Regional and Local authorities, NGO and Community Based Organisations with sustainable development principles. An Environmental Commissioner will support the SDC.</td>
<td></td>
</tr>
<tr>
<td>😊 Under the EMA, Environmental Assessments will be mandatory for all policies, plans, programmes and projects that are likely to have significant negative impacts on human health and the natural environment.</td>
<td></td>
</tr>
</tbody>
</table>
### THE TOURISM WHITE PAPER (1994) AND DRAFT NATIONAL TOURISM POLICY (MET 1999)

<table>
<thead>
<tr>
<th>Positive signs for sustainable development towards 2030</th>
<th>Policy omissions and contradictions regarding the sustainable use of resources</th>
</tr>
</thead>
</table>
| ☝️ The White Paper commits government to developing the tourism industry in order to fulfil the following objectives:  
  o Create opportunities for previously disadvantaged groups including women.  
  o Improve opportunities for the small scale and informal sector.  
  o Protect Namibia’s biodiversity.  
  o Create employment at both the national and community levels.  
| ☝️ The policy does not adequately incorporate the needs and aspirations of rural communities, local people and the informal sector.  
| ☝️ The White Paper requires part of the income derived from tourism be re-invested in the conservation of natural resources. The EIF has been formed to provide a mechanism for this.  
| ☝️ The draft policy stresses *inter alia* the need for:  
  o Maintaining peace and stability in Namibia.  
  o Maintaining and improving the Namibian product (incl. parks and infrastructure).  
  o Securing and developing important tourism areas so that their value is not undermined by other, often unsustainable land use.  
  o Tourism promotion  
| ☝️ The policy does not encourage private sector operators involved in tourism activities on communal land, to ensure a flow of benefits to local residents, and provides no relief to those who bear the costs of wildlife (e.g. elephant damage to crops).  
| ☝️ The policy does not include clear statements linking tourism to the natural resource base nor does it indicate that those who benefit from tourism should actively conserve and protect the biodiversity upon which the industry depends. Investors in the industry should be made aware that part of their investment must be used for conservation.  
| ☝️ The policy does not require an EA for tourism developments and consequently does not promote the responsible use of water and other natural resources.  
| ☝️ The policy lacks a clear vision of how the unique Namibian product should be developed. It should clearly:  
  o Emphasise the need for zonation and strategic planning, to take account of environmental sensitivity and the nature of the product, and thus avoid inappropriate tourism and negative impacts.  
  o Target foreign, high income, nature orientated clients, whilst still enabling lower-income Namibians access to prime destinations.  
  o Guide development in communal areas to ensure product enhancement.  |

### THE COMMUNITY-BASED TOURISM POLICY (MET 1995)

<table>
<thead>
<tr>
<th>Positive signs for sustainable development towards 2030</th>
<th>Policy omissions</th>
</tr>
</thead>
</table>
| 😊 This policy was developed in recognition of the fact that tourism could bring social and economic benefits to previously disadvantaged people, whilst also promoting biodiversity conservation.  
| ☝️ Under the terms of the policy the MET is obliged to:  
  o Actively provide opportunities for rural communities and the informal sector to increase their involvement in the tourism industry.  
  o Ensure that development of the community based tourism sector is environmentally sustainable.  
  o Ensure that no development takes places without the participation of the people affected.  
| ☝️ While the policy conferred conditional user rights over certain game species to communities the same rights were not extended to all natural resources (plants, fish and water). |
**WILDLIFE MANAGEMENT, UTILISATION AND TOURISM IN COMMUNAL AREAS (MET 1995) AND THE RESULTING AMENDMENT TO THE 1975 NATURE CONSERVATION ORDINANCE (MET 1996)**

<table>
<thead>
<tr>
<th>Positive signs for sustainable development towards 2030</th>
<th>Policy omissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>😊 This policy aims to establish an economic system for the management and utilisation of wildlife and other renewable natural resources for the people living on state owned communal land. It redresses historical disadvantages by providing the rights available to private commercial farmers to communal dwellers. It allows communities to benefit from wildlife through the development of tourism and other economic ventures.</td>
<td>😊 Conserving don’t enjoy special tenure or protected areas status.</td>
</tr>
<tr>
<td>😊 The establishment of conservancies is central to wildlife management, utilisation and tourism activities on communal land. Conservancies allow individuals to pool their resources (land, finances etc.) in order to develop an effective integrated management unit that can have several benefits (including improved habitat, increased wildlife numbers, reduced incidence of poaching, greater profits).</td>
<td>😊 Conservancies don’t guarantee (though they promote) the long-term conservation of biodiversity and the rights of the members.</td>
</tr>
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</table>

**LAND-USE PLANNING TOWARDS SUSTAINABLE DEVELOPMENT (MET 1994)**

<table>
<thead>
<tr>
<th>Positive signs for sustainable development towards 2030</th>
<th>Policy omissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>😊 Seeks to establish suitable structures to enable local communities to participate in decision-making, to take responsibility for the management of natural resources on the land they occupy, and to benefit from the sustainable use of these resources.</td>
<td>😊 Although the policy recognises the need for the MET to cooperate with the DWA of the MAWRD regarding land-use planning issues that affect wetlands, it does not make specific reference to consultation with other line ministries and affected parties regarding land-use planning.</td>
</tr>
<tr>
<td>😊 Aims to promote sustainable land use on privately owned farms through the provision of incentives for appropriate land management practices.</td>
<td></td>
</tr>
<tr>
<td>😊 Encourages private farmers to become involved in decision-making processes that will affect them.</td>
<td></td>
</tr>
<tr>
<td>😊 Encourages the formation of commercial farmers’ conservancies designed for the cooperative management and utilisation of wildlife.</td>
<td></td>
</tr>
<tr>
<td>😊 Seeks to maintain and/or expand the proclaimed protected areas and to encourage low-impact research, educational and recreational use of these areas.</td>
<td></td>
</tr>
<tr>
<td>😊 Encourages zoning for multiple uses both within and outside parks to avoid a situation where parks become conservation islands, surrounded by conflicting land use or degraded rangeland.</td>
<td></td>
</tr>
<tr>
<td>😊 Promotes the integration of proclaimed areas into regional and national land use planning processes.</td>
<td></td>
</tr>
<tr>
<td>😊 Recognises that the current protected area network does not incorporate all areas in need of protection.</td>
<td></td>
</tr>
<tr>
<td>😊 Encourages integrated planning in urban areas and the development of a clean and healthy environment for all residents. Recommends that development in urban areas is multidisciplinary, people orientated, and sensitive to important ecological and aesthetic features. Urban planning should zone areas as green spaces and conservation areas.</td>
<td></td>
</tr>
<tr>
<td>😊 Encourages the integrated management of vital wetland systems for biodiversity conservation, the maintenance of essential life support systems and sustainable resource use in accordance with the Ramsar Convention. Requires that EA’s be undertaken before any significant development is permitted in wetlands.</td>
<td></td>
</tr>
</tbody>
</table>

83
## THE DRAFT FOREST ACT (MET 2000)

<table>
<thead>
<tr>
<th>Positive signs for sustainable development towards 2030</th>
<th>Omissions and contradictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>✌️ Aims to ensure that Forests are protected in order to help conserve soil and water resources, maintain biological diversity and provide forest products.</td>
<td>✒️ This policy does not guarantee protection and permanence to Forest Reserves and allows the Minister, after consultation with interested parties and by notice of the Gazette, to revoke or modify any reserves that have been established.</td>
</tr>
<tr>
<td>✌️ Requires the compilation of Forest inventories and the production and implementation of Forest management plans.</td>
<td>✒️ Makes no provision for compliance with various international treaties, agreements and conventions.</td>
</tr>
<tr>
<td>✌️ Encourages the establishment of forest reserves, forest management areas and nature reserves</td>
<td></td>
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## Policies from the Ministry of Mines And Energy

### POLICY ON PROSPECTING AND MINING IN PROTECTED AREAS AND NATIONAL MONUMENTS (MET/MME and MDEC 1999)

<table>
<thead>
<tr>
<th>Positive signs for sustainable development towards 2030</th>
<th>Policy omissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>✌️ Recognises that mineral exploitation can result in significant negative environmental impacts including habitat destruction, loss of biodiversity and impacts that will threaten growth within the tourism industry.</td>
<td>✒️ There is no clear description of the conditions under which permission may or may not be granted for mining companies to operate in protected areas. There is a need to describe the different categories of protected areas and the different levels of restriction regarding development activities. In some areas mining will not be permitted under any conditions (e.g. areas of high endemism, and archaeological sites that demand special protection) Policy should include a concise listing of these areas.</td>
</tr>
<tr>
<td>✌️ Jointly prepared between the MME, MET and the National Monuments Council, and thus a good example of intersectoral cooperation.</td>
<td></td>
</tr>
<tr>
<td>✌️ Aims to permit controlled prospecting and mining within protected areas under conditions that do not threaten the natural environment unduly. Policy aims to ensure that the environment is protected through the implementation of mitigation measures that are adopted before, during and after the prospecting and mining activities.</td>
<td></td>
</tr>
<tr>
<td>✌️ Restricts prospecting and mining to formal operations only, specifically not allowing the pegging of claims in protected areas.</td>
<td>✒️ The EMA will provide the necessary legal backing for implementing this policy. However, this Act is not yet approved.</td>
</tr>
</tbody>
</table>
## Review of Policies from Other Sectors That Can Affect the Vision for Namibia’s Natural Resources to 2030

### Policies from the National Planning Commission

<table>
<thead>
<tr>
<th>THE REGIONAL PLANNING AND DEVELOPMENT POLICY (NPC 1997)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Positive signs for sustainable development towards 2030</strong></td>
</tr>
<tr>
<td>🌘 Aims to establish a regional planning framework for the decentralisation of national government and to facilitate improved coordination between regional development institutions and activities. This will provide communities with a sense of ownership over their natural resources</td>
</tr>
<tr>
<td>🌘 Acknowledges trends of increasing degradation of pastures, rangelands and woodland and gives attention to soil, water and forest management as development tools. Promotes strategies such as soil conservation and controlled grazing cycles.</td>
</tr>
<tr>
<td>🌘 No recognition of Namibia’s commitments under Environmental Treaties i.e. Biodiversity (CBD), Desertification (CCD), Climate Change (UNFCCC) and the Ramsar Convention on the Protection of Wetlands.</td>
</tr>
</tbody>
</table>

### Policies from the Ministry of Health and Social Services

<table>
<thead>
<tr>
<th>THE NATIONAL POLICY AND STRATEGY FOR MALARIA CONTROL (MHSS 1995)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Positive signs for sustainable development to 2030</strong></td>
</tr>
<tr>
<td>🌘 The policy recommends personal protection against the disease through the use of low impact repellents (e.g. pyrethroid based insecticides) on clothing and mosquito nets and placing mosquito screens on windows and doors. The impacts on environmental health by pyrethroids are considered to be minimal.</td>
</tr>
<tr>
<td>🌘 Although the policy states that studies regarding the effectiveness of the vector control programme should be done, there is no evidence that this has occurred.</td>
</tr>
</tbody>
</table>
Policies relating to trade and industry

<table>
<thead>
<tr>
<th>Positive signs for sustainable development towards 2030</th>
<th>Policy contradictions regarding environmental and biodiversity protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑ Namibia’s Trade Policy encourages diversification of the economic base and an increase in domestic value adding.</td>
<td>☢ The policy does not address issues relating to:</td>
</tr>
<tr>
<td></td>
<td>☢ The importation, use or manufacture of potentially hazardous substances that can pollute the environment, threaten human health and the productivity of agriculture and fisheries.</td>
</tr>
<tr>
<td></td>
<td>☢ The importation of, and trade in, Genetically Modified Organisms.</td>
</tr>
<tr>
<td></td>
<td>☢ The importation of, and trade in, seeds, plants and animals that are alien to Namibia and that have the ability to invade natural habitats and thus compete with indigenous species.</td>
</tr>
<tr>
<td></td>
<td>☢ Trade in valuable species of indigenous livestock (e.g. Saanga cattle and Damara sheep).</td>
</tr>
<tr>
<td></td>
<td>☢ No special reference is made to the Basel Convention on the Transboundary Movements of Hazardous Wastes and their disposal</td>
</tr>
</tbody>
</table>

Policies from the Ministry of Land, Resettlement and Rehabilitation

<table>
<thead>
<tr>
<th>Positive signs for sustainable development towards 2030</th>
<th>Policy omissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑ Policy promotes the sustainable use of land and takes into account issues of equity, security of tenure, woman’s rights and poverty reduction.</td>
<td>☢ The policy makes no mention of consultation with the MET, the ministry responsible for environmental affairs, EA’s, wildlife conservation and waste management.</td>
</tr>
<tr>
<td>☑ Recognition that, whilst the MLRR has primary responsibility for administering the policy, cross-sectoral collaboration will be sought with MAWRD, MRLGH and MTI.</td>
<td></td>
</tr>
<tr>
<td>☑ Financial and tax incentives are proposed for the protection and rehabilitation of natural environments (e.g. planting of indigenous trees and using alternative energy to reduce rates of deforestation and pollution).</td>
<td></td>
</tr>
<tr>
<td>☑ Aims to establish the Land Use and Environmental Board, which will promote environmental protection and coordinated planning and management at national and regional levels.</td>
<td>☢ The policy needs to directly address resettlement policy</td>
</tr>
<tr>
<td>Positive signs for sustainable development towards 2030</td>
<td>Policy contradictions regarding the sustainable use of water, land, poverty alleviation and biodiversity protection</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>😊 Seeks to regulate the land tenure relationship between the State and those occupying communal land – providing for the conversion of traditional rights to 99-year leasehold rights.</td>
<td>☹️ Does not assign rights to communities for all natural resources on the land including water, wildlife and forestry as well as agricultural land.</td>
</tr>
<tr>
<td>😊 Provision is made for the prevention of land degradation and mitigating impacts from prospecting, mining, roadwork's and the use of water resources.</td>
<td>☹️ Does not prohibit the allocation of communal land that contains sensitive ecosystems or threatened biodiversity. Such land must be kept under the protection of the State.</td>
</tr>
<tr>
<td>☹️ Does not ensure that leasehold agreements include an “environmental contract” between the recipients of large contracts and the Communal Land Board. This contract would contain management plans for biodiversity conservation, commercial agriculture and conservancies.</td>
<td>☹️ No provision is made to ensure that the use of chemical pesticides, fertilisers, GMOs and the mechanical clearing of land, burning and other practices that can cause land degradation or pollution are regulated.</td>
</tr>
<tr>
<td>☹️ Does not address the problem of illegal fencing off of prime land in the communal areas.</td>
<td>☹️ Does not dovetail with the EMA, which is likely to result in jurisdictional overlaps and conflicts during implementation.</td>
</tr>
</tbody>
</table>
APPENDIX 4

THE POTENTIAL EFFECTS OF CLIMATE CHANGE ON NAMIBIA’S NATURAL RESOURCES (extract from Tarr, 1997)

Causes of climate change
Since the onset of the industrial revolution, raised concentrations of atmospheric greenhouse gases (mainly carbon dioxide, methane and nitrous oxide), resulting from the burning of fossil fuels and other human activities, have begun to cause a discernible increase in the earth’s average surface temperature (referred to as global warming). In turn, this has triggered an increase in average global sea-level and is believed to have initiated certain large scale, long term changes to global climate, including increases in sea surface temperatures and changes in rainfall, flood and drought regimes. Collectively, these changes are referred to as climate change.

Namibia, as a developing country located in an arid region where drought and high climatic variability is endemic, and where great demands are placed upon natural resources, is considered to be particularly vulnerable to the effects of climate change.

Possible future climate under conditions of global warming
Based on the IPCC IS92a Greenhouse Gas Emissions Scenario, which offers a mid-range estimate of future greenhouse gas emissions and assumes only a modest degree of policy intervention to mitigate them, climate models estimate that the mean annual global surface temperature will increase by 1.5 – 4.5 °C by 2100 (compared with 1990). Changes in spatial and temporal patterns of precipitation are also expected, but the exact nature of these changes is difficult to determine. ENSO conditions are likely to intensify and naturally dry areas in southern Africa are expected to become drier during El Niño events.

Of the many interactive atmospheric/oceanic effects and feedback responses that are anticipated as a result of global warming, a rise in sea-level and enhanced sea surface temperatures will be the most discernible. The IS92a greenhouse gas scenario estimates a sea-level rise of between 23– 96 cm by 2100. Sea surface temperatures are expected to rise with an increase in air temperature, but neither to the same degree nor as rapidly.

Recently developed scenarios suggest that, in addition to becoming increasingly hotter, most of the SADC region is likely to become drier and will experience shorter, less reliable rainy seasons during forthcoming decades. Based on a regional study conducted by Hulme et al., one climate change scenario for the SADC region (Hulme’s ‘core’ scenario) suggests average warming of approximately 1.7 °C, decreased rainfall of between 2.5-7.5%, increased rainfall variability of between 5 and 15% and increases in potential evapotranspiration of between 4 and 16% for most of Namibia by the 2050s decade.

Socio-economic impacts of climate change
Increased urbanisation, increased health care and water supply costs, disease epidemics, and a reduction in food security, exports, employment and tourism potential, are all possible socio-economic consequences of global warming. The most vulnerable sectors of society are considered to be the urban poor residing in rapidly growing, inadequately serviced informal areas, and rural communities dependent on subsistence farming for their livelihoods.

Impacts on water resources
By the 2050s the water resources sector is likely to be affected by increased temperatures, a decrease in precipitation in most areas, altered runoff (reduced by 10-40% for most of the country) and increased runoff variability as a result of climate change. More extreme flood events during years of good rain are also likely. Reduced water quality and availability will
severely exacerbate all current constraints that challenge the water resources sector and will ultimately result in increased threats to public health, increased variability in hydropower output and reduced production from some industries. A reduction in rainfall will result in exponentially less runoff and a reduction in dam yield that will be also be subjected to an increase in evaporation. Current constraints that threaten the fresh water fisheries sector will be perturbed. Collectively these impacts will severely threaten Namibia’s socio-economic and environmental integrity.

**Impacts on marine resources**

Of the many interlinked atmospheric and oceanic changes that will affect marine environments as a result of global warming, only an increase in sea surface temperature (SST) and a rise in sea level are predicted with any degree of confidence. Increased SST alone will be capable of shifting wind and pressure regimes, altering the ocean’s primary production and impacting on the distribution and population dynamics of many marine species. However, researchers can only hypothesize how the interactive winds, ocean currents and upwelling processes that fuel the Benguela’s high productivity may change under altered climatic conditions.

Initially, climate change may not create new problems for Namibia’s marine fisheries sector as much as it exacerbates existing ones. Thus, the environmental conditions that prevail during the occurrence of Benguela Niños and other anomalous events may become more prevalent in the short to medium term. After about 2050 however, permanent changes to the Benguela upwelling could result, with many fish species migrating out of Namibian waters, to be replaced by more diverse assemblages adapted to warmer conditions. Although biodiversity is likely to be enhanced under these circumstances, the production of the Benguela will ultimately diminish. If this extreme scenario does develop, it will have a severely detrimental effect on Namibia’s marine fisheries sector.

**Impacts on agriculture**

Investigations into some climate change effects on rangelands and livestock health, suggest the following possible consequences of global warming:

- Geographical shifts in the areas suited to crop growth are highly probable. Based on the influence of increased CO₂ and temperature alone, Namibia’s maize triangle and Caprivi region could experience an increase in maize yields of up to 5%. However, if rainfall is reduced and becomes more variable, fewer areas will be suitable for cultivation.

- Reductions in forage quality and palatability are likely to occur because of increasing carbon to nitrogen ratios, particularly on Namibian rangelands where low nutritional value is already a problem.

- If a general trend towards increased aridification occurs in Namibia, desert expansion in semi-arid regions will reduce livestock carrying capacity. Changes in vegetation cover will significantly increase rates of soil erosion, particularly in the absence of sustainable rangeland management practices.

- Increased incidence of drought will have detrimental effects on livestock morbidity and mortality. Livestock plant poisonings are an important cause of mortality throughout Namibia and appear to increase after prolonged dry spells. Altered geographical ranges of vector born diseases are expected. Under a general aridification scenario reduced risk of some livestock diseases could be accompanied by an increase in viability for livestock in the northeastern parts of the country.

Ultimately a future climatic regime that is hotter, drier and more variable will have severe consequences for local and regional food supply, land use options, production profitability, poverty, employment potential and economic sector competitiveness. Impacts on household food security amongst subsistence farming communities could be dramatic.
Impacts on biodiversity and ecosystems

- The species most at risk under altered climatic conditions are likely to be those that are geographically localised, genetically impoverished, poor dispersers, slow reproducers or currently at the edge of their optimal tolerance levels.

- Under scenarios of increased aridification (elevated temperatures and declining rainfall) semi-arid areas in Namibia are likely to become arid and dry sub-tropical areas could shift to semi-arid conditions. Rates of land degradation are likely to increase under this scenario.

- Fast growing weeds and bush encroachment species, which commonly yield less timber, provide lower quality foliage for domestic and wild animals and supply poorer quality habitats are expected to benefit from global warming.

- Insects with their rapid life cycles and high fecundity are also likely to track changes in climate extremely effectively. As a result, increased bio-invasions of pests and disease carrying vectors are predicted.

- Based on increased temperatures and altered habitats, certain ungulate species could decline in Namibia’s arid highlands.

- Permanent damage to Namibia’s natural wetlands is likely to occur if the region becomes more arid under climate change conditions.

- The possibility of fewer fog days along the coast will threaten the survival of many unique, endemic plant and animal species that are well adapted to current conditions within the fog belt. Furthermore, increased temperatures, accompanied by reduced winter rainfall will threaten the rare succulent flora that characterise the Sperrgebiet.

Impacts on coastal zones and systems

Depending on local geomorphological conditions, any one or a combination of, the following broad responses to sea level rise (associated with global warming) are possible at a particular site:

- Increased coastal erosion;

- Flooding, inundation and displacement of wetlands and lowlands;

- Impairment of water quality into freshwater aquifers and estuaries due to increased salt intrusion;

- Reduced protection from extreme storm and flood events.

Vulnerability is expected to increase dramatically in areas that have been modified or exploited by humans. Thus, any current environmental threats to ecological systems, human health, underground water resources, inshore marine industries, the tourism sector, coastal urban infrastructure and investment are likely to be compounded by sea-level rise.

In 1991 a preliminary study on the vulnerability of Walvis Bay ascertained that the town is likely to experience impacts of first order magnitude to the effects of sea-level rise. The main threats are likely to result from increased incidence of flooding and inundation of the low-lying areas of the town and increased vulnerability to the effects of higher storm-induced coastal water levels.
## APPENDIX 5

### THE MAIN MULTILATERAL ENVIRONMENTAL AGREEMENTS SIGNED BY NAMIBIA

<table>
<thead>
<tr>
<th>Agreement</th>
<th>Brief description</th>
<th>Lead agency in Namibia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vienna Convention and Montreal Protocol</td>
<td>Aims to protect the ozone layer from harmful emissions caused by humans. Ozone depleting substances include chloro-fluoro carbons (CFC’s) and halons, which are used mostly in refrigerators and air conditioners</td>
<td>MTI and MET</td>
</tr>
<tr>
<td>Convention on Wetlands of International Importance (Ramsar Convention)</td>
<td>Aims to protect wetlands that support significant numbers and species of plants and animals, especially waterbirds. Namibia has registered the Orange River Mouth, Sandwich Harbour, the Walvis Bay Lagoon and Etosha Pan as Ramsar sites.</td>
<td>MET and MAWRD</td>
</tr>
<tr>
<td>Basel Convention (and associated Bamako Convention)</td>
<td>Aims to control the transboundary movement and disposal of hazardous waste. The convention promotes a reduction in waste generation globally, and stresses that waste should preferably be disposed of in its country of origin rather than in another country.</td>
<td>MET</td>
</tr>
<tr>
<td>Framework Convention on Climate Change (UNFCCC) and associated Protocols (e.g. Kyoto)</td>
<td>Aims to stabilise greenhouse gas concentrations in the atmosphere at levels that prevent man-made interference with the climate system. Namibia is vulnerable to climate change but does not contribute significantly to global warming since we emit negligible amounts of greenhouse gasses (e.g. CO₂), and our savannah’s, forests and ocean convert CO₂ into oxygen.</td>
<td>MET</td>
</tr>
<tr>
<td>Convention on Biological Diversity (CBD)</td>
<td>Promotes the conservation of biological diversity, the sustainable use of its components and the fair and equitable benefits arising from the utilisation of genetic resources.</td>
<td>MET</td>
</tr>
<tr>
<td>Convention to Combat Desertification (UNCCD)</td>
<td>Aims to prevent land degradation and declining productivity through promoting improved land management and local, regional, national and international levels.</td>
<td>MET and MAWRD</td>
</tr>
<tr>
<td>Convention on International Trade in Endangered Species (CITES)</td>
<td>Aims to prevent the unsustainable exploitation of wild animals and plants through international trade.</td>
<td>MET</td>
</tr>
</tbody>
</table>