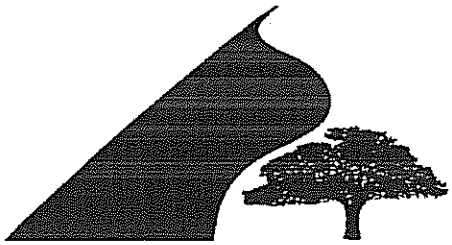
NAMIBIA'S GREEN PLAN

(Environment and Development)

Namibia's Green Plan to secure for present and future generations a safe and healthy environment and a prosperous economy

REPUBLIC OF NAMIBIA

1992



NAMIBIA'S GREEN PLAN

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Ministry of Foreign Affairs
Ministry of Mines and Energy
(including Geological Survey)
Ministry of Education and Culture
(including the State Museum, the National
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Ministry of Health and Social Services
Ministry of Trade and Industry
Ministry of Lands, Resettlement and Rehabilitation
Ministry of Agriculture, Water and Rural Development
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Ministry of Fisheries and Marine Resources
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TABLE OF CONTENTS

INTRODUCTION

Namibia's economy is almost totally reliant on natural resources, both renewable and non-renewable.

Natural Environment

The Republic of Namibia (hereafter Namibia) is situated on the south-west coast of Africa, between latitudes 17,5° and 29° south. The tropic of Capricorn bisects the country just south of the capital city, Windhoek. To the south Namibia borders on the Republic of South Africa, to the east Botswana and to the north, the People's Republic of Angola and Zambia. To the west Namibia has a coastline of about 1 400 km along the Atlantic Ocean and an exclusive economic zone extending 200 n miles out to sea.

Namibia is one of the least densely populated countries in the world. Its land area is some 824 000 km^2, a little more than Pakistan or Turkey, which have over 50 million people each. Namibia's population is only about 1,4 million, giving about 1,7 people per km^2.

Namibia has a narrow coastal plain, from which the land rises to altitudes of more than 2 000 m. From here the land falls to form an extensive interior basin of almost uniform flatness at 1 000-1 500 m above sea level.

Namibia is an arid country with a hyperarid zone along the Namib coast. Rainfall increases from the south and west towards the north-east, ranging from <50 mm to 700 mm. Only 8% of the country receives more than 500 mm per year, the minimum considered necessary for dryland cropping. With the exception of the extreme south-west of Namibia which can receive rainfall in any month of the year, the country falls within the summer rainfall region. In the north and east, at least 80% of the rain falls within a four-month period (December-March), while in the centre and south, 70% falls over six months. The rate of evaporation from open water is high; in the north about 2,6 m (420% in excess of rainfall) and

in the south 3,7 m (1 750% in excess of rainfall).

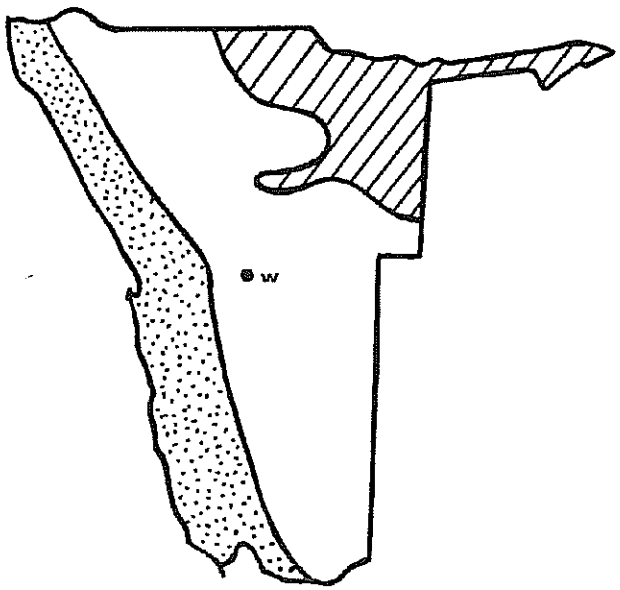
From agricultural and ecological perspectives, the most important climatic paramater is rainfall variability, which is inversely proportional to the mean annual rainfall. In the north, the variability is about 30% while in the south and west it exceeds 70%.

Mean annual temperatures in the interior of the country are mostly between 20°C and 25°C but range from below freezing to above 40°C. Coastal temperatures are cooler at about 15-20°C.

Namibia has three natural vegetation biomes: the desert (16% of the land area), the savanna (64%) and the dry woodland (20%). These biomes are further divided onto 12 vegetation types. There are no perennial rivers within the interior of Namibia. The Cunene, Kavango, Kwando-Chobe and Zambezi Rivers are situated on the northern border and the Orange River on the southern border.

Namibia supports a wealth of wildlife which, together with its open spaces and wilderness characteristics makes it an attractive tourist destination. About 13% of the country is set aside as National Parks, two of which are amongst the largest in Africa. In addition, wildlife forms an important part of the economy in commercial farming areas and, as such, wildlife is generally well managed. In the communal areas where mainly subsistence farming is practiced, wildlife presently belongs to the State. It is of some importance that local communities obtain custodianship of natural resources in these areas so that they can benefit from them, thereby creating incentives for wise management.

Namibia is rich in mineral deposits such as diamonds, silver, gold, ura-



Natural vegetation biomes of Namibia, desert (stippled), savannas (unmarked) and woodlands (hatched).

nium, copper, lead, zinc, graphite, salt and natural gas. There is the possibility of discovering oil reserves, on land or at sea.

The coastal waters of Namibia support a rich fishery which is presently recovering from over-exploitation by foreign vessels. The cold Benguela current flows northwards along the coast, and regular upwellings provide nutrients for biological production. The rich fish resources also support an abundance of seabirds and seals.

The area around Walvis Bay, the natural port for Namibia, is disputed territory. Although regarded by the United Nations as part of Namibia, the area has not been vacated by South Africa. In September 1991, after discussions between the two countries, joint administration was accepted in principle as a temporary measure. There is a small port at Luderitz, but this is not suitable for much more than fishing boats. Namibia is using Walvis Bay for its imports and exports, but while this is under South African occupation Namibia has the characteristics of a land-locked country, despite its 1 400 km coastline.

Political Background

The present shape of Namibia emerged in 1890, when the Caprivi Strip became part of the newly-formed German colony of South-West Africa. After World War I, Britain took over responsibility from Germany. Under a 1920 League of Nations mandate, control passed to South Africa. The United Nations formally rescinded the mandate in 1966, but South Africa remained in occupation. From 1966 there was an escalating war of independence, fought mainly in the north of the country, which terminated with a United Nations supervised election and national independence on 21 March 1990. The country is presently being administered centrally pending regional elections for local government.

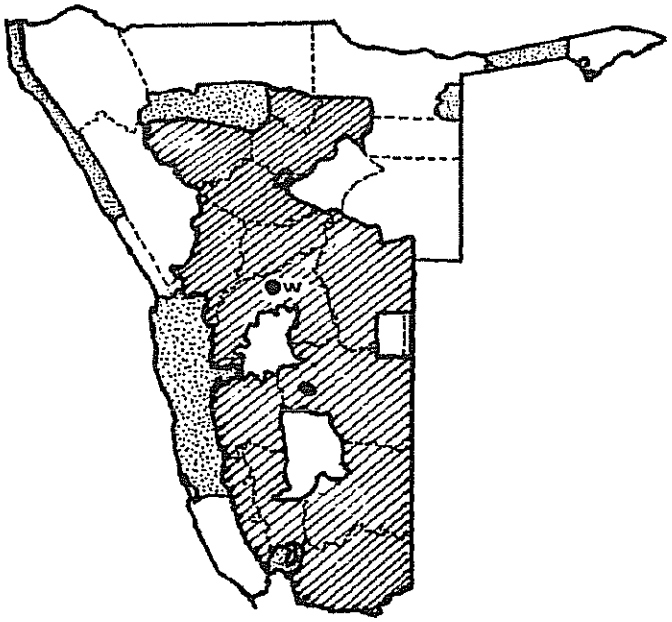
Socio-economic Environment

About a quarter of the country's population lives in urban areas. Between 1970 and 1981 the urban population grew at 3.3% a year compared with 2.7% for the whole population. Latest estimates suggest that the population is now growing at 3% per year.

Namibia is rich in cultural diversity with at least 11 different groups. The Owambo group is the largest in Namibia and accounts for about 49% of the population. English has been adopted as the official language. During the colonial era, apartheid policies ensured the political domination of the various "white" groups, who together account for about 5% of the population.

A large proportion of the land which is suitable for arable agriculture or livestock-rearing was reserved for white ownership until 1990. These commercial farms cover about 45% of the country. Much of the rest of the land (40% of the total) was divided into "homelands", now known as communal farming areas.

While the World Bank estimated 1988 per capita GDP as being some



Land tenure in Namibia; proclaimed conservation areas (stippled), commercial farmlands (hatched), and communal farming areas (unmarked).

US$ 1 200 (one of the highest figures in Africa), this masks considerable inequality. The top 5% of the population had a per capita GDP of US$16 500 while the remaining 95% of the people had an estimated per capita GDP of US$365. About 5% of the population earned 71% of the income while over half the population shared less than 3% of the income. The majority of the population lives in conditions barely above subsistence levels, and unemployment is around 30%. This disparity in income is similarly reflected in housing standards, education and health care.

The mining sector accounts for about one-third of the GDP. Government accounts for about 40% of employment, and agriculture and fishing for about 20%. The manufacturing industry is very small and growing only slowly.

The World Bank forecasts growth up to 1996 of some 3.8% a year. From 1991-93 just over 3% is forecast. The rate is then expected to grow to nearly 5% a year in 1995-96.

The main export is diamonds (about one-third of the total value). The mineral sector, including diamonds, accounted for three-quarters of the total exports by value in 1989. Another 11% came from agricultural produce, mainly livestock.

Namibia has a well developed and maintained infrastructure, with about 42 000 km of road (10% tarred), 2 340 km of railway network, 17 major aerodromes, 80 000 telephones, one television and nine radio channels and a postal network of 89 post offices.

In conclusion, Namibia has a multi-party democracy with a national constitution which is proclaimed as one of the most democratic in the world. The country supports a free press and a free market economy. Most of the economic activity is in the hands of the private sector. Namibia is a model democracy; it could also be a model for sustainable development and wise environmental management.

Namibia's Green Plan initiatives are highlighted by the following symbols:

 *Science and technology*

 *Public awareness, information and education*

 *Government programmes and services*

 *Legislation, regulation and enforcement*

 *International action*

 *Partnerships*

LIFE'S THREE ESSENTIALS - CLEAN AIR, WATER AND LAND

I a A Healthy Society And The Environment Are Inseperable

The health of individuals, society and the economy are inextricably linked to the health of the environment. A healthy environment provides the opportunity of realizing the full developmental potential of a region and country.

Reciprocal Relationships Between Environmental Health And Living Standards

Personal health, i.e. physical, mental and spiritual well-being; societal health, i.e. well-being of relationships, degree of peace and cooperation; and economic health, i.e. the sustainability of the economy and equitability of wealth are inextricably linked to the health of the environment. The environment determines what development options are possible. A healthy environment, in which ecological processes occur unhindered and in which the full complement of biotic diversity occurs, creates the possibilities of realizing the full developmental potential of an area. Any loss of environmental health reduces options for development and fosters dependency of people on the government and the government on international donors.

On the other side of the coin, environmental health is dependent on the health of people, society and the economy. A sick society in which self-interest, ambition, greed, avarice, excessive wealth and dire poverty are prevalent is unlikely to have a healthy environment and will probably lack the will to restore the health of its environment.

What is the current status of our health and that of the environment and what can be done about it? How does Namibia compare to the rest of the world?

The Legacy Of Colonialism

When Namibia gained independence two years ago, we inherited an ailing environment, people and economy. Many of our current problems can no doubt be ascribed to this legacy. For example, artificial settlement patterns were created during the 1920's by the colonial administration. More and more people were settled on marginal land with consequent problems of overexploitation of many natural resources, including water, grasses and trees. Non-renewable and renewable resources were used to produce short term, high economic returns for the colonial regime and were not stewarded for future generations. There was little concern for the future of the environment in the so-called communal areas or in the commercial farming areas. Protection of the environment focussed on excluding people from wilderness areas to earn foreign currency from tourism. Environmental protection and development were seen to be in opposition.

This legacy has resulted in an underdeveloped nation with a highly segregated society and vast economic disparities. The nation and her environment are in need of rehabilitation and the new government has verbally indicated its desire to rectify the situation. But can it do it? What are the constraints and opportunities to achieving a healthy environment and nation?

Human Population Pressure

Population pressure is invariably a major contraint to sustainable development. Namibia's 1.4 million people live in a vast land of 823 144 km^2. Our population is unevenly distributed within this area; some rural areas support about 11 people per km^2 and others have rural population densities of less than one person per km^2. The national population density is a mere 1.7 people per km^2. Compared with the rest of the world, Namibia would appear to be free from one of the major problems that beset national aspirations for development, i.e. population pressure. This, however, is a false impression. The low population density of Namibia reflects the low human carrying capacity of this part of Africa. Namibia is the driest country in Africa south of the Sahara and this aridity is coupled with relatively low primary and secondary production potentials. With a population doubling time of about 23 years, Namibia is faced with just as severe a threat from overpopulation as the majority of underdeveloped nations. For example, 115 additional school-going children need to be included in the education programme each day of the year. To keep up, the education authorities will need to build four new classroom's and train four new teachers each day!

Namibia's population growth rate of about 3% per year is a major obstacle to sustainable development and improving the quality of life of its people. For example, about 115 additional children qualify for entry to schools each day, requiring four additional teachers and four additional classrooms to be added each and every day of the year.

Disparities Between Rich And Poor

Namibia is a land of contrasts. One of the most dramatic, and least palatable, concerns the huge gulf between rich and poor. The vast majority of wealth rests in the hands of 5% of the people; 88.7% of national income is earned by this small minority. Furthermore, it is this group of people who dictate policy and institute development plans and projects.

Inevitably, the concerns of the rich and poor are as disparate as their incomes and this difference is reflected in attitudes towards the environment. The poor see the environment as a supply of essential renewable resources that meet their basic requirements for food, shelter, medicine, fuel, agricultural implements and fencing. These people spend their lives struggling to wrest a living from the fragile environment and inadvertently contribute towards environmental degradation in the process. The poor are intimately involved with the environment and are aware of environmental degradation but feel powerless to do much about the situation. The rich, in contrast, live a life that is buffered from many environmental realities and are perhaps less sensitive to changes in the environment or are involved with the environment on an intellectual, armchair level.

Because decision makers inevitably have concerns and perspectives that differ from the poor majority, there exists the danger that development initiatives may simply placate the consciences of the rich and not benefit the poor. For example, bitumen surfaced roads facilitate easy access to under-developed regions by donors, developers and politicians but do little good, if any, for the local people who walk barefoot next to these roads and lack the money needed to purchase the goods that are imported via these conduits from the cities.

Environmental Health And Wealth

Most Namibians are directly dependent on subsistence agricultural production for their living; approximately 70% of the people live in the rural districts. These people satisfy many of their basic material needs through using renewable resources that are obtained from their immediate surroundings. Thus, the health and wealth of our poor people are directly derived from their immediate environment.

In addition, a considerable proportion of foreign revenue is generated from the exploitation of renewable natural resources such as offshore fisheries, livestock and game products, and tourism. Although the mining industry, especially diamonds and uranium, currently forms the backbone

The concerns and attitudes of the rich and poor towards the environment are as different as are their incomes. Decision makers must ensure that development plans address the needs of poor people and actively contribute to improving their quality of life.

of our foreign exchange earning capability, these non-renewable resources are finite and their wealth potential is limited to the period that is economical to continue mining an ever dwindling resource. In contrast, wealth derived from renewable natural resources can be earned indefinitely provided that the resources are stewarded wisely. In the long term, more wealth will be earned through the use of renewable resources than non-renewable resources. As a result, maintaining the health of our environment is essential if we are to raise or at least maintain living standards in Namibia.

Water Is The Limiting Resource

In a semi-arid to arid climate, rainfall is the key factor that drives all the important ecological processes upon which we depend. However, rainfall is very variable and it is difficult to predict how much rain will fall in a given area and when the rain will fall. This variability in water supply makes it difficult to manage man-made ecosystems such as crop lands.

The lack of food security that has emerged during the 1992 "drought", reflects how difficult it is to ensure high crop yields in a variable climatic zone.

The central role of water to food production and the unreliability of supply from rainfall, has resulted in considerable efforts to increase water supply security by using groundwater or river water. Both these sources are however very limited in Namibia. Perennial rivers only occur on the southern and northern borders and ground water sources are often too saline for human and animal consumption and irrigation. Furthermore, the large needs of industry, particularly the mining industry, and domestic requirements in our growing urban centres compete with the rural districts for our limited fresh water supplies. A lowering of water tables in some of our westward flowing, ephemeral rivers due to industrial and domestic exploitation is an indication of the limitations of internal sources of water.

It is vital that the use of water for one limited purpose, such as the extraction or processing of a non-renewable resource, does not limit future options for sustainable development. Although much attention has been directed to increasing the supply of bulk water in Namibia, ironically very little has been devoted towards efficient use of available water.

There is an urgent need to develop an appropriate Water Conservation Policy and Strategy for Namibia.

Not withstanding the fact that water is the principal limiting factor in Namibia, increasing its supply does not necessarily guarantee an increase in human carrying capacity and therefore a raising of living standards. Often quite the reverse can occur. For example, increasing the security of water in Owambo through the use of Cunene River supplies, has interfered with traditional cattle migration patterns, resulting in longer residence times and therefore increased pressure on the already degraded grasslands. Similarly, injudicious irriga-

tion of crop lands can increase soil salinities to the point where water reduces, rather than increases, crop production. In semi-arid to arid climates where potential evaporation is considerably higher than rainful, salinization of soil is an ever present hazard. Unfortunately, many of the soils of Namibia are not suitable for irrigable farming.

The Need For Healthy Land

In addition to an adequate supply of fresh water, the availability of undegraded land is a key factor promoting the health and wealth of the country. Plants and, indirectly, livestock, game and people derive their nourishment from soil and the water that infiltrates the soil. Losses of soil and seedbanks through soil erosion can occur very easily in a semi-arid to arid climate if vegetation cover is reduced by overstocking, deforestation or field clearing for crops. This is particularly so because high intensity rainfall with high kinetic energy is a feature of these climates as are strong winds. When soil erodes, it is the most nutrient-rich layer at the top that contains the seeds of natural vegetation that is removed. An unknown amount of precious top soil has been lost and a consequent reduction in carrying capacity has occurred in Namibia.

A much greater and overt threat to the availability of good land in Namibia, however, is bush encroachment. Approximately 14 million hectares of once prime cattle-ranching country (i.e. 17% of the country) has already been encroached upon by undesirable bushes. In some places, the bush is so dense that cattle and people can hardly penetrate it and there is the ever present threat that the remaining bush encroached areas will deteriorate to this extent as well. The reduction in carrying capacity and therefore potential wealth that could be derived from our grasslands is considerable.

Bush encroachment is considered to be a result of inappropriate management practises that include fencing and the decline of browsing wildlife, a decrease in the frequency and extent of veld fires, overstocking and therefore overgrazing and inadequate rotational grazing. Reversal of the process appears to be extremely difficult and expensive.

Deforestation

Just as an increase in undesirable woody biomass can reduce the wealth and health of the nation so can a decrease in desirable woody biomass. Deforestation has reached such proportions in the north of the country, particularly in Owambo, that the traditional way of life of many people is on the verge of collapse. Progressively there is inadequate timber to meet the needs for the construction of homesteads, fences, implements and fuel. People are being forced by circumstance to use less preferred alter-

Renewable natural resources - land, water, air, plants and animals - are the wealth of Namibia. Food, shelter and money can be obtained indefinitely from these resources, provided that they are managed wisely.

natives, alternatives that often hasten the decline of the environment and hence living standards. So, for example, many poor people in Namibia are turning to cattle dung as a source of cooking fuel. This process robs the soil of valuable fertilizer and accelerates the reduction in carrying capacity.

A National Development Plan

Sustainable development in Namibia, as in the rest of the world, will only occur once a significant proportion of the people become aware of their role in maintaining the environment which sustains them. It is time that a national development plan that aims for sustainability is drawn up and implemented. Such a development plan will measure progress in terms other than GDP alone. The equation will take into account quality of life, especially the quality of life of the poor. Sustainable development will only become possible when the role models of society set precedents and examples that, if followed, will lead people along the path of sustainability. Until the actions of the rich and powerful can be reconciled with the goal of sustainability, the concept will remain just a concept to the rich and will be ignored by the poor who effectively will have been destined by the rich to become poorer, more vulnerable to disease in an environment that will degrade to an irreversibly low carrying capacity desert.

Government Commitments

In an attempt to restore the health of the nation and its environment, the government of Namibia commits itself to:

Subjecting all ministerial activities to an annual environmental audit to be included in the annual white paper report;

Encouraging big commercial and mining enterprises to undergo annual environmental audits;

Taking steps to minimize consumption in terms of finance, energy and natural resources, including water;

Ensuring that all new government buildings are models of locally appropriate architecture, using a high content of nationally available materials, and employing labour-intensive construction;

Ensuring that independent environmental impact assessments form part of the prefeasibility study of all development projects and subjecting all such projects to long term regular environmental monitoring;

Namibia is in need of a National Action plan to implement sustainable development. Such a plan must measure progress in terms of the quality of life of the poor and not in terms of GDP alone.

Monitoring the living standards of the poor on a regular basis and using this information as the yardstick of development;

Permitting only those developments that do not restrict the developmental options of future generations of poor people;

Doing all that it can to reduce the human population growth rate and achieve a stable population size by the year 2020;

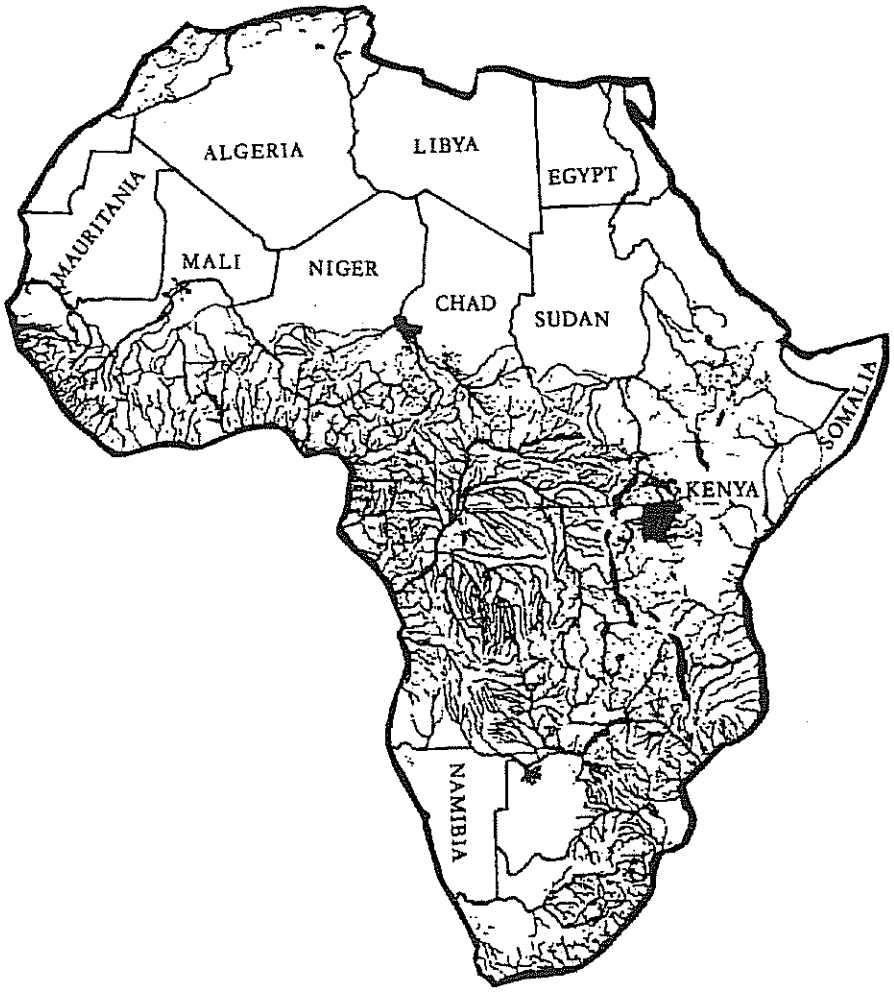
Encouraging environmental awareness and education initiatives.

I b Continuing Action To Protect And Restore Our Water

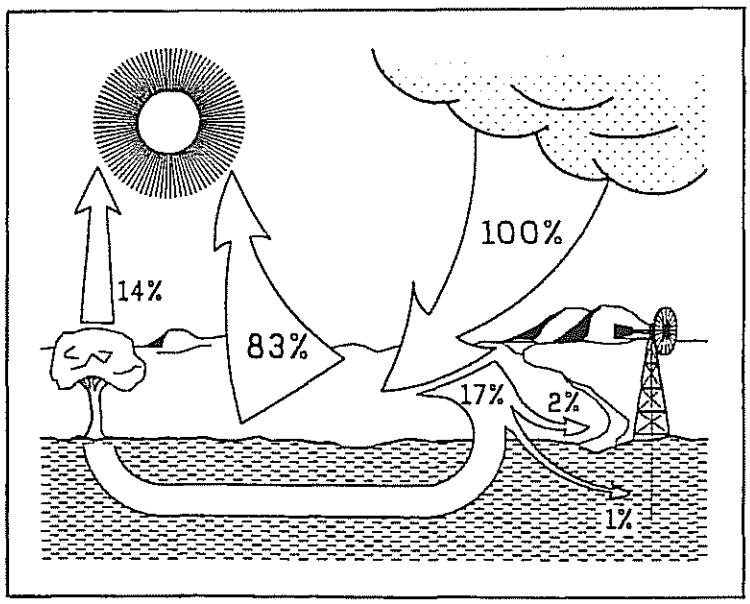
Our goal is to ensure the efficient, optimal and sustainable utilization of water in the interests of Namibia, its people and its plant and animal life.

Introduction

Namibia is one of the most sparsely populated countries in the world. This is largely because it is an arid country with limited water resources. Other than the major perennial rivers on its borders and the semi-tropical



Permanent inland lakes and rivers of Africa



The hydrological cycle in semi-arid Namibia

Eastern Caprivi region, there are almost no natural permanent surface water bodies in Namibia.

Mean annual rainfall varies from less than 25 mm over the coastal Namib Desert to 700 mm in the north east. Given that open water evaporation can be as high as 2600 mm/annum in some areas, and rarely less than 1800 mm, the lack of surface water is perhaps not surprising. It is estimated that, on average, 83% of total rainfall evaparates shortly after precipitation. Of the remaining amount, 14% is used by plants for evapotranspiration, 2% enters drainage systems where a proportion is available for harvest from surface facilities and only 1% recharges groundwater resources.

The early development of towns, villages and mission stations in Namibia centred around reliable water sources. Windhoek, the capital city, is at the site of once strong artesian springs, as is Grootfontein. Swakopmund, on the mouth of the ephemeral Swakop River used to rely on underground reserves in the alluvials for its water supply.

In more recent years, however, the expansion of many centres has outgrown the local water supplies making it necessary to import water over relatively long distances from areas where more adequate and sustainable water sources occur. Even rural subsistence farmers have in many cases become dependent on water transported from some distance away.

Water In Namibia Today

Namibia is currently dependent on three major types of water source. The first of these are the perennial waters of the Zambezi, Okavango, Cunene, and Kwando Rivers in the north, and the Orange River in the

recycling should be promoted and appropriate university courses introduced. An Environmental Science course at third year level should cover topics such as environmental systems, ecology, pollution control, waste management, environmental impact assessments and integrated environmental management.

A firm commitment from Government offices (the civil service network) to lead waste reduction is needed as an example to the nation to reduce waste, recycle paper, purchase returnable containers only, use recycled paper and purchase recycled goods in preference to others and support local recycling and re-use based, industries.

The problem of solid waste disposal in communal/rural areas particularly in the north needs to be investigated and incentives offered for waste collecting, sorting, re-use and recycling in these areas. This could possibly be implemented through community projects which could use the profits for community improvements.

Legislation aimed at encouraging industries to comply with certain minimum standards of waste production e.g. emissions and effluents, should be drafted.

National waste disposal and recycling programmes and activities need to be co-ordinated.

Effective legislation regarding safe waste disposal is urgently required. This should distinguish between different types of waste, consider environmental hazards and be based on the best available scientific assessments and technology.

Managing Hazardous Wastes

The constitution of the Republic of Namibia outlaws the dumping of foreign hazardous waste, but Namibia remains responsible for dealing with her own hazardous wastes which fortunately make up only a small proportion of the annual waste generated.

The present legislation controlling hazardous waste management is considered inadequate and new legislation is urgently required. Enquiries regarding proposed legislation revealed several abandoned attempts in the late eighties and one proposal by the Ministry of Health and Social Services that legislation regulating radio-active materials be drafted in co-operation with the International Atomic Energy Agency, IAEA, of Vienna (Austria).

The different types of hazardous waste cannot be disposed of in the same manner. A national policy and legislation on waste management is needed and it must be based on the best available scientific information

and technology. The following waste management principles are proposed:

- Safe and environmentally responsible methods must be used and aesthetic considerations taken into account.
- Waste types need to be kept separate and each type dealt with appropriately.
- Disposal methods should minimise pollution. Factors such as the contamination of groundwater must be avoided. Emissions from incinerators should not themselves be potentially harmful.
- Transport of hazardous wastes should be regulated in accordance with international practice making use of the Hazchem code.

At present the various municipalities and the peri-urban board each seem to have their own regulations governing waste disposal. Some hazardous waste, for example expired medicines are disposed of by incineration at the State Hospital. The mines and industries are left to determine their own standards, the only constraint being that their emissions and effluents do not contaminate water sources. The City of Windhoek recently conducted an EIA to select a new dumping site which would not contaminate ground water, but does not provide for the safe disposal of any hazardous wastes.

The most important shortcoming is the lack of effective legislation to control the disposal or processing of hazardous waste produced in Namibia.

A national record should be kept of hazardous waste - This should cover imports of all hazardous substances be it for production purposes or as a component of a product, the production including mining of hazardous substances, disposal of hazardous waste, recovery, re-use, recycling, and safe storage options. The information from this waste audit should be freely available to the public.

Appropriate technology to reduce, recycle, or re-use hazardous wastes and to dispose of or destroy them safely should be found and applied.

A single national body should be responsible for safe waste management.

Government incentives backed by appropriate legislation are needed to encourage a change to clean production technology.

Clean production, although initially expensive can be economically and technically viable. It minimizes the production of waste through process redesign, some industries e.g. ICI in Europe has successively reduced their chemical waste production by 95%. Ideally, clean production promotes the minimum use of raw materials and energy, does not produce hazardous waste and ensures the fi-

nal product does not itself create a waste problem after use. The uranium mine at Rössing has on its own initiative reduced the amount of water used by the mine by half and reclaims some of the sulphuric acid in the tailings for re-use.

Cleaning Up Waste Sites

Due to the lack of appropriate disposal sites for hazardous wastes, it is certain these find their way into the domestic waste sites and waste water. There is no safety policy other than that of banning people from the waste disposal sites. This ban, although effective in health terms, hampers initiatives for recycling. Separate waste disposal sites for the different categories of waste are urgently needed.

As mentioned in the introduction, litter is a serious problem in Namibia. The lack of an organized system of solid waste collection and disposal in the north of Namibia although lamentable makes this region an obvious area for the recycling of glass, metal, and for compost making as the soils are often infertile.

A well organized network of waste disposal which incorporates recycling and re-use by industries from the outset would do much to reduce waste in the north and can be an example to the rest of Namibia.

Local and national clean-up campaigns for roadsides, riverbeds, town grounds and recreation areas are effective short-term solutions to the littering problem and should be encouraged. They create an environmental awareness and pride in participants and are a visible means of tackling the problem.

Environmental education in schools should promote a responsible attitude to litter.

The Namibia Sports and Recreation Club NASOK, has done much in the past ten years through nation-wide Tidy-up campaigns. The club is essentially a youth and community service tackling community problems at grass-roots level. One of their activities is to encourage voluntary community services which include litter tidy-ups. In Swakopmund workers of the Department of Transport who clear the road verges contribute 10% of the glass collected for recycling.

Working Internationally

The Namibian Constitution expressly prohibits imports of nuclear or toxic wastes. Despite this there have been three recent attempts to sell the idea of an international hazardous waste disposal site in Namibia. According to the proponents, certain sites are ideal for a "world scale hazardous waste repository", these have no recent signs of tectonic activity, no groundwater, the area is largely uninhabited, and evaporation rates are high. Large financial incentives have been offered and turned down.

Namibia is also a signatory of the Lomé convention No 4, which in article 39 on the Environment includes the following agreements " *The Con-*

tracting Parties undertake to make every effort to ensure that international movements of hazardous and radio-active waste are generally controlled..... the Community shall prohibit all direct and indirect export of such waste to the ACP states while at the same time the ACP states shall prohibit the direct or indirect import into their territory of such wastes..."

The UNEP sponsored Basel Convention of September 1989, further prohibits the transboundary transport of toxic waste. Although Namibia is not a signatory, many of the nations producing hazardous wastes which may be tempted to export these wastes, are bound by the convention. The Organization of African Unity has also recognized the need to prohibit the importation of foreign hazardous wastes. Despite these agreements and the constitutional clause, Namibia remains vulnerable to this type of exploitation.

The Government should enact legislation to effectively ban the import of all categories of hazardous waste into Namibia. The constitution can only serve as a guideline for the law.

Aid organizations should consider supporting waste disposal and re-use campaigns in Namibia.

II

SUSTAINING OUR RENEWABLE RESOURCES

II a Promoting Sustainable Water Management

" The state shall actively promote ... (the) utilization of living natural resources on a sustainable basis for the benefit of all Namibians both present and future .... "
Article 95 of the Constitution of the Republic of Namibia.

Introduction

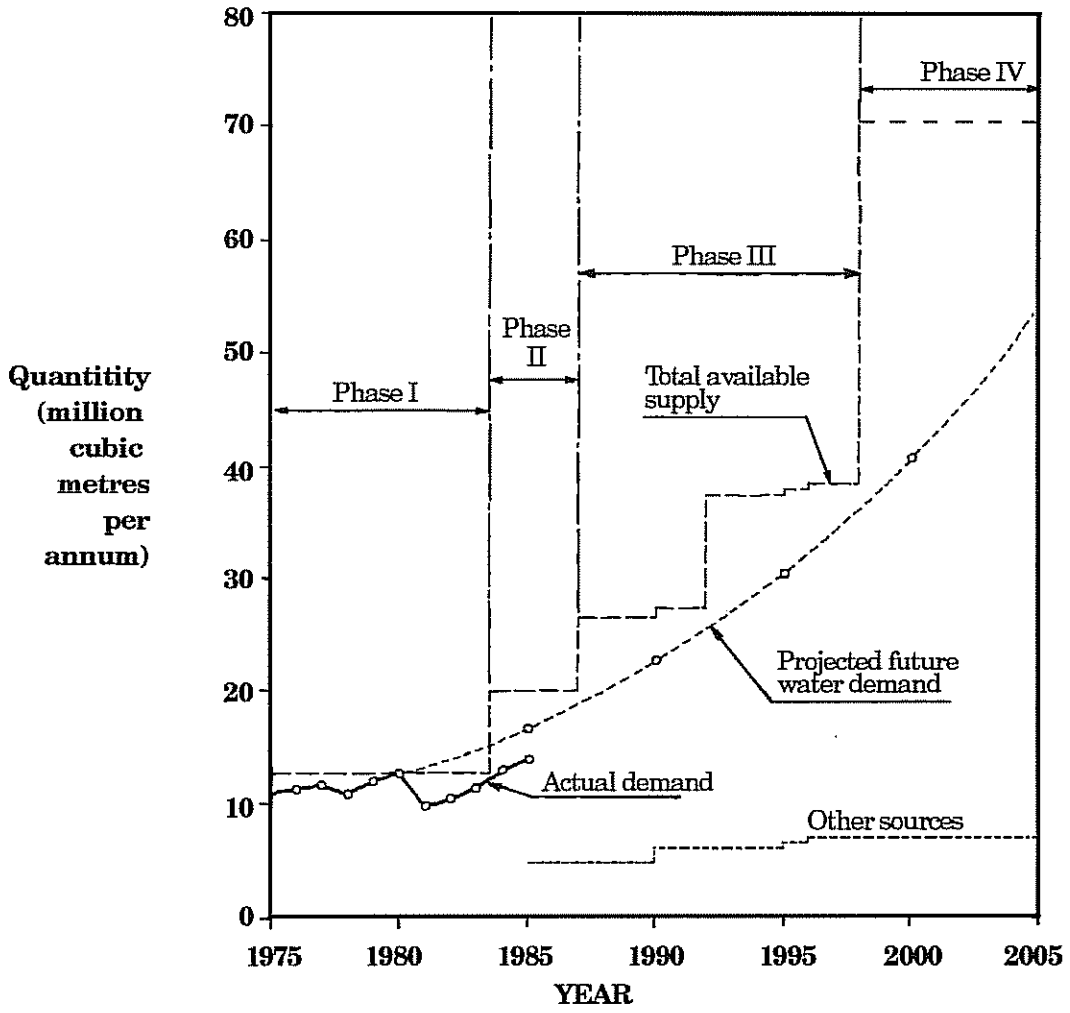
In a country as arid as Namibia, sustainable water management is a continuous challenge. Water is scarce and is arguably one of the more important natural resource limitations to development and expansion in Namibia today. Thus, socio-economic, industrial and agricultural development plans must be made within the natural regional and temporal limitations of long-term water availability.

Many Namibians realize the need to protect and conserve water resources and wetlands and have a high regard for both their economic and ecological values. The national objective is to manage the water resource so that it can be used without jeopardising future water supplies, ecological diversity or the environment.

The demand for water is continually increasing, as State water supplies to rural areas are extended and upgraded, as the living standards of Namibians increase and as the nation strives towards food self-sufficiency. The challenge is to meet this ever greater demand for water in a way that is sustainable in the long-term.

In order to ensure an adequate supply of clean water to the citizens of Namibia it is essential to protect scarce surface and groundwater sources

Namibia's objective is to manage its water resources for present use without jeopardising future water supplies, biotic diversity and or ecological processes.



Water demand projections for the central area and phased implementation of the ENWC's various sources

from over-utilization and to prevent a deterioration in water quality. There is a national and, in the case of boundary and trans-boundary rivers, an international obligation to manage the water resources sustainably.

Sustainable water management requires good planning, an integrated approach, and scientifically based assessments of all proposed development schemes as these invariably influence water resources.

The Water Act, No 54 of 1956, makes provision for the protection of river catchments, controls effluent discharge into rivers, includes legislation covering water pollution and the control of aquatic alien plants, outlines regulations which govern the optimal use of water resources and promotes a balanced development of man and his environment. This Act makes the Department of Water Affairs responsible for the utilization, control and conservation of Namibia's water re-

sources. A new Water Act has been drafted and will soon be submitted to parliament. It includes the legislation already in operation and will have broader powers to ensure the effective protection and responsible utilization of both surface and groundwater resources.

The Soil Conservation Act, No 76 of 1969 indirectly controls siltation by measures aimed at reducing erosion. The new policy document of the Ministry of Wildlife, Conservation and Tourism singles out wetlands as important ecosystems requiring conservation.

Article 95 of the Namibian Constitution, quoted at the beginning of this chapter, although not legally enforceable in court, remains the most important environmental guideline to policy makers and courts interpreting new laws.

Environmental assessments must become a compulsory part of all development feasibility studies.

Sustainable Water Management Strategies

Long Term Planning

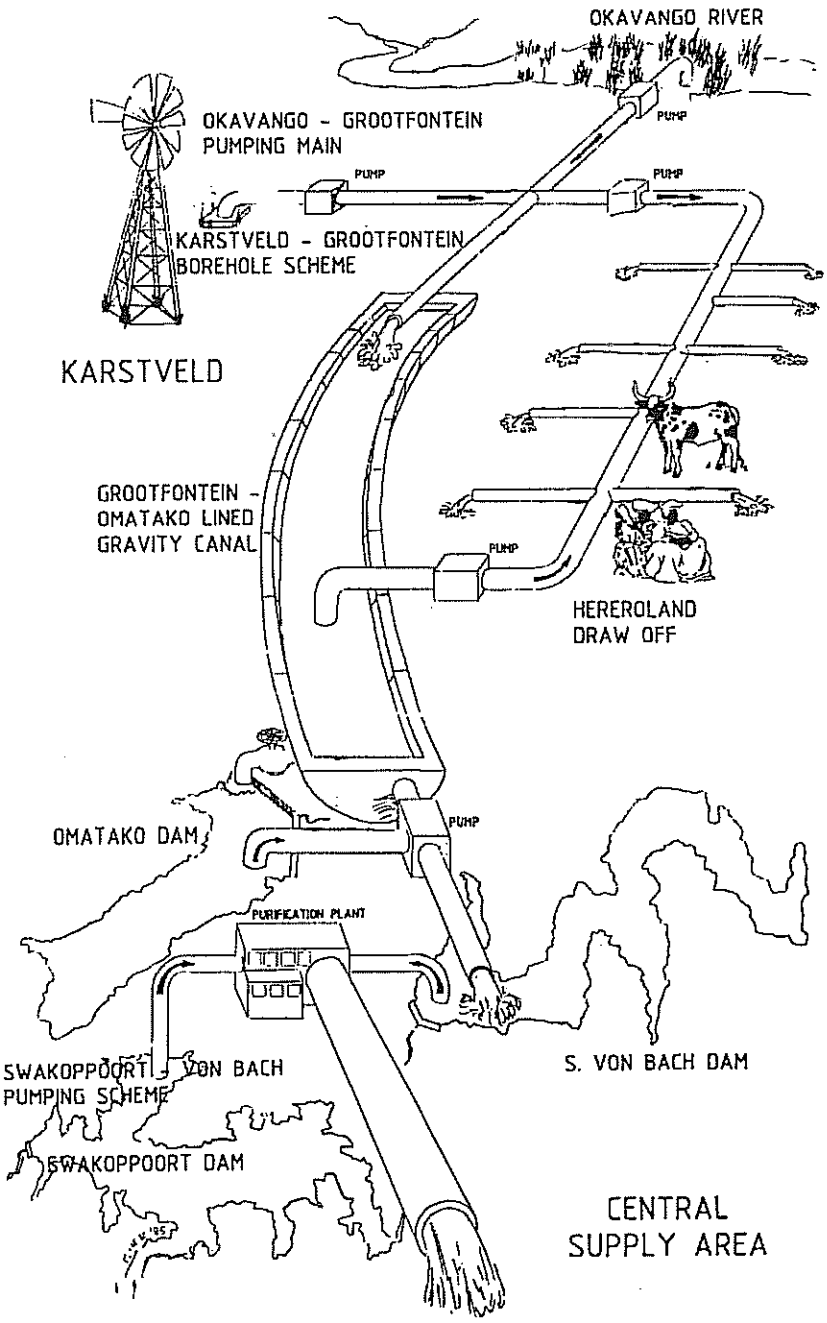
The Department of Water Affairs already plans ahead for sustainable yields at 95% reliability. These allow for economic growth, modernisation in rural areas and for the effect of sustained droughts on potential yields. This statistically safe yield of 95% is considered an acceptable compromise between using as much water as soon as possible to reduce the high evaporative losses and the necessity of keeping water in reserve for future droughts.

Hydrological and geohydrological data are carefully collected and changes monitored. Models based on this database together with predictions of increasing water demands are used to plan future water supply schemes and to manage existing ones sustainably.

Phased Approach And Resource Diversity

The development and expansion of water supply schemes are planned and timed to meet increasing water demands realistically. A good example of this approach is the Eastern National Water Carrier (ENWC). The ENWC, is an integrated long-distance water supply scheme which will eventually supply water from the perennial Okavango River via a series of aqueducts and storage impoundments. These sources comprise the State dams, Von Bach, Omatako and Swakoppoort in the drier central regions of Namibia, the Karstveldt borehole scheme which will serve as an interim water source and the Okavango River on the north eastern border of Namibia.

The ENWC is being developed in phases to accommodate the increasing water demand of the central region of Namibia over a period of forty years. The ENWC makes use of an interim water supply source and can be supplied by a diversity of integrated sources. The most direct supply is from Von Bach Dam in the Swakop River. This can be aug-



Schematic representation of the various components of the ENWC

mented by supplies from Swakoppoort Dam downstream and from Omatako Dam in a different catchment area. When necessary water can be imported from the Karstland aquifers via a network of boreholes and the Grootfontein-Omatako canal. Eventually the central region will be able to draw water from the perennial Okavango River to bridge temporary

shortfalls. This system of integrated operation makes it possible to increase the assured yields from the three ENWC dams by transferring water from dams with less favourable evaporation characteristics and by using the water on a higher yield/lower reliability basis.

Environmental Considerations

In the design, construction and operation of all large water schemes allowance is now made for their environmental effects.

The ENWC Example

Recognizing that the construction and operation of a long distance water transfer scheme such as the ENWC must inevitably have environmental implications, research to assess these was initiated in 1983. Investigations included; a baseline study of the major impoundments, a literature survey of long-distance water transfer, a baseline survey and fish surveys of the Okavango River, a nation-wide snail survey, a plant ecology survey to determine the possible effect of groundwater withdrawal from the Karstveld aquifers on the woody vegetation and an investigation into animal mortalities in the open canal. The effects of inter-dam transfers on water quality, the cost of purification and the ecology of the dams is being monitored so that the operation procedure can be adjusted to have the least possible environmental impact.

Surface Waters

For water schemes on both ephemeral and perennial rivers, allowance should be made for downstream effects. Recent examples where measures have been proposed are the Oanob Dam and the project proposed to investigate the environmentally sound management of the water resources of the Okavango River Basin.

The Oanob Dam, recently constructed in the ephemeral Oanob River in central Namibia, was designed to allow for the periodic controlled releases of water below the dam. Research prior to construction indicated that simulated flooding would be necessary to maintain the riverine vegetation, in this case a camelthorn (*Acacia erioloba*) woodland, downstream.

Prior to embarking on large-scale water withdrawal from the perennial Okavango River on the northern border of Namibia, the Department of Water Affairs in the Ministry of Agriculture, Water and Rural Development has proposed an environmental assessment of the entire Okavango River Basin. This will involve both Angola and Botswana and will determine the ecological water requirements of the river system so that a sustainable management strategy can be drawn up.

Groundwater

The national groundwater supply infrastructure consists of more than 400 production boreholes that supply about 100 State water schemes, including towns e.g. Swakopmund, Omaruru, Arandis and mines, e.g. Rössing Mine. Water levels, abstraction rates, rainfall, surface runoff, and recharge are regularly monitored. This information is used to manage

the aquifers sustainably and to ensure effective abstraction. Strict limits are set to avoid the detrimental effects of over-abstraction and special care is taken not to exceed the mean long-term recharge rates. Salt-water intrusion into highly abstracted coastal alluvial aquifers is a serious problem and measures have been taken to avoid it.

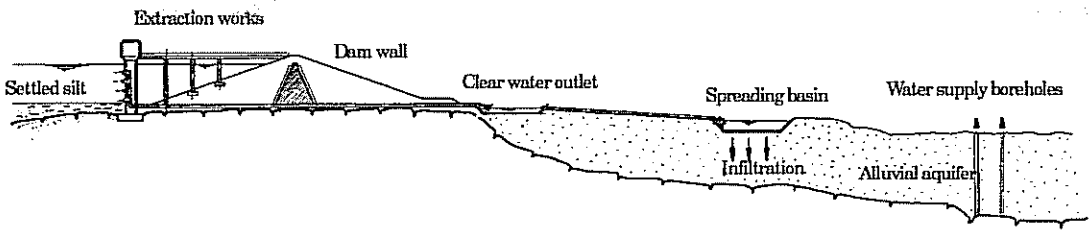
Long-term abstraction and recharge records of the most important aquifers in the Karst dolomitic area, the Omdel and Swartbank Alluvial aquifers, as well as the Stampriet Artesian Basin, are used to guide abstraction and allocate sustainable quantities of water. Due to the critical demand on this resource, water is allocated in the following order of priorities; firstly for domestic consumption and stock watering, secondly for industrial and mining demands, thirdly for irrigation and finally for tourism and other uses. A permit system is used to regulate groundwater use.

In the early seventies, water samples from 40 000 boreholes nation-wide were analyzed and mapped to provide a good national record of groundwater quality.

The Omdel Example

The best example of sustainable groundwater management is the groundwater recharge enhancement project of the Omdel aquifer in the Omaruru Delta that supplies Swakopmund, other towns on the west coast and Rössing Uranium Mine. The present rate of abstraction exceeds the annual average recharge by 2.5 Mm^3/a. Recharge occurs only during sporadic ephemeral floods and is hampered by silt clogging. In 1989 an investigation into the possibility of increasing groundwater storage in the Omdel aquifer was initiated. The objective is to place clear water into groundwater storage in the Omdel aquifer. This artificial recharge will be accomplished by a dam (40 Mm^3) which will trap the silt laden flood water. After several days of settling the cleared water from the dam will be released downstream via a natural channel along the river bed into infiltration areas to allow artificial gravity recharge of the Omdel aquifer.

Care must be taken to use no more water than can be naturally replaced.



Schematic Layout Of The Omdel Aquifer Recharge Scheme In The Omaruru River (note the extraction works which syphon the clear water from the surface to the spreading basins where the aquifer is recharged)

Promote Sustainable Utilization

Namibia is essentially arid. Development projects should be planned for the natural dry periods in the cycle not for the unusually wet years. In order to promote sustainable water utilization and research the following recommendations are made:

The limitations of Namibia's water resources should be recognized and this dependence emphasized to donor organizations and foreign developers.

A national policy to promote environmental sustainability should be legislated.

Public awareness and education addressing sustainable water use should be improved. Due to rapid population growth, practises which for many years were environmentally sustainable are no longer so, and communities need to adapt.

"Clean production" which uses a minimum of our natural resources particularly water and produces the minimum of waste should be promoted. Namibia cannot afford industries with high water demands or which pollute our scarce water supplies.

The national water database and data collecting network, although good, should be improved, as should modelling techniques and drought forecast abilities.

Research should be initiated to determine the ecological water requirements of Namibia's water sources and to protect the wetlands from non-sustainable exploitation.

Research to assess the impacts of harmful chemicals on water resources and wetlands and to search for environmentally acceptable alternatives should be undertaken.

Drought Management

The short and medium term drought management strategies used by Namibia can serve as an example to other arid regions and to countries which are expected to become increasingly arid due to global climate change.

The drought policy of the Department of Water Affairs depends on the integrated utilization of resources to limit the impact of droughts and certain emergency actions which can be taken when the reserves in any source are not sufficient to meet the assured supply for the next two years. Actions taken successfully during the drought at the beginning of the eighties were:

- In addition to the ENWC, Windhoek has its own municipal groundwater supplies which are available for emer-

gencies and the city is capable of supplying 6.8% of the city's drinking water using recycled water.

- Better utilization of sources by judicious assessment of their natural losses, i.e. first using those which have the highest evaporative or seepage losses.

- Introduction of new sources in existing supply systems

- *Temporary* over-utilization (mining) of groundwater sources, subsequently left alone to recover in non-drought years.

- Use of the sewerage water reclamation plant in Windhoek to reclaim and recycle water although this is an expensive practise compared to using natural water sources. The reclaimed water meets international drinking water standards.

- Introduction of restrictions coupled with higher tariffs for higher consumption levels and a public awareness campaign which brought about a 30% voluntary saving.

Promote Water Conservation

To promote the idea that water conservation measures are not only for droughts, but that water is a scarce and valuable resource to be used with care at all times, requires national and local awareness campaigns to initiate both household or community action. The educational newspaper supplement *Abacus* which has a readership of 25 000, is doing much to educate people and to promote an awareness of water conservation.

Communities can save water by being encouraged to improve land use practises. Present irrigation methods are very wasteful and more suitable techniques e.g. root irrigation should be implemented, commercial irrigation schemes can set the example for subsistence farmers. The planting of crops suitable to arid conditions and the use of appropriate cultivars through sustained agricultural research should be encouraged.

Land use planning for entire river catchments is important to ensure that water quality is maintained and that land use practices are appropriate for the region.

Households can contribute locally by improving the collection of rainwater with the use of containers to catch runoff from roofs.

Water can be saved by the use of appropriate technology for arid environments, e.g. solar energy distillation plants to improve the quality of brackish groundwater. This and other technology with a low water consumption e.g. wind and solar energy generation should be

developed and actively encouraged.

Environmental education has a role to play in protecting water resources from pollution and preventing health risks.

More effective legislation is needed to control pollution. An awareness of producer responsibility should be promoted and fines increased in line with current market values.

International Obligations

Namibia recognizes the need for the sustainable management of internationally shared water resources with consideration for other user nations.

The Okavango River, a perennial river on the northern border of Namibia, is one such internationally shared water resource. An international agreement is at present being drawn up with the Governments of Angola and Botswana to deal with proportional water withdrawal and agree on shared responsibility for the Okavango River Basin ecology.

A similar agreement exists with Angola for the Cunene River and the supply of hydro-electric power. The hydro-electric power station at Ruacana is fed by the Gove Dam in Angola. The proposed Dam at Epupa Falls further downstream will reduce the unit cost of electricity substantially (from 23.5 c to 15.9 c in the year 2000) and is being planned in co-operation with Angola. An Environmental Impact Assessment (EIA) will form an integral part of the feasibility study for the Epupa Dam scheme.

Namibia is also involved in an international agreement on the sustainable use of the Zambezi River resources, the Zambezi Action Plan ZACPLAN, presently being implemented by the countries through which the river passes.

Namibia will continue to participate in the responsible regional development of the shared border rivers in order to promote the sustainable utilization of these natural resources.

Our Challenge: Rural Water Supply

In an arid country like Namibia, the supply of water to all spheres of the Namibian society is undoubtedly one of the most important factors determining the potential for social and economical development of the Namibian people. The general climatic, geological and topographical conditions of Namibia have made water one of the scarce resources of the country, which must be utilised appropriately and sparingly to ensure the sustainable use of the water resources.

The current overall water supply situation in most urban centres is satisfactory and has a reasonable coverage. This is however not the case in the rural communal areas where only about 50 % of the people have proper access to reliable sources of safe water.

The Namibian Government is presently mounting a major effort to reduce the current shortfall in water supply in the communal areas.

The Water and Sanitation Policy WASP Committee has been formed whose main tasks is to identify the major problems and their underlying causes in the water and sanitation sectors, propose actions, identify responsibilities and finally formulate a national policy.

Furthermore, arising from the World Summit for Children held in September 1990, the Namibian Government in collaboration with UNICEF, has prepared a National Plan of Action, which includes safe water and hygienic sanitation, to improve the situation of women and children in the country. Namibia also subscribes to the UN Year 2000 Plan which aims to ensure safe drinking water for all by the year 2000.

Namibia is committed to the provision of safe and reliable sources of drinking water as well as appropriate sanitary facilities for all.

Environmental aspects

Water resources and the environment of Namibia are closely related and given Namibia's low rainfall, there are complex environmental considerations which have to be taken into account in the water supply sector. Due cognisance of this fact is taken whenever any exploitation of water for development is considered.

In supplying increasing amounts of water to rural areas, care is taken that abstraction from water sources is limited to the sustainable yield of the source and to avoid supplying for a number of livestock greater than that which can be supported by the available grazing. As an example, in the planning of the Okahao-Onaanda pipeline system which is currently being constructed in the north of the country. The amount of water that could be supplied to the area was limited by the number of livestock that the grazing of the area could support. By applying this principle, an attempt is made to limit overgrazing, erosion and subsequent desertification of the environment.

Furthermore, when building major canal and pipeline structures care will be taken to ensure that these do not form obstructions to the migration routes of game or to the natural drainage patterns of rivers.

Major construction projects in the water sector should always preceded by an Environmental Impact Assessment (EIA) in order to prevent or minimize the potential negative effects on the environment.

Environmental assessments, such as an EIA on the Ogongo-Oshakati water supply scheme and an environmental profile by the Ministry of Wildlife, Conservation and Tourism are being carried out where major pipelines and canals are currently under construction in the Owambo Region.

The pollution of existing water sources by industrial and mining ef-

fluent is presently well under control but should be guarded against constantly. Proper sanitation facilities in the rural areas are presently virtually non-existent and an effort is to be made to promote a "latrine culture" amongst the rural population in order to improve health and prevent groundwater contamination.

In the rural communal areas, a programme will be launched in the near future to educate the rural population in the need for and necessity of sanitation facilities and resulting health benefits.

Community participation accompanied by education of the population and training of water point minders is actively encouraged. For this purpose several water committees have already been established at village and regional level. In conjunction with these water committees, a water tariff policy is to be implemented.

It is expected that these measures will eventually lead to better maintenance of existing facilities and encourage the judicious utilisation of water.

The use of appropriate and affordable technology, suitable to third world conditions, will be promoted to enable the rural communities to operate their own water schemes and carry out the maintenance of such schemes.

Promote Wetland Conservation

Although Namibia has come a long way towards managing her water resources sustainably, the value of wetlands is still not fully appreciated and these ecosystems need protection.

The importance of the northern perennial rivers to subsistence economies should be recognized. A large proportion of Namibians are dependent on wetland associated natural resources for food, water, building materials, tools and employment.

The dependency and inter-dependency of wildlife on wetlands should be better assessed. The wetland regions in the north-east of Namibia support the highest diversity and numbers of plants and animals in the country. This genetic resource should be protected and the rich biodiversity maintained.

Legislation is needed to protect wetlands from damaging human activities such as siltation, chemical pollution by pesticides, herbicides, industrial effluent, fertilizers and domestic effluent, the clearing of riverine vegetation and floodplain destruction.

The wetlands associated with the northern rivers have excel-

lent tourism potential which should be developed.

Especially sensitive wetlands need to be designated and conserved. Such sites of specific scientific interest include Guinas lake and Aigamas Cave, sole refuges of two of our endemic fish species.

Namibia should investigate and become a signatory of the Ramsar convention to protect internationally important wetlands such as Sandwich Harbour which holds large numbers of paleartic waders and significant numbers of red data bird species.

A whole catchment approach is essential to effectively manage our rivers. This will involve sound land use practises, controlled development, good planning, a holistic multi-disciplinary approach to management, as well as international agreements on shared river basins and other water sources.

II b Achieving Environmental Sustainability In Agriculture

Namibia's goal is to maintain and enhance the natural resources that the agricultural sector uses or affects, while ensuring environmental, economic and social integration.

Introduction

About 45% of Namibia is privately owned farmland and 40% is farmed communally. Thus about 85% of Namibia is in the hands of the agricultural sector.

Land is an essential element in the lives of most Namibians. It provides them with a living, social security, a stake in the future of the country, and a contribution to the future wellbeing of their children. It also fulfils other cultural and social functions that contribute to their quality of life as well as to a stable and prosperous society. Land and the resources that it supports are essential for the wellbeing and survival of the Namibian people and their country, now and in the future.

It is therefore necessary for all Namibians, and especially responsible government, to manage and nurture the land and its resources in a wise and sustainable manner. It little profits the development of the country and its people that expedient short-term decisions are taken, or short-term profits grabbed at the expense of the quality and productivity of our fragile and limited land. To do so would incur hidden debts which would undermine both society and the economy. Worse still, we would be stealing resources and environmental productivity from our children and from all future generations.

Namibia is particularly vulnerable to over-exploitation and mismanagement because of our harsh climatic conditions. If we make a mistake today, it will take many years and large amounts of money to correct; and corrections are not always possible.

Climate

Namibia is an arid country, with a hyperarid zone along the Namib coast. Rainfall increases from the south and west towards the north-east, ranging from 2 mm to about 700 mm. Only 8% of the country receives over 500 mm, the minimum regarded as necessary for dryland cropping.

Over 90% of the country falls within the summer rainfall region; about 80% of the rain falls within a four-month period (Dec-Mar). Farmers in the north can expect about 50 days per

Rainfall belts (mm)	Area (km^2)	Percentage
100	181 092	22
100-300	271 638	33
300-500	304 563	37
500	65 852	8

Percentages and areas of Namibia within different rainfall belts.

year with some rainfall, while in the south farmers record less than 10 days with rain. The rate of evaporation is high. In the north the annual evaporation from an open body of water is about 2.6 m (420% in excess of rainfall) and in the south, 3.7 m (1 750% more than the rainfall).

From an agricultural and ecological perspective, the most important climatic parameter is rainfall variability. This is used to measure the reliability with which rain falls in a particular region. The rainfall variability increases as the mean amount of rain decreases. This means that not only do the southern and western regions receive less rain, but their rainfall is also considerably less reliable. In the north farmers can expect their annual rainfall to fluctuate within about 30-40% of the long-term mean, whereas in the south and west, farmers should expect the rainfall to fluctuate by 60% and more. It is this unreliability in rainfall that has led to special adaptations in animals living in these regions, most notably, nomadism. And it is this variability which makes these arid regions so vulnerable to mismanagement and desertification.

The term "mean rainfall" is a largely useless and misleading term in arid regions. Its use should be avoided by the farming sector, particularly by the Ministry of Agriculture personnel.

Instead, a national rainfall map should be prepared showing rainfall expressed as a range of the median rainfall that accounts for 95% of the variance. This would assist farmers

In arid regions rainfall is not only low, but also highly variable. The term "mean" rainfall is largely useless and misleading. Instead, planners and farmers should consider the "range" in rainfall they are likely to receive. For example, instead of expecting a mean of 200 mm, a farmer in this area should plan for rainfall of anywhere between 80 mm and 280 mm.

and the government to accept as normal rainfall that falls well below the long-term mean, and help them plan better for these events, rather than be caught unprepared by "droughts" which are a normal and regular part of the climatic cycle in arid regions.

Agricultural Activity

In general, small stock is reared in areas that receive under 200 mm rain and large stock in areas above 300 mm. Both large and small stock are farmed in between. About 12% of the surface area of Namibia is desert and no agricultural production is possible. The grazing capacity for the rest of the country (ha/large animal) is as follows:

23% of area = 24 + ha/large animal

10% of area = 18 - 24 ha/large animal

15% of area = 12 - 15 ha/large animal

40% of area = 8 - 10 ha/large animal

Permanent rivers occur only on the northern and southern borders of the country. Most farming communities rely on groundwater and to a far lesser extent, on surface reservoirs and piped water. Groundwater is not evenly distributed across the country nor is it equally accessible. In the arid south, for example, the probability of establishing a successful borehole is less than 20% while in the north it may be as good as 90%. Similarly, in the south groundwater costs almost 10 times more to obtain, and this makes it inaccessible to many farmers.

Sustainability should be the key issue when considering a limited and finite resource such as groundwater. The rate of abstraction must be directly related to the rate of recharge of the aquifer, and agricultural development plans must be tailored to meet this limitation

Development In Agriculture

This sector was developed to provide food security, to create job opportunities and to stimulate the economy. Commercial farms were designed in size to be economically viable. Farms in the more arid regions were therefore larger than farms in areas with a higher rainfall. Water sources were then opened by sinking boreholes, constructing dams or constructing pipelines. Fences were elected to demarcate individual farms and to divide individual farms into different paddocks (camps) so that rotational grazing systems could be implemented.

In communal areas waters were opened to decentralise communities, to open up new pastures and to relieve the pressure on the nature pastures at traditional water points as human

Water is in limited supply in many parts of Namibia. Sustainability of this resource should be the key issue when planning agricultural development programmes.

population and herd pressures increased.

The Government made loans and subsidies available for the construction of water installations, fences and accommodation for farm workers and, in case of need, subsidies for drought relief. Furthermore, by means of its extension and research functions the Government continuously gave advice regarding carrying capacity and stock numbers, rotational grazing, disease control, strategic feeding, fertility and performance testing as well as financial management and other economic aspects.

Stock diseases are controlled by the Directorate of Veterinary Services as a free service to farmers and to ensure that high international standards regarding diseases are maintained.

The Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No. 36 of 1947) was introduced to protects consumers of agricultural products, farmers and farm workers against dangerous pesticides and to protects the environment against contamination by persistent toxic chemicals such as DDT and Dieldrin. The Agricultural Pest Act (No. 36 of 1983) was promulgated to protect farmers and the country against the import of harmful plants, such as alien invasive species that could damage agricultural production.

Problems Encountered

In spite of, or perhaps because of, guidelines for carrying capacity, stock numbers and rotational grazing, a slow degradation of the natural pastures has been observed.

Bush Encroachment

Bush encroachment is one of the most serious forms of habitat degradation in Namibia. It affects over 14 million ha, mostly in the commercial farming districts and in Hereroland. It is most severe in the 300-500 mm rainfall belt, particularly on calcareous soils in Tsumeb and Grootfontein, where the number of small woody trees and shrubs can average 10 000 plants per hectare. This has reduced the ecological carrying capacity of commercial farmlands considerably, in some areas from one large stock unit on 10 ha to one on 40.

Little information exists on the rate of bush encroachment. Some estimates made from old ground and aerial photographs in the Waterberg area show that, in 1940 the region was an open grassland with at most about 15% cover by woody vegetation. In 1961 the woody vegetation cover had increased to 40-60% and by 1979 to 70-80%. The main encroaching species are the thorny *Acacia mellifera* subsp. *detinens* and *Dichrostachys cinerea*, both small trees and shrubs.

There is a popular misconception that bush encroachment is the direct result of overgrazing. While this might be one of the main management-related factors, to view overgrazing as the only cause would be to oversimplify the problem. Bush encroachment usually results from a number of interacting factors:

District	Surface area ($ha x 10^3$)	Area encroached (%)
Grootfontein	2 565	80
Tsumeb	894	90
Otjiwarongo	1 955	75
Outjo	2 628	50
Okahandja	1 432	50
Gobabis	4 039	50
Omaruru	850	30

Estimated surface area affected by bush encroachment in selected commercial farming districts

- continuous removal of the grass and herb layer by permanent grazing, as opposed to short periods of high intensity grazing;
- absence of bush fires which would kill the seedlings of woody vegetation;
- reduction in numbers of browsing animals, particularly large browsers which destroy woody vegetation;
- climatic conditions favouring the flowering, seeding and germination of woody vegetation, followed by drier periods during which water is accessible mainly to the deeper-rooted woody plants and not to shallow-rooted grasses.

Costs of restoration of encroached areas depend on the density, species composition and method of bush destruction, but usually exceed the market value of land by a factor of 1.5 or more, depending on the selectivity of the method employed.

Erosion

Much of Namibia is highly vulnerable to soil erosion, in the form of gully and sheet erosion from high kinetic energy rain from thunderstorms, and wind erosion. The rate of soil erosion is generally inversely proportional to vegetation cover. There is considerable evidence of soil erosion taking place over large parts of our agricultural land, particularly in the extreme north, south and west. This erosion is closely linked to overgrazing and poor pasture management. Despite having a Soil Conservation Act (No. 76 of

1969) within the Ministry of Agriculture, this Act has never been applied and it is not considered to be effective.

Environmental Overview

A revue of conventional agriculture in Namibia during colonial times leaves one in little doubt that commercial farmlands have, in general, been poorly managed. This has happened despite the fact that the vast majority of financial and technical support has been invested in the conventional commercial farming sector to the detriment of communal farmers and less conventional forms of land use. A major cause of the failure of commercial agriculture has been the eurocentric approach taken. Much effort has been spent on replicating farming systems used in Europe, despite the vastly different climatic conditions. Examples include dividing up land into closed farming units, providing set carrying capacity figures and prescribing rigid policy, e.g. on fire. These inflexible practices have taken little account of the highly variable climate. This artificial system has been propped up by financial subsidies paid by the state. In many cases, these subsidies have further exacerbated the problems by providing financial incentives for continued and increased mismanagement such as overgrazing.

Future Action

It is apparent that if agriculture in Namibia is to be run on a sustainable basis with a productive future, a strong agricultural policy and strategy is required that takes into account the highly variable climatic conditions that occur in arid and semi-arid regions. Such a policy must be innovative and include land-use options that are more compatible with fragile ecosystems than is conventional agriculture.

For a prosperous future it is beyond any doubt a basic requirement to preserve the natural resources in Namibia. It is essential to stop soil degradation and to continue with soil and pasture reclamation including the eradication of bush and prevention of further encroachment. To this end, the Ministry of Agriculture, with the assistence of other ministries, the University of Namibia and other interested organisations, should embark on a major extension and training programme, for both present farmers and new farmers entering the farming profession.

Government must commit itself to an increased level of funding for appropriate and relevant agro-ecological research and monitoring of (a) the sustainable management of agricultural land in arid and semi-arid regions, and (b) desertification, with particular attention to early warning indicators and counter-measures. It is essential that criteria be identified that indicate mismanagement, and that clear and consistent measures be ap-

plied to ensure that landowners do not continue to mismanage the country's limited and fragile agricultural lands.

Finally, strong links need to be developed between commercial and communal agriculture in Namibia. Resources, expertise and technology need to be transferred from the commercial to the communal and subsistence farming sector. Incentives and institutional support need to be given to the communal regions for the development of commercial, market-orientated farming.

II c Sustainable Fisheries In Namibia's Exclusive Economic Zone

Namibia's goal is the long-term sustainability of our Fisheries Resources.

Introduction to the Benguela System and the Namibian Marine Environment

Namibia's coastline is about 800 nm (about 1 500 km) long. The shelf area from the shore to 200 m deep is approximately 110 000 km^2, and to 1 000 m approximately 230 000 km^2. The bottom then slopes fairly steeply down to several thousand metres in depth. The 1 000 m depth line is found within a range of 30 to 130 nm, mostly about 80 nm from the shore. The shelf is at its widest off the Cape Cross-Walvis Bay area and off the Orange River in the south. Nearly all the fishery occurs in the shelf area.

The sea off Namibia is highly productive mainly because of the upwelling of nutrients resulting from the Benguela current which flows northwards along the coast. As with other coastal upwelling systems, the Benguela current is dominated by fish species that can utilize the rich plankton production in the upper water layers. However, relatively few species make up the bulk of the total fish biomass: clupeid, pilchard and anchovy represent the pelagic inshore fauna; horse mackerel (maasbanker), with smaller and varying amounts of chub mackerel, the offshore pelagic fish; and hake, often termed demersal, inhabit the whole water column with its main distribution offshore, but extending into shallow waters inhabited mainly by the juvenile part of the population.

In addition, there are a number of less abundant fish and shellfish, in particular, snoek, kingklip, sole, monkfish, squid, deep sea crabs, and rock lobster, which are of significant economic importance. Seals and sea birds are abundant in the inshore areas especially along the southern part of the coast.

The driving force of the upwelling system are the cells of high pressure (the South Atlantic high) that develop over the southern Atlantic. The anticlockwise wind systems generated by these cells manifest as strong, prevailing south to south westerlies on the west coast of South Africa and Namibia. These winds simply blow the surface layers of sea water out to sea in a north westerly direction. These surface layers then get replaced by cold, nutrient rich waters that rise from the deep layers of oceanic waters off the continental shelf.

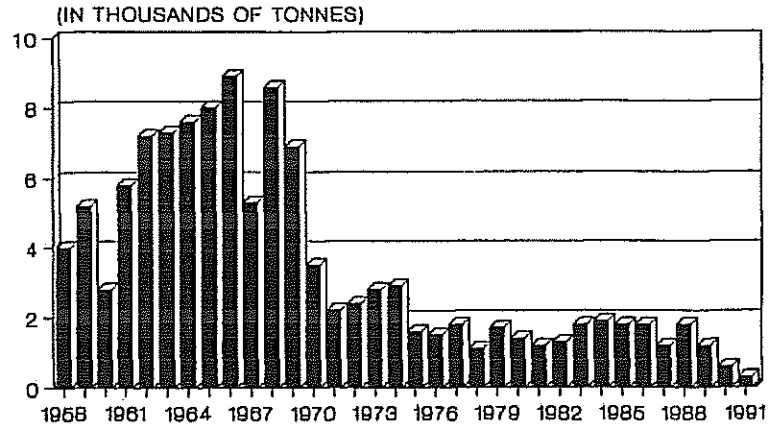
The whole system, which includes the various fish species harvested off the coast of Namibia, is therefore dependent on the development of these south Atlantic highs.

Controlling the Effects of Fishing Mortality

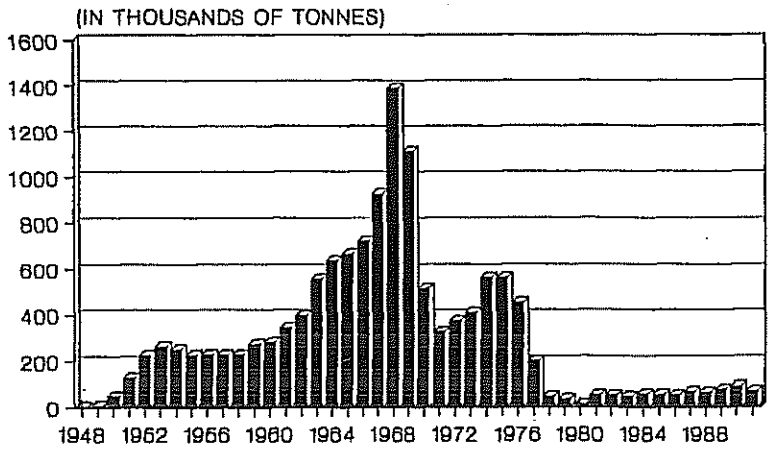
Superimposed on the natural fluctuations in production caused by natural fluctuations in the global weather patterns is the effect of fishing by man. To understand "sustainable fisheries" and to manage resources in such a way that sustainability over the medium term is "ensured" is different. Man's grasp of global weather patterns is not yet sufficiently well advanced to be able to predict what will be the result of, for example, rising atmospheric CO_2 levels on such systems.

Before spending more time on the parameter that man cannot predict with certainty, let alone control, let us first examine the parameter that man is supposed to have control over, the fishing effort.

The catch statistics of especially lobster and pilchard off the Namibian coast reflects the almost universally



Rock Lobster Landings off Namibia 1958 - 1991



Pilchard Landings off Namibia 1948 - 1991

experienced result of man's failure to control his fishing effort.

Namibia's fish stocks collapsed through overfishing and the stocks were replaced by less desirable species (e.g. the growth in the Cape horse mackerel stocks coinciding with the decline in the pilchard and hake stocks).

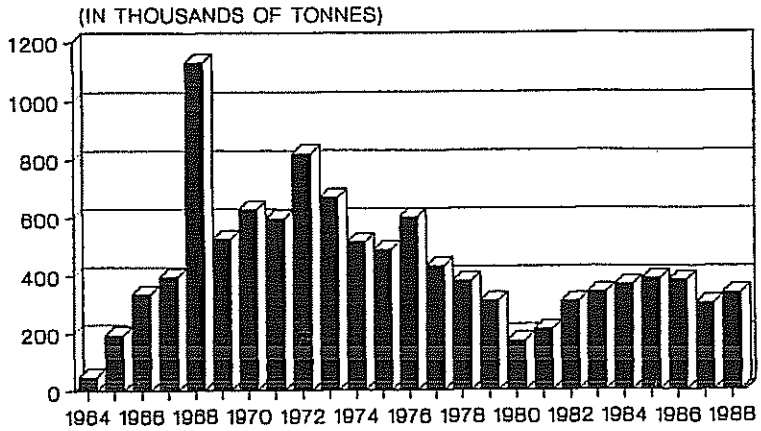
Namibia has embarked on an almost unique effort, since Independence, to rebuild its ailing fish resources. Exactly how serious this matter is regarded is reflected in both Article 95(1) of the Namibian Constitution and in the section on Resource Management Policies in the official policy on Fisheries of the Republic of Namibia, "Towards responsible Development of the Fisheries Sector". These documents state as follows:

1. Article 95(1) of the Constitution of the Republic of Namibia: "The State shall adopt policies aimed at the maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future; .... "

2. Government White Paper on Fisheries Policy, section on "Resource Management Policy":

"Patterns of exploitation which protect juvenile fish will be applied through provisions such as minimum allowable mesh sizes, minimum allowable fish sizes, and closed areas and seasons. Multi-stock management will be adopted where research reveals processes of stock interdependence.

"The Government will also seek to protect the fish resources and the fisheries from possible negative effects of other activities impacting on the sea or the sea bed.



Cape Hake Landings off Namibia 1964 - 1988

Initially, the specific management policies for the main stocks will be as follows:

TAC's for hake will be restricted to levels which will result in increases of the stocks to 4 or 5 times their present level. In an initial period, exploitation pattern will be improved to protect juveniles and small-sized fish.

Until a consistent stock recovery is demonstrable, pilchard fishing will be allowed only to supply a limited amount of fish to the labour-intensive canning industry. Mechanisms will be put in place to prevent by-catch of juvenile pilchard.

Fishing of anchovy (for fish meal production) will be limited until the stock has recovered. When fishing is resumed, a system of prohibitions by areas or seasons will be established when by-catch of juvenile pilchard occurs.

Horse mackerel fishing can initially be maintained at a high productive level. Restrictions to prevent by-catch of hake in this fishery will be adopted.

Catch restrictions will be applied for the rock lobster fishery in a programme to rebuild this resource.

Seals are considered to be exploitable resources and will be utilized through culling, but conserved at safe sustainable populations levels."

The Republic of Namibia is committed to these undertakings contained in its Constitution and Fisheries Policy. The Ministry of Fisheries and Marine Resources, as the responsible body, will continue on the road of responsible fishing and maintenance of the marine ecosystem by sustainable utilization, protection and conservation of the marine resources within and outside its Exclusive Economic Zone.

Whilst Namibia is legally responsible for control within its Exclusive Economic Zone, we share the concern of many other countries when it comes to straddling stocks and control over high seas fishing operations. The Republic of Namibia therefore offers its support for international efforts to enhance responsible fishing on the high seas and on straddling stocks.

The Status of Namibia's Fish Resources and Strategies Applied to Manage Individual Stocks

Crustaceans

Lobster

The total allowable catch (TAC) for lobster was cut back from the pre-Independence 2 000 mt to a mere 100 mt two years after Independence. This drastic reduction was prompted by the extremely low catch of 376,4 mt landed for the 1991/92. The cut in TAC has been quite traumatic for the lobster fishing companies and has had severe implications for employment in the industry.

Some compensation has been made by allocating a hake quota to the companies affected. Low quotas and the fact that the minimum legal size allows for females to breed at least twice before recruiting into the fishable population, should ensure a recovery and sustainability.

Crab

Special measures were introduced to protect the red crab (*Chachyon marinea*) resource. The number of crab licenses have been reduced from five to four, catches are restricted to depths greater than 500 m to protect females and juveniles and larger mesh sizes or escape gaps on traps are being investigated. Extensive tagging programmes to facilitate the assessment of biomass from tag returns is underway. Spider crab is being exploited at low levels only and reasearch to assess stocks will be implemented.

Trawl Species

Hake

In the case of hake the average annual TAC of around 400 000 mt set by ICSEAF (International Commission for the South East Atlantic Fishery) before Independence was cut by half by ICSEAF for the year in which Namibia gained Independence. Even before Independence, Namibia requested the ICSEAF member countries, through the president elect, to withdraw their fleets. Soon after Independence Namibia proclaimed a 200 nm EEZ. The "low" ICSEAF quota was further reduced by Namibia and, taking into consideration the fish caught by the ICSEAF fleet in the three months prior to Independence, allocated only 50 000 mt to be caught for the last three quarters of 1990. During 1991 a TAC of only 60 000 mt was allocated, based on a biomass of 300 - 400 000 mt. In spite of registering almost a doubling of the fishable biomass of hake in 1992, the TAC was kept to 90 000 mt. It should be emphasised that the present biomass, in spite of the encouraging signs of recovery, is at less than one quarter of the biomass at which it would peak and support the Maximum Sustainable Yield for the species. it is therefore important to keep the fishing mortality below 20%. In addition, a ban on trawling in water shallower than 200 m is in force, to protect juvenile hake. This programme is already showing signs of success as preliminary results for 1992 indicate a further substantial increase in the hake biomass.

Cape Horse Mackerel

This stock is in a healthy state. The policy for exploiting the resource at a fishing mortality level of about 30% of biomass is regarded as realistic. Recent stock biomass surveys indicate a stock size of between 1.5 and 3 million tons. A TAC of 450 000 mt was therefore set for 1991 and also for 1992.

Purse seining for horse mackerel in offshore areas is encouraged because the risk of taking pilchard as bycatch is diminished. Midwater trawling is restricted to a water depth greater than 200 m to minimise accidental pilchard and juvenile hake bycatches. Recent reports from surveys indicate that these measures are proving suc-

cessful and hake bycatches are now down to about 3% of total landings.

It is possible that competition between the increasing pilchard and hake stocks and the horse mackerel may lead to a decrease in the latter in the long term.

Small Pelagic Species

Pilchard

Of the Namibian fisheries resources, the collapse of the pilchard (*Sardinops ocellatus*) was perhaps the most dramatic. From an estimated biomass of about 6 million tons in the late 1960's, the biomass dropped to a meagre 50 000 mt in 1980. In 1980 all directed catches for pilchards were stopped.

A slow process of keeping the canning industry alive and rebuilding the stock ensued. This resulted in a present stock biomass of about 500 - 800 000 mt. This is not yet a total recovery but there are at least encouraging signs. For the first time in many years the age structure of the stock has recovered to include two age classes. The presence of fish of three years old bodes well for the future, because recruitment from older fish is thought to be much better than that from smaller, young fish. A constant problem in a mixed fishery industry is protecting the pilchard from being landed as bycatch with other species.

Anchovy

Scale records in sediment core samples going back some 18 000 years, show that the Namibian small pelagic resource has been largely dominated by pilchard. Pilchard, being more suitable for human consumption and being a longer lived species than anchovy (*Angraulis capensis*) is seen as a more valuable and more predictable resource. The 1987 - 1988 increase in anchovy biomass is seen by some researchers as a response to the collapse of the pilchard. Whether both pilchard and anchovy can be managed to yield substantial catches remains to be seen. Recent experience on the Namibian coast indicates that substantial anchovy biomass buildup is cyclic and fluctuates irrespective of fishing mortality.

To expect a constantly high catch from this species over time may therefore not be realistic and it may pay to fish opportunitically and heavily when the resource is available.

Minor Species

A number of minor species, for example different tuna species, snoek (*Thyrsites atun*) and species that are landed as bycatch to the trawl industry, for example different squid species, kingklip (*Genypterus capensis*) and monk or anglerfish (*Lophius upsicephalus*) should also be considered.

Tuna is targeted and may prove to be easier to protect and manage than species that come as bycatch to efforts targeted at other species. Careful planning of areas dedicated for long lining or bottom trawling may afford some protection to kingklip. The management of snoek, for example, may be less easy.

The total ban on the use of any form of gill net will go a long way to protect the larger pelagic species such as tuna

in Namibian waters. Joint efforts by countries bordering the south Atlantic will enhance efforts by individual countries to rebuild and protect especially the migrant species like tuna.

Fresh Water Fisheries

Namibia, being a semi desert country, has a scarcity of water bodies and rivers with a potential for fresh water fish production. Inland water bodies are furthermore mainly used for the supply of potable water to households and industry. These water bodies are therefore not regarded as potential sites for fish production. In some state dams, although earmarked for irrigation, some potential exists. The fact that these dams are in the central and southern parts of the country, whereas the majority of the population lives in the far north, poses a transport problem. No great potential for fresh water aquaculture, by comparison with the abundant marine resource, exists.

The only perennial rivers are on the northern and southern borders of the country. In the north, where the human population density is highest, the rivers are extensively fished. In the past, lower population densities and the disruption caused by the war, especially in Angola, eased the fishing pressure on the rivers. The situation is rapidly changing and it is feared that some species are already endangered. To attempt to regulate artisenal and subsistence fishing that has been going on from time immemorial, by legislation is bound to meet with resistance. Only through educating the people about the concepts of sustaninable fisheries and the importance of the maintenance of species diversity can lasting protection and sustainability of the resources be hoped for.

Pollution And Other Influences On The Environment

Namibia is contributing relatively little to local and global pollution.

Pollutants from elsewhere circulating in the oceans and air, however, influence Namibia as much as any other country. The pollution of the environment of a country like Namibia is observed with growing concern and anger by its inhabitants and the question as to how Namibia will be affected by, for examples the rising CO_2 content in the air and the resultant climatic changes, is frequently asked.

In the Namibian EEZ exploration for oil and the mining of diamonds on the sea bed started some years ago. By conducting an environmental impact study in time, base line data is to be gathered and the effect of such activities will be monitored. This will facilitate the optimal exploration of the potential mineral resources in the Namibian EEZ without undue loss in sustainable utilization of the living marine resources.

The sustainability of Namibia's living resources is, however far more threatened by the observed changes in global temperature.

The Future

It is clear that Namibia is serious about re-establishing its fisheries re-

By careful environmental assessments and monitoring of activities such as mining of the sea bed for diamonds and off-shore oil exploration, Namibia intends to ensure that the sea's lucrative renewable resources are not jeopardised.

sources and managing them in a responsible and sustainable way. The effect of the environment on the long-term future of the resource is, however, another matter. It is disturbing that a small country like Namibia is likely to suffer from the actions of man, in spite of the country's own efforts to maintain and protect its resources. Pollution that has a global effect should be addressed by the world at large with the necessary urgency and concern.

It is only relatively recently that the effects of global warming were considered.

In addition to a drier and more variable climate, Namibia might expect a rise in sea level, a warming in sea temperature and an change to the character of the Benguela system. As a result, low lying coastal areas would be flooded, and the distributions of fish and other marine species might shift with changing water temperature patterns. Changing wind patterns could have a profound effect upon the Benguela system, perhaps initially increasing the amount of coastal upwelling which could lead to anoxic bottom conditions, but thereafter changing to a calmer environment, weaker current and warmer sea temperatures.

We cannot yet predict with any accuracy what will be the effect of Global Warming on the Namibian marine environment and on the fishery resource. It must be clearly stated, however, that Namibia holds the polluters of the world responsible should the Namibian marine heritage be negatively affected by global climatic changes. It is regarded as grossly unfair that Namibia, who is managing her natural heritage wisely and with care may suffer from the reckless actions of other co-inhabitants of the globe. Should any such effects become visible, full compensation will be sought.

II d Achieving Sustainability In The Forestry Sector

Namibia's goal is to achieve sustainability in the forestry sector by carefully managing and protecting what resources we have, replacing those that we have lost and creating what we do not have.

Introduction

Although Namibia is mainly arid and semi-arid, about 80% of the land area of 823 000 km^2 supports trees and shrubs in vegetation types that range from open savannas to dry woodlands. About 20% is covered by dry woodlands, 29% by savannas with thorn or mopane trees, and another 29% by sparse savannas with scattered trees and shrubs. The remaining 22% is desert. About 12% of the country, i.e. 100 000 km^2, supports commercially exploitable timber.

The main part of Namibia's forestry sector is situated in the higher rainfall regions in the north and north-east of the country within the forest savanna and woodland vegetation type. This area is neither heavily stocked nor does it support high forests, but it is rich in savanna tree and shrub species. While there are no true "forests" in Namibia, it is convenient to use the term to cover the various woodland and savanna habitats that are exploited for timber.

The Role Of Forests

Woodlands and savannas play a vital role in protecting environmental stability, water resources and fragile soils. This has direct implications for crop and livestock production and for the sustainable development of rural communities. Forests support a rich diversity of biota, some of which are endangered and threatened with extinction.

By protecting dryland watersheds, ensuring groundwater recharge and stabilizing soils against wind and water erosion, the woody vegetation is an essential component in agricultural management and development, and in the maintenance of national food security.

For the majority of Namibia's rural people, the forests traditionally provide land for shifting cultivation and grazing, as well as fuelwood, building material for homesteads and cattle kraals, wild foods, shade from the sun and shelter from the wind, medicines

Namibia's woodlands are rich in biological diversity. They stabilise soils, influence temperature and rainfall and provide fuelwood, building material, medicine and food for the majority of Namibia's people.

and cosmetics. In addition, a number of secondary products are important, such as fodder, honey and beverages, e.g. fermented sap and berries of a number of different plants. Some tree species are of special cultural importance. Fuelwood has traditionally been used for cooking, heating, lighting and at social gatherings.

Present Problems

Many parts of our country, particularly the underdeveloped rural areas, are faced with deforestation resulting from heavy pressure on the natural resources. These areas are subject to heavy exploitation in order to meet domestic wood requirements. Unplanned exploitation of forests has spread in the communal areas of the northern region due to population pressure, poverty and underdevelopment. This situation is acute, particularly in those areas close to permanent settlements.

The majority of people in Namibia practice pastoral farming. The increase in numbers of livestock coupled with poor pasture management has resulted in overgrazing. Poor regeneration of our forests is a common condition, and is linked to overgrazing and too frequent fires. The incidence of fires in the woodlands of the north and north-east is very high, even annual in some areas. Trees and fodder are destroyed at a rate exceeding recruitment and regeneration is suppressed. Although fire is an integral part of the ecology of the region, it is destructive if not properly managed.

Under colonial rule there was little development within the forestry sector. There was limited research on woodland systems and forestry production, and research facilities were lacking. Since independence, the administration and development of Forestry has been severely hindered by the shortage of qualified forestry staff. There is a critical need to understand the ecological processes of woodland ecosystems and to establish appropriate management practices.

The population pressure in the northern parts of the country, especially Owambo, is seriously threatening the conservation, sustained use and even the existence of some of the rich indigenous woodlands. This trend is most likely to continue and to spread to Kavango and Caprivi unless changes in land use and development patterns are soon effected.

Many of Namibia's people are simply not aware of the effects of their actions on the environment, while others, because of their state of poverty have no option but to continue with their harmful activities. Awareness and education programmes are an essential part of sound forestry manage-

Deforestation is one of Namibia's most critical environmental challenges. It is brought about by overexploitation resulting from population pressure, poverty and underdevelopment, overgrazing by domestic stock and too frequent fires.

ment, and should be incorporated into all rural development projects.

Riparian woodlands in the northern parts of Namibia have been particularly badly deforested. Rivers attract people, and the river terraces provide good soils for cultivation. As a result, riverine forests are cut, leading to destabilisation of river banks, soil erosion, increased turbidity in rivers and a lowered resource base for people and wildlife. Another factor that is important is that these riverine forests provide a unique habitat for many plants and animals. Many tropical vertebrates and species from higher rainfall regions, e.g. some antelope species, birds, bats and invertebrates, enter Namibia only along these corridors and are confined to these riverine forests. Along the Kavango River, for example, about 70% of the riparian forest has been lost and, with it, the associated forest species. Many of Namibia's Red Data species are from this habitat and are on the list because of the destruction of their habitat.

Challenges

The main challenges to forestry development in Namibia are the protection and conservation of the resource, the development of new forestry resources and the utilization of both indigenous and man-made forests for optimal sustainable benefits.

The Namibian government supports:

the conservation and sustainable utilization of existing forests and forest lands;

the management of the catchments of perennial rivers and semi-arid regions for increased vegetation cover; and

the promotion of the above policies by public awareness campaigns and tree planting programmes.

The government is committed to the conservation of Namibia's biological diversity. According to the National Forestry Policy, 10% of the land area of the country will be managed as state forests. In addition, the government has accepted the following:

The maintenance of environmental stability through protection and, where necessary, restoration of woodlands and savannas.

The conservation of the natural heritage of Namibia by carefully managing the natural forests with their abundant and varied biotas.

Namibia has lost much of its riparian woodlands. In addition to protecting river banks from erosion, this habitat supports a high diversity of fauna and flora, many of which occur in higher rainfall regions and are confined in Namibia to these narrow corridors along rivers. The protection and re-establishment of riverine woodlands is a priority within the forestry sector.

Making forestry an essential part of land-use planning and land-use policy.

Making a "greener" Namibia by increasing the wooded area and by promoting appropriate land-use and habitat protection practices, particularly in areas at risk to desertification.

Making Namibia self-sufficient in fuel woods and construction timber by supporting afforestation and re-afforestation with indigenous and appropriate exotic species.

Encouraging efficient and sustainable utilization of forest resources, including appropriate technology, e.g. fuel efficient stoves, and indigenous knowledge and traditions.

Increasing our knowledge about woodlands and savannas in the forestry sector, the ecological processes involved and management actions, by means of a broad-based, well supported and organised research and monitoring programme.

The supervision of commercial forestry by government to firstly promote the industry, but also to ensure that the resource is harvested on a sustainable basis.

Educating the people of Namibia to be aware of the importance of woody vegetation (and the forestry sector) to the health of the environment, the economy of the country and to themselves.

Encouraging the participation and involvement of rural communities, including women and young people in all forestry and conservation activities.

Forestry plays an important role in contributing directly and indirectly to sustainable food production and the quality of life of the rural people. It must therefore be closely integrated with the other rural activities such as animal husbandry and cultivation to broaden the resource base and improve the nutritional and social security of people. Forestry must be included in other resource management and rural development projects.

Programmes Initiated And Future Requirements

Since the inception of the Directorate of Forestry at independence, a number of forestry projects have been initiated, some related to species trials and others to afforestation programmes. The most important step to date has been the development of a National Forestry Policy. This in turn is being applied in the preparation of management and research programmes, particularly in the areas of

fire in indigenous forests, agro-forestry and afforestation. Nurseries have been established throughout the country to encourage tree planting.

Forestry development in Namibia has been neglected for the past 70 years. While the contribution of this sector to the GDP will always be fairly low, the wise and sustainable management of woodlands and savannas is essential for the wellbeing of Namibia's environment, for soil and water conservation, for agriculture, wildlife management and tourism.

The most critical need within the forestry sector at the moment is the training of management and scientific staff. Second is the improvement of management systems for indigenous woodlands, particularly with regard to fire and sustainable harvest. Third is the need to extend the nurseries network throughout the country to promote tree planting campaigns, the development of woodlots and plantations. Finally, an active extension and public education programme is needed to alert people to the problems of deforestation and the need to use woodland and savanna systems in a sustainable way. With these four elements in place, Namibia's forestry sector will be well set to manage a healthy and productive industry.

II e Sustainable Management Of Wildlife

Namibia has a rich and diverse wildlife resource. Through wise and sustainable management of wildlife all sectors of the population can benefit and the protection of biodiversity can be enhanced.

Introduction

Namibia's rich and diverse wildlife is one of the greatest assests of the country and it's people. Namibia is in the unusual situation that more than 90% of its wildlife, particularly larger mammals, are found outside formally proclaimed conservation areas, mainly on agricultural land.

About 80% of the larger game species are found on privately owned commercial farming areas which comprise 44% of the surface area of the country, 9% on communal farming areas (41% of the country) and the remaining 10% on the protected conservation areas which cover 15% of the surface area of Namibia.

The game on the privately owned, commercial farming areas currently supports a healthy game industry which generated in excess of R30 million during 1991.

These large numbers of game on privately owned land can be directly attributed to legislation promulgated in 1976 which gave private land owners rights of ownership over some game species. This legislation thus established an ecomomic value for game and created a financial incentive for landowners to utilize game animals on a sustainable basis. This not only ensured the maintenance of the habitat of the target species, but also secured the existence of all other species sharing that habitat thus maintaining biodiversity for that region.

In recent years the wildlife industry on commercial farms in Namibia has grown considerably as farmers have realised the distinct and very important advantages of game farming over that of more conventional agriculture. Indigenous wild animals are better adapted to local environmental conditions. They have evolved with the plants on which they feed and thus have less impact. Their wide range of feeding habits (grazers and browsers at different levels) result in higher carrying and harvesting capacities. There is also a more diverse marketing potential such as trophy and sport hunting, cropping, live capture and tourism.

The sustainable use of wildlife for economic gain is currently limited to privately owned land. On communal land all wildlife belongs to the State and rural communities have no ownership rights or any other jurisdiction

Most of Namibia's wildlife is in private ownership. Wildlife is an important resource on private farmlands, earning farmers over R31 million in 1991.

or control over wild fauna and flora in their areas. This has led to a situation of serious conflict between wildlife and rural people in communal areas. The larger mammal species cause damage to crops, large predators kill livestock and endanger the lives of the rural people. Tourists flock to scenic communal areas to view wildlife, without any financial benefits returning to the people of the area.

Mission And Policy

The Ministry of Wildlife, Conservation and Tourism (MWCT) drafted a new policy during 1991 to address these and other environmental issues.

The following Mission Statement was adopted :

- "To maintain and rehabilitate essential ecological processes and life-support systems, to ensure biological diversity and to ensure that the utilization of natural renewable resources is sustainable for the benefit of all Namibians, both present and future, as well as for the international community".

Policies were drafted seperately for each of the three different land-use regions : Communal areas, Commercial farming areas and Conservation areas. Through these policies the MWCT supports rational, sustainable and integrated land use planning in all environments throughout Namibia; the formation of appropriate institutions to ensure that local communities are involved in all consultative and decision-making processes, and undertakes to ensure the maximum sustainable benefit from the land and natural resources for those communities.

Implementation & Action

The MWCT established an Environmental Planning Unit within the Ministry during 1991 to coordinate the programme for intergrated land-use planning for the various communal areas and the implementation thereof.

Four Community-based conservation programme surveys have been completed during the past two years, in Eastern and Western Caprivi, Bushmanland and, most recently, in the Kuiseb River of the Namib-Naukluft Park.

The objective of these programmes is to involve rural communities in conservation and wildlife management through their re-empowerment, and to share with them the benefits derived from wildlife management.

The landuse plan programme for the Western Caprivi was completed in 1991 and implementation of the recommendations have started. These include direct consultation with the rural communities on border agreements between parks and rural areas,

The government supports rational, sustainable and integrated land-use planning in all environments throughout Namibia, and the formation of appropriate institutions to ensure that local communities are involved in all consultative and decision-making processes and undertakes to ensure that benefits from natural resources are returned to these communities.

utilization of vegetation in "bufffer zones" around the parks, utilization of wildlife in these areas, and methods of establishing a "conservancy" structure for proper management of wildlife within a particular area.

Funds generated for Rural Communities

The Government is currently investigating methods of channeling funds generated from wildlife within the rural communal areas directly to these communities and setting up structures within these communities for managing their own wildlife resources.

Non-Governmental Organizations in Namibia have played a particularly important role in setting the tone and laying the groundwork for these ideas. They have created pilot projects for rural communities to generate income from tourism and other non consumptive uses of wildlife resources within the Communal areas of Kaokoland, Damaraland and Bushmanland.

Legislation

The Government of Namibia is currently revising and redrafting legislation on wildlife and other environmental issues.

Particular attention is being paid to ownership and rights of wildlife utilization in communal areas.

Commercial Farming Areas

Although the game industry on privately owned farms has expanded rapidly over the past few years, various problems still face this young dynamic industry. A lack of proper market research and strategy caused the large scale utilization / culling operations of certain game species to fail. The current extraordinary boom in the Ostrich farming industry seems to be heading for the same fate as the crocodile-skin industry which collapsed after a few years of unusually high demand for skins.

Need for Coordinated Research

Four Government Ministries are responsible for various aspects of control and research on the utilization of wildlife. Academic institutions of the University of Namibia, the Technicon and the Desert Ecological Research Unit at Gobabeb are also involved.

The government is committed to re-empowering rural communal farmers to fully participate and benefit from wildlife management in their areas.

Better collaboration between these institutions conducting research on wild fauna and flora and their sustainable use is needed.

These institutions should form a national wildlife research coordinating committee, chaired by the MWCT. This committee should provide guidelines and direct research on wildlife utilization, marketing of wildlife products, harvesting and stocking rates and related issues.

Proclaimed
Conservation Areas

The MWCT recognises the importance of intergrating some of these areas in regional and national land-use planning so that they contribute economically and culturally at the local and national levels.

This Ministry is currently investigating various programmes for increasing the value and benefits of conservation areas to all Namibians. Programmes in the Etosha National Park, the West Caprivi Game Park, Mamili and Mudumu National Parks and the Namib-Naukluft Park are being developed to integrate conservation with local rural development to the benefit of local communities. These include the possible utilization of wildlife in "buffer zones" on the park boundaries, repopulating wildlife on adjacent communal lands; direct access to the park for rural tourists and providing conservation training and extension programmes within the park for all its neighbours.

Extension And Training

The transfer of rights of ownership to rural communities will create tremendous requests for more knowledge, advice, training and support to start programmes on sustainable utilization in those areas.

These programmes will have to be carefully planned and coordinated between the various Ministries, academic institutions and NGOs who will play an important role in getting these programmes off the ground.

The MWCT is currently providing educational material to the Ministry of Education, the University of Namibia and the Technicon on wildlife utilization and other environmental issues for inclusion in the various curriculae.

International Cooperation

The Government of Namibia recognises its international obligation towards conservation of wildlife and biological diversity. It will participate in international conventions to safeguard the survival of wild species and remain sensitive to world opinion on conservation issues.

The Government will however take into account the wishes of its own people above those of the international community. It will retain its sovereign right to use its wildlife in a sustainable manner to the best interests of Namibians and to further national objectives of conservation and wise resource management.

Recommendations

1. Economic Benefits to Rural Communities

Government be formally requested to change current financial regulations with regard to state income so that income derived from consumptive and non-consumptive uses of wildlife in Communal areas be channeled directly to those rural communities as well as setting up structures within the rural communities to distribute the income received.

2. National Wildlife research committee

That a national wildlife research committee be formed with all the relevant Ministries, academic institutions and NGOs to determine priorities for a national research programme and coordinate and direct current research on the sustainable use of wildlife and other related issues.

3. Integration of Conservation areas and Rural communities

That the Ministry of Wildlife and the Government be requested to expand their investigations and current programmes on finding ways of integrating and creating direct benefits for rural communities form wildlife in proclaimed conservation areas.

4. Extension and Training

That the Ministry of Wildlife and the Government be requested to identify a Committee or Working group of Ministries, academic institutions and non-governmental organizations to set up a formal structure or practical guidelines for the planning, technical input and advice given to rural communities on sustainable use of wildlife.

5. International Agreements

That the Ministry of Wildlife be requested to include into their policy statement on International conservation agreements the following statement :

"The Government will however take into account the wishes of its own people above those of the international community. It will retain its sovereign right to use its wildlife in a sustainable manner to the best interests of Namibians and to further national objectives of conservation and wise resource management."

6. Exploitation of Plants

That the ministry of Wildlife be requested to launch an investigation into the current exploitation of plants in Namibia with guidelines and recommendations for the control and management to ensure the sustainable use of plants to the benefit of Namibia.

II f Development and Management of an Appropriate and Sustainable Tourism Industry

Namibia's tourism industry is based largely on its natural resources such as wildlife, wilderness and scenery. A sustainable tourism industry must be managed carefully to complement and broaden this resource base, not undermine it.

Introduction

One of the major development problems of Namibia is generating economic growth. Economic growth is necessary for alleviating economic problems such as unemployment, broadening the tax base of the Government and raising living standards.

In the short-term the only two sectors of the economy with a significant potential for growth are fisheries and tourism. The potential for developing the fishing industry is, however, limited and must be well controlled to prevent over-exploitation as happened during the sixties.

Tourism has become one of the largest, most lucrative and fastest growing industries in the world. It is an industry which needs comparatively little capital for its development and the creation of employment, much less for instance than the manufacturing and mining sectors.

Tourism is at present the fourth most important sector of the Namibian economy, after mining, agriculture and fisheries. At least 6 000 people are directly employed in this sector. Indirect employment in tourism is much greater. Tourism contributed an estimated R200 million to Namibia's gross domestic product during 1991. Taking into account the present low occupancy rates of accommodation (50-60%) as well as the potential for further development in the tourism sector, it is clear that tourism could easily double its contribution to the GDP over the next few years. This will, however, only happen if tourism is correctly promoted and the whole industry is carefully and properly managed.

Our challenge is to develop a sustainable tourism industry that will complement and not harm the attractions which draw tourists to Namibia, i.e. our scenery, wilderness, wildlife and cultural diversity.

Definition of "Sustainable Tourism"

Sustainable tourism can be defined as the business of hosting visitors to and within our country for economic gain, while taking fully into account the

Tourism is the fourth most important sector of Namibia's economy. If carefully and sensitively managed, it could expand considerably over the next few years and earn sustainable benefits for local communities, the private sector and the country.

sensitivity of the environment, the limitations of the natural resources on which tourism is based, and ensuring that the support systems and attractions which bring tourists to Namibia are not being undermined by that very activity. The development of sustainable tourism will require an integrated and multi-sectoral approach. The potential is considerable in Namibia for the development of a sensitive and sustainable tourism industry that can grow for the benefit of local communities, the private sector and the country.

Participants Iin Sustainable Tourism

Tourism is a multidiciplinary activity and several participants are involved in its development and operation. The most important participants are:

- The Tourism Industry, which has as its goal the development of a profitable business. If it is a sound industry it will look at its investments in the long-term and will not go for quick profits. This means that the industry in general should be aware of the benefits of protecting tourism resources against overutilization.

- Local Communities, which, through direct employment and the creation of markets are able to initiate rural development programmes. At present, the materialization of these benefits are reduced because of a number of filters and bottlenecks, which need to be removed or diminished.

- The National Government, which will obtain foreign currency for every Rand spent by overseas tourists and tour operator. However, the economic benefits of tourism and the sector's power to create income, export earnings and give employment can be reduced by leakages in the economic system. It is therefore of prime importance that the National Government provides economic linkages between tourism and other economic sectors and that leakages are kept at a minimum. The National Government also sets the rules for operating a tourism sector and it should provide the basic infrastructure including the education and training systems as well as the overall planning framework for the sector.

- Environmental Protection Bodies, which can be found at the local, the regional, national and, in some cases, the international levels. The main aims of these bodies are the protection of the environment, con-

servation of natural recources, preservation of cultural heritage and rehabilitation in cases where valuable resources have been overutilised and damaged.

- Finally, the Tourist plays a central role as the focal point for the overall sector activity. There is a large diversity of tourist types and reasons for travelling. Various tourist categories have different behaviour patterns and their demand for specific facilities and services vary considerably, resulting in very different approaches needed.

Planning for Sustainable Tourism

Planning of tourism is an intergrated process, where the considerations of all the above participants are brought together into a comprehensive tourism development strategy. In this process, possible causes of conflicting interests have to be evaluated and solved, maximising the overall benefits. For each of the five components, however, some basic requirements will have to be fullfilled. Tourists must be satisfied by what they receive for their money. The tourist industry must be able to manage a viable operation in the long run. The local communities must see tourism to be of overall benefit. The National Government must find its investments in the tourism sector and the supporting infrastructure to be a beneficial economic investment. The environmental protection bodies must be assured that the tourism industry will not have harmful effects on the environment, but can, on the contrary, be used to promote and financially secure protection of the environment. Without the above understanding and cooperation between the parties involved a beneficial and sustainable tourism industry cannot be created.

A tourism development strategy will therefore consist of a concensus of the above requirements but it will furthermore be constructed through the evaluation of a number of planning parameters such as:

Assessment of potential tourism products, their carrying capacities and their accessibility;

An analysis of the demand for identified products and a strategy to reach potential markets;

The availability of infrastructure, facilities and services and the possibilities and costs involved in eventual improvements;

The general availability of economic and manpower resources to support the development;

In the case of sustainable tourism development the evaluation of carrying capacities as well as environmental and socio-cultural effects of developing the products and the infrastructure must be carefully assessed.

Carrying capacities refer to the maximum number of tourists a specific site or area can accommodate at a specific time before negative effects manifest themselves. These effects can be biological and physical, they can relate to the tourists' experiences of the site, or they can be of a socio-cultural nature, where problems are experienced by local communities.

Determining carrying capacity is a particularly difficult process as this will vary considerably according to such variables as season, the behaviour of tourists, the availability and standard of the infrastructure, information and the design of facilities, etc.

Management and Marketing Issues

Even in well planned projects not all eventualities can be considered. Conflicts can develop between the participants involved in the tourism development. Similarly, conflicts can develop between tourism and other economic activities such as industrial development, mining or agriculture. Furthermore, environmental problems can occur which threaten the tourism industry, caused by factors such as pollution, or overutilization of sensitive or scarce natural resources such as water. Also, friction can arise between tourists and local communities.

To control such situations tourism guidelines for a management system should be developed. Many of the actions needed will be at the local level, but will require technical and managerial support from the national level.

The development of a clear and strong marketing strategy is a central issue of immediate importance for the creation of sustainable tourism. Marketing programmes reflect the tourist image of a country, which is essential for attracting the right type of visitor and for developing a tourism industry in line with the products supplied.

Marketing is the link between the products and the potential tourist. The products should be designed to take full advantage of local resources and attractions while taking due cognisance of environmental constraints and sensitivities.

Sustainable Tourism Development in Namibia

Namibia's tourism is very closely linked to wildlife and environmental conservation. The very fragile natural resources in some parts of the country and the existence of rare and valuable endemic flora and fauna all require firm management guidelines. The present and future success of Namibian tourism is dependent upon its environmental management policy. The Namibian tourism industry is very much aware of this. The country has a nature tourism image and the products are designed accordingly.

Special emphasis should, however, be given to the development and management of national parks and special natural features with the dual aim of environmental protection and high quality tourism development. If tourists are given a unique nature experience the country has a tourism prod-

The fragile environment in large parts of Namibia, and the existence of rare and valuable endemic flora and fauna, require a firm environmental management policy for tourism so as to ensure the protection of the country's resources.

uct with a high sales potential. The nature experience is not sufficient in itself, however, as the facilities, services and infrastructure also have to be developed.

While the tourism industry in Namibia is on a sound footing, the following issues should be addressed to further strengthen the industry:

A clear understanding of the abovementioned strategies will have to be fostered. This involves a closer collaboration between the parties involved, a higher degree of community involvement and development of a managerial system to secure appropriate tourism development. The managerial system should be capable of dealing with most problems at the local level, but should be supported by resources from the national level.

The second and essential issue for developing sustainable tourism is to closely link tourism and environmental conservation. Tourism should be used to promote nature conservation and at the same time nature conservation should be used for developing future tourism growth. This aim is best achieved through a commercial approach, closely linking natural resources and earnings. A significant proportion of the income generated from tourism must be re-invested to develop, manage and promote tourism and to sustain and develop the natural resources.

More awareness of tourism at the local and national levels will have to take place. Local communities will have to be more closely involved in tourism as well as nature conservation issues. Through tourism linked to nature conservation, local income can be generated and a higher degree of understanding of the value of environmental protection will result. Without local community involvement and a commercial approach to tourism, the dual aim of a sustainable tourism industry and an increased concern for environmental conservation cannot be achieved.

II g Mining And Sustainable Development

Mining in Namibia contributed about 33% of the GDP and about 76% of total export earnings. Namibia's challenge is to contain the environmental damage caused by prospecting and mining to an absolute minimum and to rehabilitate mined areas as an essential part of their decommissioning.

Mining In Namibia

Mining in the wider sense of the word involves the search for economically viable mineral deposits, the evaluation of mineral finds, the winning and the processing of minerals from viable mineral deposits, and the decommissioning of the mine on the termination of the mining operations. The underlying motive is man's constant drive to develop a more comfortable way of life and as long as this driving force exists and resources are available, mining will be an integral part of the human activity on earth.

For Namibia, being a developing country, mining and the income derived from the export of the mineral products have been the main source for general development ever since diamonds were first discovered at Kolmanskop in 1908. Scrutiny of the financial records show that over the years 1975 to 1990 mining has contibuted 33% (max. 47%, min. 24%) of the total GDP, 32% (max. 61%, min. 10%) of the direct taxes paid to the fiscus, and 76% (max. 85%, min. 65%) of the total export earnings. Also, the mining industry is a major employer that is responsible for substantial training in mining-related disciplines. Accordingly there can be little doubt that mining formed the backbone of the Namibian economy for many years and will probably continue to do so in the foreseeable future.

Mining And The Namibian Environment

Since mining is in essence a destructive process, it is bound to take its toll in terms of environmental degradation. This is particularly so in Namibia where about half the country is fragile desert. Physical degradation in such arid environments usually has long term aesthetic implications due to the low rate of regeneration of desert landscapes. However, mining activities take up only 0,1% of the total land surface of Namibia.

The search for minerals (exploration and prospecting) generally entails regional and semi-regional surveys of a relatively low density of human activity per unit of land surface area. In the mineral deposit evaluation stage the land area involved reduces drastically whereas the intensity of human activity rises sharply, to reach a maximum in the winning and proc-

essing stage. The search activity, provided reasonable care is taken, tends to pose a relatively small threat to the environment, but once a mine is established the potential of damage to the environment becomes much more acute. At the same time the responsibility for environmental upkeep widens from strictly intra-company to intra-mine community and a clear distinction is necessary between the environmental degradation attributable to the mine per se and that attributable to secondary human activities.

The rehabilitation of decommissioned mines upon cessation of activity is viewed as an essential component of the whole mining process, to avoid accummulation of future debts to the environment by the community.

Mining And The Namibian Economic Future

The ideal situation in any developing country would exist when the cost of development is carried by the sustained utilization of renewable resources.

In Namibia such a situation may arise once the fishing and tourism industries have developed to their full potential. Unfortunately it would appear that this ideal is not yet within sight and that mining will have to support development at least in the foreseeable future.

In spite of the fact that minerals are seen as a non-renewable resource, the economically recoverable quantity of minerals fluctuates in tandem with production and marketing factors. Accordingly, although mineral deposits are quantifiably finite in absolute terms, continuous technological innovation tends to constantly expand the limits of viability of mineral deposits. It seems reasonable to assume that most minerals are a long way from total depletion and, given the relatively unexplored nature of large parts of Namibia, mining activities in this country will probably be possible for a long time to come.

The Ultimate Challenge

Based on the given considerations, the government, the mining fraternity and the general public of Namibia must strive to optimise the advantages of mining relative to the disadvantages of the industry. Such optimization should be based on the reality that as long as the country derives or needs to derive benefit from mining, it will have to make a sacrifice on the environment.

Since mining-related degradation of the environment can not be prevented the obvious challenge is to contain it and thus to minimize its impact on the quality of life of all Namibians.

Partnership In A Shared Responsibility

As implied earlier the three main participants in proper environmental housekeeping to ensure sustainable mining activities are the government as regulatory authority, the mining industrialists as entrepreneurs and the general public as employees and beneficiaries at large. Each of these participants, down to their last individual member, needs to be fully com-

mitted to, and honest about, the relative benefits of mining to the community as well as the task of caring for the environment. If this pre-condition is not met any attempt to contain the possible mining-related degradation of the environment will be a futile exercise.

Acceptable Guidelines For Mining And The Environment *

For sustainable development of Namibia in general, and of the mining industry in particular, the government, mining entrepreneurs and their employees should:

- *recognize that high priority must be afforded to environmental protection and management;*
- *establish environmental accountability at the highest management and policy-making level;*
- *encourage through dissemination of information all employees at all levels to recognise their responsiblity for environmental management;*
- *make available adequate resources, staff and requisite training to implement environmental management plans;*
- *effect dialogue with the affected community and other directly interested parties on the environmental aspects of all the phases of mining, and negotiate the participation of these parties where necessary;*
- *practise risk analysis and risk management in the design, operation and decommissioning of mining activities, including the safe handling and disposal of hazardous mining and other wastes;*
- *recognise linkages between ecology, socio-cultural conditions and human health and safety, both in the workplace and in the natural environment.*

It is also accepted that the mining entrepreneur should:

- *adopt best practices to minimize the environmental degradation, notably in the absence of specific environmental regulations;*
- *adopt environmentally sound technologies in all phases of mining activities;*
- *seek to provide adequate additional funding and innovative financial arrangements to improve and maintain high stand-*

* FOOTNOTE: The guidelines used in this chapter are formulated after the guidelines adopted at the International Round Table on Mining and the Environment, Berlin, 25-28 June, 1991.

ards of environmental performance of mining operations, and the final decommissioning of the mine infrastructure.

Furthermore the government should:

evaluate and adopt wherever possible appropriate economic and administrative instruments to encourage the reduction of pollutant emissions and the introduction of innovative technology;

explore the feasibility of reciprocal agreements with neighbouring countries to reduce trans-boundary pollution;

encourage long term mining investment by having clear environmental standards with predetermined environmental indicators.

The general public should:

recognise the direct and indirect benefits the country derives from the presence of a sound mining industry and that mining-related degradation of the environment can be contained but not entirely prevented;

make a positive contribution to protection of the environment especially where mines are situated in remote and ecologically sensitive areas. Much of the degradation of the environment around existing mines is due to secondary human activities unrelated to the mining itself.

Towards A Clean Local Environment

Following the given guidelines the Ministry of Mines and Energy and the mining industry have accepted the policy of requiring that, at the onset of each new mining venture, an environmental management system is established.

Such management system ideally should include a detailed baseline study, a full environmental impact assessment with adequate pollution monitoring, control and auditing facilities, and clearly defined preventive and mitigative measures.

This general policy is adequately supported by legislation for mineral prospecting and mining and petroleum exploration and production. Explicit stipulations on environmental protection and management are contained in the legislation controlling natural oil and gas exploration and production in Namibia territory (Petroleum (Exploration and Production) Act of 1990). Similarly the new Minerals (Prospecting and Mining) Act of 1992

The Government of Namibia and the mining industry have accepted the need for the establishment of an environmental management system at the onset of each new mining venture. This would include baseline studies and an E.I.A.

introduces measures to be followed by the government to ensure proper care for the environment.

A Contribution To Global Environmental Well-being

Realizing the probable adverse effects that the burning of fossil fuels may have on the global atmospheric conditions the Ministry of Mines and Energy favours the use of electricity as an energy source in mining wherever possible.

The main source of the Namibian electricity is the Ruacana hydro-electric power station in the Kunene River. A second hydro-electric power station at Epupa in the same river is currently under investigation.

The development of the hydro-electric and solar power potential of the country is a priority with the government because of their clean and non-inflationary nature. By creating and maintaining low cost sources of clean energy the government plans to promote the use of electricity in mining, other industries and general households and so contribute to the arresting of the greenhouse effect and its consequences.

II h The Role Of Trade And Industry In Economic Growth And Sustainable Development

The Trade and Industry Sector aims to achieve both efficient economic performance and ecological sustainability.

Relative Importance Of Trade And Industry

In 1983 the contribution of the wholsale and retail trade to the Namibian economy was estimated to be 13.6% of the GDP. In the absence of more recent grouped statistics it is not clear if there has been a relative growth or decline in this sector.

The manufacturing sector's contribution to the GDP from 1980 to 1988 has averaged only 4.3% and provided 9176 jobs in 1989 (i.e. approximately 5% of the labour force in the formal sector). Industrial development in Namibia is dominated by food processing and, within food processing, the processing of fish products.

Namibia's economy is highly dependent on external trade. Merchandise exports are dominated by minerals which accounted for 76% of total exports in 1989. For domestic production and market requirements 90% of goods are imported. This includes approximately 50% food imports. In recognition of this "open" economy and vulnerability to price changes in the foreign markets for its commodities, greater processing of goods for local consumption and for the export market is necessary with the ultimate objective of ensuring the development of a more diversified economy.

Relationship Of Trade And Industry With Sustainable Development

Demand For Natural Resources

The above mentioned dependence of the Namibia economy on the export of commodities and the current drive for vertical and horizontal beneficiation of commodities exerts an increasing demand or pressure on the supply or utilisation of natural resources. Due to the concern that measures adopted for environmental considerations may have adverse impacts on trade and impede economic growth, it is increasingly recognised that policy actions both at the national and international level, are required to ensure that the goal of sustainable development and the rules of the international trading system are mutually supportive.

There appears to be a broad consensus that ultimately there should be no conflict between manufacturing or

trade and sustainable development, as sustainable development aims at achieving both efficient economic performance and ecological sustainability.

Environmental Policies

Environmental policies can affect manufacturing or trade in a number of ways:

- environmental protection measures introduced by Government could reduce the competitiveness of a specific industry, leading to pressures for trade protection on the grounds that competition from imports from countries where environmental protection is lower is unfair;

- environment, safety or health protection measures introduced by Government could lead to trade restrictions or embargo on imports;

- environmental protection programmes in the developed countries could have an impact on the total location of investment as it could lead to relocating environmentally damaging (or "polluting") industries from developed countries to developing countries with lower environmental protection requirements.

  (Namibia has, for example, experience of attempts to dump municipal and industrial waste under the cover of receiving recyclable products or a major source of energy or financial compensation).

Manufacturing Or Trade Policies And Measures

Economic policies affect the utilisation of resources not only domestically but also internationally and especially through the effects of such manufacturing or trade measures on other countries' domestic policies.

i. Non-Tariff Barriers: While Namibia, for example, had to take unilateral action to block the above mentioned dumping of foreign waste, the use of trade measures to enforce environmental policies should as far as possible be avoided, to discourage the introduction of non-tariff barriers to trade. Therefore, this could have been addressed if we had internationally accepted standards in place through international agreements.

ii. Harmonisation of Standards: While harmonisation of differing national environmental standards may be preferred from the manufacturing or trade point of view, from the point of view of sustainability it would be desirable that differences in environmental conditions be allowed to offset competition so that international specialization is efficient also from an environmental point of view.

This is because the enforcement of stringent environmental regulations of product standards can restrict market access. Standards should neither be discriminatory nor a disguised barrier to trade, but transparent, subject to international monitoring and sound management, taking into account the special conditions and development requirements of developing countries. Effective dispute settlement procedures would also be required.

iii. Export at any cost: The combined effects of low commodity prices, increasing import prices, high debt service ratios, tariff escalations and increased non-tariff measures, should not give cause to take an "export-at-any-cost" approach as it could lead to an excessive use of natural resources and the danger of a resource degradation cycle.

iv. User Charging: An important factor behind environmental degradation is that cost and prices of commodities often do not fully reflect their social cost (including that of environmental degradation).

A number of principles such as polluter-pays principle, the user-pays principal and the use of a precautionary approach where uncertainties exist can be utilised as regulatory tools to integrate environmental costs into economic activities, but may not be supportive to international trade if not transparent and accepted by the trading partners. Therefore, there is internationally a need to examine the terms and conditions on which these measures can be resorted to. This will require financial resources additional to the means of Namibia to investigate the Namibian position.

v. Recycled materials: Recycled materials and markets thereof could gain importance in future (amongst other to the greater awareness of environmental concerns) and with new production techniques and more stringent regulations regarding pollution, certain industries may have to close down and in some cases be replaced by more advanced ones. This means that environmental problems could more frequently transcend national boundaries and therefore necessitate more international co-operation.

vi. Technology: Technology is both the source of assaults on the ecosystem and the potential solution to improvement in environmental quality.

If environmental goals are integrated in these revolutionary technology innova-

tions the transition to a sustainable future will be faster, should cost less and provide mutual understanding and cooperation. Up to now, most environmental technologies have been developed in response to the appearance of environmental problems and had to be retrofitted to existing systems.

vii. Resource based industrialization: It must be noted that the Namibian concept of a resource-based industrialization policy may, for example regarding hides and skins, lead to processing which could emit substances that are potential pollutants of the environment. However, manufacturing also increases the market value of natural resources and so generates an economic incentive for their conservation and renewal.

Conclusion

In conclusion it would seem that:

Environmental policies should deal with the root causes of environmental degradation whilst taking care that environmental measures do not result in unnecessary restrictions to trade.

Environmental measures addressing transborder or global environmental problems should, as far as possible, be based on international concensus.

Should trade policy measures be necessary to enforce environmental policies the following principles should apply: standards should neither be discriminatory nor a disguised barrier to trade, but transparant, subject to international monitoring and sound management, taking into account the special conditions and development requirements of developing countries.

II i Land Reform, Resettlement And Sustainable Development

Namibia's land reform and resettlement programme must take environmental and climatic issues into account to ensure that the land will be able to support resettled people sustainably in the long-term.

Introduction

Namibia has perhaps the most favourable man-to-land ratio in Africa, with a population density of about one person to 686 ha. But it is an arid country with a fragile environment. Only 8% of the land receives more than 500 mm of rain per annum, the minimum regarded as necessary for dryland cropping. Another 33% of the country receives between 300 and 500 mm per year. Apart from these low averages, rainfall is highly unpredictable. Higher rainfall areas can expect fluctuations within 20% of the annual average. This variability increases with a decline in rainfall, so that in areas with a mean annual rainfall of 200 mm variations of up to 60% occur.

The agricultural potential of the land and land use patterns broadly reflect the rainfall pattern of the country. In the drier south and south-western regions, sheep farming predominates; in the central regions mixed small stock and cattle farming occurs while in the highest rainfall areas of the east and north-east cattle and game farming predominate. It is only in these regions that rainfed agriculture is practised on a regular basis, although small pockets of irrigation can be found elsewhere in the country.

Type of Farming	Area (ha x 10^6)	% of total farming area
Cattle	33,329	47,85
Cattle and small stock	9,810	14,11
Small stock	26,509	38,04
Dryland horticulture	0,0135	0,02
Irrigation	0,0026	0,0003

Broadly the following farming zones can be discerned:

Land provides the basis of existence for about 85% of the Namibian population. While about 20% derive a living from working in commercial agriculture, more than 60% are engaged in subsistence farming. The quality of land and water are therefore crucial to the present and future well-being of all Namibians. The fragility of the land places a special responsibility on the present generation to protect it to ensure that future generations will also be able to benefit from it.

Land Reform And Sustainable Development

It is commonly assumed that environmental degradation will inevitably follow land settlement and resettlement programmes. Such arguments are usually 'strengthened' by referring to the degradation which occurred on former commercial farms that were incorporated into communal areas. Settlement and resettlement programmes can take one of two forms:

i. settlement of groups of people on commercial farms

ii. the colonisation of presently unused areas.

Just about all commercial farmland is suitable only for extensive livestock production and wildlife farming, of which the former predominates. These two forms of production are the most efficient use of the land, since rainfed cultivation is not possible on account of low rainfall. Cattle provide people with a means of moving through arid areas and converting grass and rain into a useable form. But pastoralism or stock production as a technique to utilise scarce resources in arid areas is crucially dependent on large areas of land and flexible grazing systems. Anything which reduces this flexibility threatens the viability of stock farming. This becomes particularly pertinent during periods of drought.

Evidence of this can be found in some commercial farming regions where fences have limited the flexibility of management of livestock. About 65% of the commercial land in the northern region suffers from bush encroachment, while another 1,8 million ha of an estimated total of 11 million ha in the central region (16%) also suffers from the same problem. Depending on the degree of bush encroachment, productivity in the afflicted areas has declined from between 20% and 80%.

Those areas where communal farmers were moved onto fenced farms incorporated into Namaland and Damaraland following the recommendations of the Odendaal Commission (1964) show the most serious signs of ecological degradation. In-

Namibia's fragile land places a special responsibility on the present generation to protect the land to ensure that future generations will also benefit from it.

deed, given the fact that these fences did not allow for a sufficiently flexible system of range management, there may be sound ecological reasons for letting fences decay.

The increased fencing of communal land may have similar negative ecological effects on range land. In addition, these fences often restrict access by communal farmers to grazing reserves far away from their normal grazing areas.

Implications Of Land Reform

Settlement Of Groups On Commercial Farms

If commercial farming units were to be allocated to groups of small farmers, land degradation would be likely to follow, unless strict pasture and herd management techniques were observed and enforced. These should provide for sufficient flexibility to sustain agricultural production during drought years and beyond.

Colonisation Of Unused Land

Namibia possesses large tracts of unused land in the north and north-east of the country. Approximately 3,6 million ha of land in the Damaraland and Kaokoveld region are at present unused. However, this land is located in a semi-desert environment with an average annual rainfall of 50-100 mm. These areas are not suitable for agricultural production, and could form a natural buffer against the inland expansion of the Namib Desert.

Large tracts of pristine pastures are found in the Herero, Kavango and Ovambo region. Such areas have already been 'opened' up to a limited extent by providing water points, to relieve the existing pressures on communal land. Despite problems with regard to underground water, unused land will continue to be targeted for resettlement schemes.

Artificial water points may provide short term benefits to pastoralists, but whether they contribute to sustainable development of new land is questionable. Permanent water points encourage herders to keep their herds around them, rather than to move over wider areas. Trampling of the land around these water points is likely to occur, increasing the risk of desertification.

Sustainable development and its opposite, land degradation, is always a function of human activities. More often than not, human mismanagement of the land rather than climate is the main culprit in turning productive land into wasteland. Overgrazing is likely to happen under conditions where farmers have unrestricted access to the land without having the responsibility for looking after it. In such cases herds will increase with little regard to the quality of the pastures. To ensure the sustainability of production under such conditions, it is essential that appropriate schemes be introduced.

To do this successfully, it is necessary to tap the body of knowledge that small-scale stock farmers may have about pasture management. This requires that planners treat the needs

and objectives of stock owners with sympathy, and try to understand the multiple functions of livestock.

Conclusions

It is recommended that no settlement of people be considered in areas which are at high risk of desertification. Apart from the possible ecological damage that this may cause, it is highly questionable whether resettlement projects in these areas would be sustainable in the long run, given the low and highly variable rainfall and high frequency of droughts.

Alternative land use options should be investigated in an attempt to diversify production on the land along ecologically sustainable lines. In this regard wildlife management and different forms of tourism should be investigated.

Land reform and resettlement programmes should be based on carefully prepared land-use plans which take into account the resource base, climate and other environmental factors.

A clear policy and strategy on hand Reform and Resettlement should be developed which takes into account environmental constraints, research needs and long-term sustainability.

II j

Poverty - A Major Threat To Sustainable Development

"Do not borrow off the earth for the earth will require its own back with interest." Swahili proverb.

The alleviation of poverty is the most difficult task facing the new government of Namibia. Poverty, however, is not the same as inequality. The distinction needs to be stressed. Whereas poverty is concerned with the absolute standard of living of a part of society - the poor - inequality refers to relative living standards across the whole society. This paper defines poverty as the inability to attain a minimal standard of living.

As a point of departure, we must ask what we mean by a minimal standard of living? Household incomes and expenditures per capita are usual yardsticks for measurement of standard of living as long as they include own inputs from production (for example, informal sector employment, subsistence agriculture, barter, collecting firewood, cooking food, clothing, housing, etc.). We must also seek to understand the nature and extent of poverty: who are the poor, what are their numbers, where do they live, what are their living circumstances? Given these basic yardsticks it is immediately possible to identify sectors of Namibia's population who have low incomes and whose standards of living are low; these would include the majority of subsistence households resident in the so-called communal areas; the unemployed urban poor and exploited farmworkers and their families living on commercial farmlands.

Namibia faces a serious problem of both relative poverty, evident in the highly skewed distribution of income, and of absolute poverty, evident in the proportion of the population below a nominal poverty line. Namibia's per capita income of nearly US $1 200 places it firmly among the middle-income countries. Aggregate figures, however, tell only part of the story.

According to 1989 statistics, the wealthiest 5% of Namibians generate more than 70% of the country's GDP, while the poorest 55% generate only 3%. More than two-thirds of the population, moreover, are estimated to have standards of living so low that they live in "absolute" poverty. According to a recent World Bank report, Namibia's "white" population, which is no more than 5% of the total, is mostly urban and enjoys the incomes and amentities of a modern Western European country. The "black" population which is mostly rural, in contrast, lives in abject poverty. What the

tiny elite (both black and white) earns in a day of work, the urban poor earns in two weeks and the rural poor earns in one year.

Access to basic services, likewise, is highly differentiated. While the urban elite has access to excellent health care, the rural majority does not. One out of twenty children born today will be dead by his/her first birthday, and one out of ten will be dead before the age of five. Access to good education among the rural majority has been extremely limited. Prior to Independence in 1990, a rural child's chances of being taught by a "qualified" teacher were as low as one in fifty in certain regions (Caprivi and Herero).

Poverty is usually either explained in terms of political and socio-economic factors - that is, it is regarded as structurally induced - or it is looked upon as the outcome of impoverished natural resources: the differences in approach reflect two clearly distinguishable perspectives. The first concentrates on underlying causes and attributes the conditions of poverty to a range of dependent variables; the second perspective, although recognizing underdevelopment, is more concerned with the effects of poverty. A fuller understanding of the meaning of poverty is likely to be found in a combination of elements from both perspectives.

The relationship between poverty and the environment, in paricular, can variously be attributed to a continuing condition of under-development; to an active process of underdevelopment and to the extraction of surpluses through colonialism, neocolonialism and the forces of capitalism and unequal exchange; to ill-health and poor nutrition; to war; to natural disasters; to famines; to population growth and its pressures on resources; to degradation of the environment; to the impact of inappropriate capital-intensive technologies and to the failure of government services to provide for basic needs. Most of these factors can be seen to have had a profound affect on Namibian society, within the timespan of living memory, and have contributed to the incidence of poverty.

While the events of the past century have been tumultuous, it must also be recognised that poverty and social hardship also existed in the pre-colonial era. This was a consequence primarily of sub-marginal and erratic rainfall and of technological (and therefore productive) limitations in relation to Namibia's poor soils. The human condition was equally constrained by inadequate health knowledge, practices and service which shortened life and eroded strength. None of this denies that technologies were developed which related admirably and sustainably to poor soils with limited, uncertain rainfall.

This state of affairs, however, pertained as long as populations were small and the only significant demand on the land was for food. The fact remains, thus, that for many Namibians hunger was an annual occurence, diseases frequent, and death an ever present danger.

The existence of the poverty in Namibia in the contemporary era can be attributed to a number of reasons:

- from a historico-political perspective, apartheid policies were directly or indirectly responsible for many of the ills which face the country today; the effects of these policies, moreover, continue to be felt in the physical, social, economic, environmental and spiritual heart of the nation. In 1964 the "Odendaal Commission" assigned some 33.3 million hectares to 10 black "homelands" and 34.9 million to white commercial farmers: the "homelands", although predominantly lying in the higher rainfall areas of the country, are endowed with marginal soils and poor natural resource bases.

- The artificial concentration of the population into ethnic regions, has led to over population in many areas and consequently to over-exploitation of natural resources. Recent evidence suggests that agricultural productivity in the communal areas is in secular decline, as increasing numbers of people attempt to work smaller and more marginal land. The majority of rural households are no long able to sustain themselves purely from agricultural production and must augment their incomes from a variety of different sources.

- Opportunities for employment outside of subsistence agriculture, however, are extremely limited; the formal employment sector is small and unemployment, is high. The ILO have estimated that 25-30% of the labour force in the formal sector are unemployed, while two-thirds of those in the subsistence sector are underemployed. To compound this problem, an estimated 16,500 new workers, at the present rate of population growth, are entering the labour market each year.

- The high population growth rate, estimated at 3% per annum, is also aggravating existing problems, for although Namibia's population density is amongst the lowest in the world, the distribution is highly skewed, with the greatest concentration living in the north, which accounts for 60% of the total population. Within the densely populated regions of Owambo, Kavango and Caprivi population densities are also uneven, with very high concentrations in some locations resulting in land shortages and human and animal concentrations that are reaching or have already exceeded the carrying capacity of the land.

- Underdevelopment of the so-called communal areas, principally through administrative neglect as a consequence of the

apartheid system and as a consequence of the Independence war, has resulted in the marginalisation of human resource capacities and capabilities through inadequate provision of services and facilities such as education (schools), health (clinics, hospitals), agricultural extension, market outlets, and infrastructure (roads, water, electricity).

These points merely touch upon the issue of poverty and its underlying causes, but it remains an indisputable fact that poverty is a widespread and deep-rooted social ill which exists throughout the country, and that it is an issue which requires urgent attention.

Since the majority of Namibia's poverty stricken population are rural and thus, by implication, dependent on agriculture to meet subsistence and survival needs, the effects of poverty on sustainable development are concerned predominantly with population, land and ecological issues. It is well known that need can be as damaging environmentally as greed.

It is also generally acknowledged that interaction between poverty and the environment leads to a downward spiral of degradation, since those who are poor and hungry will often have to use the resources of their immediate environment beyond long term levels of sustainability in order to survive. They will often (as in Kavango and Caprivi) cut down the forests, and (as in Ovambo) their livestock will overgraze, whilst they lack the material, technical and organisational resources to invest in environmental renewal. The consequence is a vicious circle, as a depleted resource base leads to further poverty and to still further exploitation of a deteriorating environment.

Deforestation (or more accurately denudation by stripping all tree and bush cover), for example, is a result of households, generally without alternatives, attempting to meet basic survival needs: clearing land for agriculture, for use as building and fencing materials, and for energy needs. But, deforestation is ultimately disastrous in its impact on productivity and in its contribution to desertification (loosely defined) and soil erosion. It also directly influences patterns of household productivity. As agricultural productivity becomes increasingly insufficient to meet basic needs more and more people (and young men in particular) are leaving the rural areas in search of work. This leads to labour shortages in the rural areas and increases the burden on women and girls (by reducing their ability to grow crops, attend school, secure medical attention, improve environmental sanitation, etc.), and reduces the ability of rural households to escape the poverty cycle.

The question of the interrelationships between poverty and sustainable development is not clear cut, and has formed part of a debate that has been ongoing amongst international organisations, governments and academics for the past two decades. The nature of poverty itself and its underlying causes are complex, the more so when one considers the implications

that this poverty will have for sustainable development.

The oft-quoted text-book solutions and remedies for poverty alleviation can only hope to succeed if the general principles are adapted for each specific circumstance. The failure of large numbers of development programmes (with 'sustainably' often tacked on as an afterthought) has certainly much to do with the fact that these initiatives do not sufficiently consider peoples' needs, nor provide them with enabling alternatives to alleviate the root causes of poverty. Sustainable growth calls for development strategies that do not compromise the welfare of both present and future generations - thus it is a long term inter-generational approach.

In the face of the great unknowns concerning human interaction with the environment, the outcomes of long-term development strategies remain difficult to predict. The consequences of past developments which have lacked foresight and vision, nevertheless, are evident from the plethora of environmental problems which face the world today; at the same time, even the most thorough planning process cannot guarantee sustainable development. To alleviate poverty whilst managing growth on a sustainable basis requires sound macroeconomic policies and an efficient infrastructure; these are essential in providing an enabling environment for the productive use of resources, both human and material. Major efforts are needed to build local capacities, to produce a better trained, more healthy population and to greatly strengthen the institutional framework within which development can take place. It is also clear that, over the longer term, welfare cannot be steadily improved unless economic growth significantly exceeds population growth, whilst major efforts must be made to protect, not destroy, the environment. Greater sensitivity towards the environment, ultimately, is only likely to ensue once the majority of the population are able to raise themselves above the crushing level of absolute poverty.

In the Namibian context, the issues of poverty, the environment and sustainable development need to be viewed as interactive. We have a tendency at present to view issues sectorally (in terms of land, water, nature conservation, community development, etc.) rather than from a holistic perspective. This shortcoming exists at both a conceptual and a practical level. Ministries generally plan according to their particular mandate, but usually do not become involved in issues outside of the direct sphere of influence. Development agencies and NGOs, likewise, follow their own specific briefs and only in limited instances attempt integrated approaches. This is not to deny that specialisation is necessary, rather it is to stress that different agencies need to be aware of the interrelationship between their own activities, all the rest of the dimensions of human endeavour and the relatively fragile Namibian ecology.

In the final instance, while we need to recognise the historical determinants of poverty in Namibia and to under-

stand the processes which have led to a misuse of many of our basic resources, it is likely to be political dangerous and environmentally potentially disastrous, to continually dwell on the past while ignoring the present. Environmental degradation is continuing at a steady rate, and with it the prospects for sustainable development are further diminishing. Namibians succeeded in liberating themselves from colonial rule, they need now to devote their fullest attention to liberating themselves from poverty.

II k The Role of Development and Donor Agencies in Nation Building and Sustainable Development

Namibia's objective is to direct donor and development agencies to address the priority goals set out in its National Development Plan, and to ensure that Environmental Impact Assessments form an integral part of all these development projects so that sustainability is ensured.

Introduction

Namibia's independence on 21 March 1990 was achieved in an environment posing major challenges for planning and development. While administered as a province of South Africa, pre-independent Namibia had little administrative autonomy with regard to overall macro-economic decisions and planning. Administrative, technical and financial institutions were set up to cater for the modern economic sectors, neglecting the development of the communal areas where most of Namibia's people live.

Against this background the Government has undertaken the task of restructuring the Government machinery and retraining its civil servants. The Government has created new ministries and new policies, partly in order to provide mechanisms to implement its development plans. The Constitution of the Republic of Namibia provides the legal framework for the establishment of a National Planning Commission which is charged with the preparation of planning the priorities and direction of national development.

The National Planning Commission is established in the President's Office. The membership, powers, functions and personnel of the Commission's Secretariat are to be regulated by an Act of Parliament. The Cabinet has defined the following specific functions under the supervision and leadership of the Director-General:

- to promote the orderly development of Namibia,
- to plan and co-ordinate the development plan of Namibia,
- to undertake planning on a regional basis,
- to co-ordinate economic, social, infrastructural and institutional development in Namibia,
- to provide periodic plans for socio-economic development,

- to participate in the preparation of the annual government budget to ensure that socio-economic objectives and priorities are covered,
- to provide appropriate statistics for monitoring socio-economic performance, and
- to be responsible for the mobilisation and co-ordination of development assistance and advise line ministries on its use.

Recent Initiatives In Economic And Social Policy Of The Government Of Namibia

To carry out its functions a National Planning Act and a Transitional National Development Plan were drafted. The basic objectives of the National Development Plan are to achieve:

- effective management of demographic change and pressures,
- food self-sufficiency and food-security,
- efficient and equitable use of water resources,
- greater energy self-sufficiency,
- maintenance of species and ecosystems and prevention and reversal of desertification,

The welfare of the people will be promoted through policies aimed at:

- ensuring that every citizen has access to public facilities and services,
- raising and maintaining the level of nutrition and public health,
- raising the standard of living of the Namibian people,
- ensuring equality of opportunity for women,
- protecting and maintaining ecosystems and living natural resources.

To attain these objectives, the Government has identified four priority sectors:

- agriculture and rural development, on which the livelihood of the majority of the people depends,
- education and training, to give an opportunity to all Namibians to participate fully in the development process,
- health care (including potable water) for the neglected majority of the population, and
- housing, particularly for the less advantaged.

In the area of agriculture and rural development the increase and diversification of crop production is of major importance to improving the country's food self-sufficiency. Another important objective is to reduce the gap between communal and commercial farming, by raising communal

farmers' productivity. Communal farmers would be encouraged to increase production for the commercial markets.

In the fishery sector, the objective is to limit fishing to levels compatible with the renewal of the resource and internalize the benefits of the offshore fisheries. Ample opportunities would arise for investing in fishing fleets, especially after the recovery of the resource.

Namibia's educational system is not tuned to the country's needs: 30-40% of school-age children do not attend classes, and 60% of the teachers are not adequately qualified. Education will play a key role during the reconstruction and rehabilitation of the Namibian economy as well as for nation building and sustainable growth. Basic objectives would be the upgrading of the qualifications of the teachers, the provision of school facilities and the promoting of non-formal education.

Public health has been mostly curative in nature and not adequately available to a large sector of the rural population. In addition, most Namibians have access to only inadequate and unsafe water and live under substandard sanitary conditions. As a result many suffer from preventable diseases. Low incomes also affect the nutritional, housing and sanitation status of Namibian families. A large proportion of mothers and children are affected by these conditions. The government has devised a health policy whose central goal is the equitable provision of health services for all by the year 2 000.

There is an acute shortage of housing in some areas of Namibia. In order to alleviate this, the government intends to promote popular participation in housing through co-operatives, to induce greater use of local construction materials, assistance in the prevention of slums and peri-urban settlements.

Planning and Donor Aid Co-ordination

Namibia's membership in the CMA implies that the country does not face an effective balance of payments constraint. This institutional arrangement also means that Namibia's options for financing the public sector are limited. Money creation is not feasible, and because the local money and capital markets are still undeveloped, external borrowing and grants become the only significant source of resources through which the deficit of the public sector can be covered.

Concerning the need for development co-ordination, development aid became an important input for the development of an independent Namibia. The UNDP confirmed its commitment to assist the new government to organise a donor conference during June 1990. The need for aid was confirmed at the conference where pledging for development aid reached US$ 700 million for the period 1991-1993. Almost 80% of this amount would go into the supply of water and infrastructure, education and health facilities, agriculture and fisheries.

The link of foreign aid to political reform has assumed increasing impor-

tance with the trend towards democratisation in many parts of the developing world. The link seems strongest in sub-Saharan countries where most donors share the view that democratisation is conducive to improved economic performance. Political conditionality relates aid provision to actions ranging from improved human rights performance to constitutional change. Countries like Norway and Sweden have favoured governments committed to social values and high welfare spending.

Despite initiatives to increase environmental awareness in Africa over the last two decades, it has been unfortunate to note that environmental degradation in Africa has continued to plague the continent in crisis proportions. Following discussions at conferences held at various venues in Africa during 1991, an African environment and development agenda was compiled which emphasized the important linkages between a sound management of natural resources, the achievement of sustainable development goals and the elimination of poverty. Africa's priority concerns relating to environment and development emerge in the areas of:

- poverty and population dynamics;
- food security;
- energy security;
- sustainability of economic growth and employment;
- security and stability of financial resources;
- improvement of quality of life and habitat; and
- improvement of analytical and managerial capacity in the area of environment and development.

Planning for Africa's environment and sustainable development will of necessity call for considerable resource requirements and strong institutional and technological support. However, all development agencies working in Africa must continue to respond to environmental management responsibilities both within the national, regional and the global context.

The Government of Namibia has been under pressure since independence to transform its pledges for external borrowing and grants into real programmes and projects.

A total of 29 donors are reported to have disbursed development assistance to Namibia during 1990. Of these, nine were from the UN-family, two from non-UN multilateral organisations, thirteen from bilateral donors and five were NGO's. The total actual disbursement represents 97% of total pledging for 1990. The ranking of the 10 largest donors in accordance with the size of reported disbursement is as follows: EEC, Norway, Germany, Sweden, Finland, UNDP, Cuba, United Kingdom, and CFTC.

The bulk of bilateral assistance was provided to human resource development, whereas the multilateral donors spread out on four major sectors:

economic management, development administration, human resource development and humanitarian aid and relief.

Since independence, UNDP and UNICEF have stated their commitment to synchronize and programme jointly, whenever feasible, their respective assistance which covers the same cycle in areas such as primary health care, basic education, food security and women-in-development. UNFPA will also integrate its assistance with those of other UN agencies especially in the fields of population data collection and analysis, statistics, maternal and child health and women-in-development. UNESCO, ILO, IMF, World Bank, UNCTC, UNIDO, IFAD, UNJCGP, WFP, FAO and WHO liaise their activities with those of UNDP.

Namibia's independence marks the creation of a liberal democratic state with a Bill of Fundamental Rights, Freedom of Speech, the acceptance of the Principles of a Free Market Economy and an Independent Judiciary. These principles form part of the Constitution and as such are unassailable. The government continues also to respond to environmental management responsibilities both within the national, regional and global context. Pledges for donor aid are throughout transformed into real development programmes and projects that ensure nation building and sustainable growth. Despite a high population growth rate of 3,0% and frequent droughts, it has been fortunate to note that food shortages and environmental degradation do not pass beyond critical conditions as is the case in many other African countries. As long as Namibia continues to maintain its democratic principles and environmental management responsibilities, the door to international aid and assistance should remain open. It is also true that nation building and sustainable growth can only be ensured through this commitment and policy.

Conclusion

A number of development projects are currently being carried out in Namibia. In most cases, donor agencies and/or goverment ministries have ensured that Environmental Impact Assessments have been applied. From these assessments, the following problems have been recognised:

- little co-ordination exists between ministries,
- lack of a standardised approach,
- no legislation to enforce EIAs,
- no review process and process to ensure that stipulations within the EIA are accepted and followed.

It is therefore recommended that:

an Interministerial Committee be established under the chairmanship of the Ministry of Wildlife Conservation, and Tourism, to co-ordinate environmental issues;

policy and procedures be established by the Ministry of Envi-

ronmental Conservation for all EIAs;

appropriate legislation be drafted to ensure that EIAs have adequate support for their implementation,

a public awareness programme be initiated to inform people in both the developmental and environmental fields about the role of EIAs.

II 1 Preparing For The Future: Education and Sustainable Development

Namibia's goal is to increase awareness and knowledge, and develop skills and attitudes amongst young Namibians conducive to a harmonious relationship with the environment.

Introduction

Namibia's Constitution is one of the few that take the environment into account. Sustainable use of natural resources "for the benefit of all Namibians, both present and future" (Article 95) is listed as one of the Constitution's aims. Namibia's environment is one of great beauty and potential, but also of alarming fragility.

Education is an important vehicle in trying to achieve the aim of sustainable use of natural resources. Education is a strong instrument of both conservation and change in social thinking as well as being the most organised means for transmission of these social norms and ethics. Therefore, attempts have always been made to use education in serving the aims of society or a nation.

If used appropriately, education can be the key to ensuring that a country's citizens follow the path of environmental responsibility and sustainable development. This can be achieved if environmental issues and the link between conservation and development are woven throughout the fabric of formal education.

Environmental Education

The introduction of environmental education into the educational structure is one of the ways in which educationists can enable pupils to learn about man's relationship with the natural world. The concept of environmental education (EE) in the educational structure in Namibia is quite new, but the Government is committed to ensuring that EE becomes part of every pupil's learning experience.

This experience will embrace ecological knowledge, people- environment relationships, ethics, politics, sociobiology and public participation in decision-making.

The Ministry of Education and Culture has expressed its support for EE, and one of the aims of basic education will be to care for the environment through sustainable development. The introduction of a new curriculum includes three subjects in the Junior Secondary phase which lend themsElves to an environmental education approach to teaching. These subjects

are Life Science, Agriculture Production and Farming Technology and Geography. In the Senior Secondary phase, subjects such as Development Studies, Biology, Agriculture and Geography will serve this purpose. A subject called 'Natural Economy' will form part of the school curriculum in the future. This subject has the potential to meet many of the aims of environmental education.

The Ministry has appointed an environmental education coordinator in the curriculum planning unit. This person is responsible for liaising with other Ministries, especially the Ministry of Environmental Conservation, Wildlife and Tourism, NGOs and donors.

Future action will include:

Cooperation, support and assistance to the Ministry of Environmental Conservation, Wildlife and Tourism in order to put their environmental education centres into operation. Emphasis will be put on linking programmes to school curricula and the provision of materials for teachers. In order to achieve this, coordinators of EE in the two Ministries involved will work together at Ministerial, Regional and School level.

A cross curriculum approach to the teaching of all relevant subjects will be promoted. Environmental education should be an objective in the Broad Curriculum for all phases, i.e. Junior Primary, Senior Primary, Junior Secondary and Senior Secondary.

A permanent post will be created for an environmental education coordinator within the Ministry of Education and Culture. This person will have the responsibility to:

- Draft an integrated environmental education curriculum for all school phases.
- Coordinate environmental education within the Ministry of Education and Culture nationally and internationally.
- Liaise with other government institutions, teachers training institutions, NGOs, etc.
- Coordinate environmental education down to regional and school level.
- Identify community-based needs in order to promote the effectiveness of EE at grassroots level.

The training of teachers regarding environmental education is a vital component in any attempt to firmly establish EE in the formal education structure. In-service training of teachers will encourage creative teaching whereby teachers are able to carry out environmental education with limited resources. One or two teachers will be identified within each school who will participate in an ongoing in-service training programme.

Support to teachers in the form of training and development and distribution of resource material will also be vital. Some of these materials are already being developed and this work will be expanded.

Curriculum panels which will include environmental education, will be established within the Ministry of Education and Culture and will take responsibility for managing the whole cross curriculum approach.

The national strategy for the Ministry of Education and Culture will be as follows:

- Appoint a curriculum planner for EE who will work in the National Institute for Education Development.
- Establish a curriculum panel that will take responsibility for environmental education within the Ministry of Education and Culture.
- Basic education reform to include environmental education as a cross curriculum subject in basic education.
- Evaluation of the junior secondary curriculum to start conducting a cross curriculum environmental education syllabus.
- Promote Natural Economy as a subject in the Senior Secondary phase by assisting with the development of teaching materials and equipment.
- Planning and conducting in-service training courses for environmental education.
- Assisting with curriculum development for pre-service training courses and cooperating with teacher training institutions.

Tertiary Education

Tertiary education is another important vehicle for ensuring that the formal education system prepares Namibians for a future of sustainable development.

Again, it is through a cross-curricula approach that the principles of environmental responsibility can become part of the learning process of every student.

This is particularly important at the tertiary level where students are being trained to enter professions in which daily decisions are taken which directly affect the environmental health of the nation.

For example, the engineers who leave the tertiary education system need to take with them a broad base of knowledge which will enable them to plan and design environmentally friendly development projects.

Engineers need to be aware of the need to carry out environmental impact assessments as part of project planning. They need to be aware of the need to consider appropriate forms of material, technology and energy in the design process.

This is true of other disciplines such as architecture, town and regional planning, etc. In subjects such as Agriculture, the key concept of sustainable use of resources needs particular emphasis. Even within the Arts subjects at tertiary level, there is a place for consideration of the importance of the environment in human cultural and spiritual life.

Wherever possible, the Government will encourage the inclusion of environmental issues in the syllabi of the subjects taught within the tertiary education system.

The Ministry of Education and Culture will develop a national strategy for the inclusion of Environmental Education throughout the formal education structure, and for the development of a cadre of teachers well-equipped for this task.

III

OUR SPECIAL SPACES AND SPECIES

III a Protecting Our Special Ecological Areas

Namibia's long-term goal is to set aside as protected space at least 10% of each vegetation type and a representative selection of special features.

Introduction

The Namibian government believes that protecting and enhancing the natural heritage of Namibia is of vital importance. The rich diversity in biological forms, landscapes and human culture must be a major component of our legacy to future generations. This diversity represents an irreplaceable portion of the world's biodiversity; accounts for the characteristic ambience of Namibia; serves as the major attraction for tourists from all over the world; provides many Namibians with highly valued recreational, research and educational opportunities; and, most important, forms the basis of both our subsistence and market-based economies.

Protecting special places and ecological areas from pressures resulting from human populations and development activities forms one part of the multifaceted approach in Namibia to ensure the protection of our natural heritage. Controlled access to sensitive areas is sometimes required to preserve important landscapes from the activities of humans. The network of protected areas also plays a critical role in conserving representative portions of different vegetation types, habitats and species.

Fourteen protected areas, representing 13.1% of the land area of Namibia, have been established since 1907. Marine environments and some terrestrial systems have, however, been neglected. The national target is to include at least 10% of the vegetation types and a representative selection of special features in a protected area network. Land not suitable for other purposes has historically been allocated for conservation.

Namibia's network of protected areas is a vital component in the national strategy to conserve biotic, archaeological and scenic diversity.

The design and shapes of protected areas were largely based on arbitrary decisions and short-term political considerations. Some protected areas are thus not representative of regional diversity or appropriate for the protection of the systems they represent. Inappropriate park design has resulted in continuous expenditure to maintain arbitrary boundaries to the detriment of wildlife populations and neighbouring human communities.

The government strives to protect the special places that best represent the landscapes and ecological diversity of Namibia.

areas should serve as "core areas" for wildlife and as sources of economic and material benefit to neighbouring human communities. The success of the protected area network in Namibia will depend on the public perception of these areas as sources of more benefits than conflicts. *Human needs in terms of the use of re- sources in and around protected areas are thus recognized as important ingredients in the management of such areas.*

Protected areas in Namibia were originally developed to cater for the

Distribution of protected areas in the three major biomes of Namibia.

Biome	Proportion of country (%)	Total protected area (km^2)	Proportion of biome (%)	No. of protected areas per size category (km^2 x 100)			
				<1	1-10	10-200	>200
Woodland	20	10 714	6.5	0	2	3	0
Savanna	64	27 621	5.2	2	2	1	1
Desert	16	69 828	53.0	1	0	1	1
Total	100	108 163	13.1*	3	4	5	2

*National total

Wildlife and humans often compete for the same resources in Namibia. It would therefore be unrealistic to try to contain entire ecological systems within protected areas due to competing human needs. Rather, protected

recreational needs of foreigners and minority population groups. Rural communities neighbouring on protected areas have received minimal benefit from parks and seldom made use of their recreational facilities.

Protected areas should serve as core conservation areas for wildlife and natural resources. Where possible, they should be open systems which export resources for the economic and material benefit of neighbouring communities.

Park management philosophies have aimed at the exclusion of people and human effects, resulting in continuous problems and conflicts. Park boundaries have become the frontiers of conservation and military strategies were employed to protect these boundaries. *The government of Namibia wishes to normalize the relationships between park management and park neighbours, and redefine the role of protected areas in Namibian society.*

Completing And Rehabilitating The Protected Area Network

It is not sufficient to apply legal measures through proclamation to achieve protection for a given area. Unless the public wants that form of protection, it is bound to fail. The purpose of protection must be spelled out precisely in each case. Simply protecting a few features of a landscape or a part of the habitat of a species is not necessarily effective to maintain biodiversity in the long-term. It is counterproductive to have a large number of parks covering a large area if these parks are not viable and contribute little towards biodiversity conservation.

In Namibia, the protected area network is the principle method of preserving and protecting land and its resources from changes brought about by people. Most of the parks and reserves were established to protect declining populations of large mammals, with less consideration given to protecting a representative part of an ecosystem. The characterization of biodiversity in Namibia is far from complete and in all probability additional reserves will be required to include the wider spectrum of diversity in the protected area network. *The government aims to reassess and rationalize the viability, management and representation of all units in the protected area network. Special attention will be given to the design of units, boundaries, compatibility of management objectives with physical constraints and the optimal use of each unit.* Strict protection following the "National Park" model is not an appropriate approach for many of the smaller units requiring intensive management.

Alternative options concerning the effective protection of special places and viable units will be considered. Partnerships between State, private and communal landholders may solve many conservation issues without the need for appropriation of land. Future proclamations of land by the State as parks or reserves will be limited to situations where strict pro-

tection measures are essential and cannot be achieved by less formal steps. The status of State land not included in the protected area network yet managed for the maintenance of wildlife and for recreational purposes, will be given special attention. The government thus envisages a protected area network composed of:

- units with a form of legal status commensurate to the threats of transformation or the loss of biodiversity;
- viable units incorporating land under different tenure categories, ie. multiple ownership of a mosaic of subunits managed for a single purpose;
- units with management goals conforming to the optimal use of land for each unit, and recognition of the relative value of individual units towards biodiversity conservation.

The protected area network will thus include formally proclaimed national parks, monuments and reserves as well as contractual parks, conservancies, private and communally owned nature reserves, national heritage sites and other categories of land managed according to the spectrum of goals contained in the IUCN list of conservation categories.

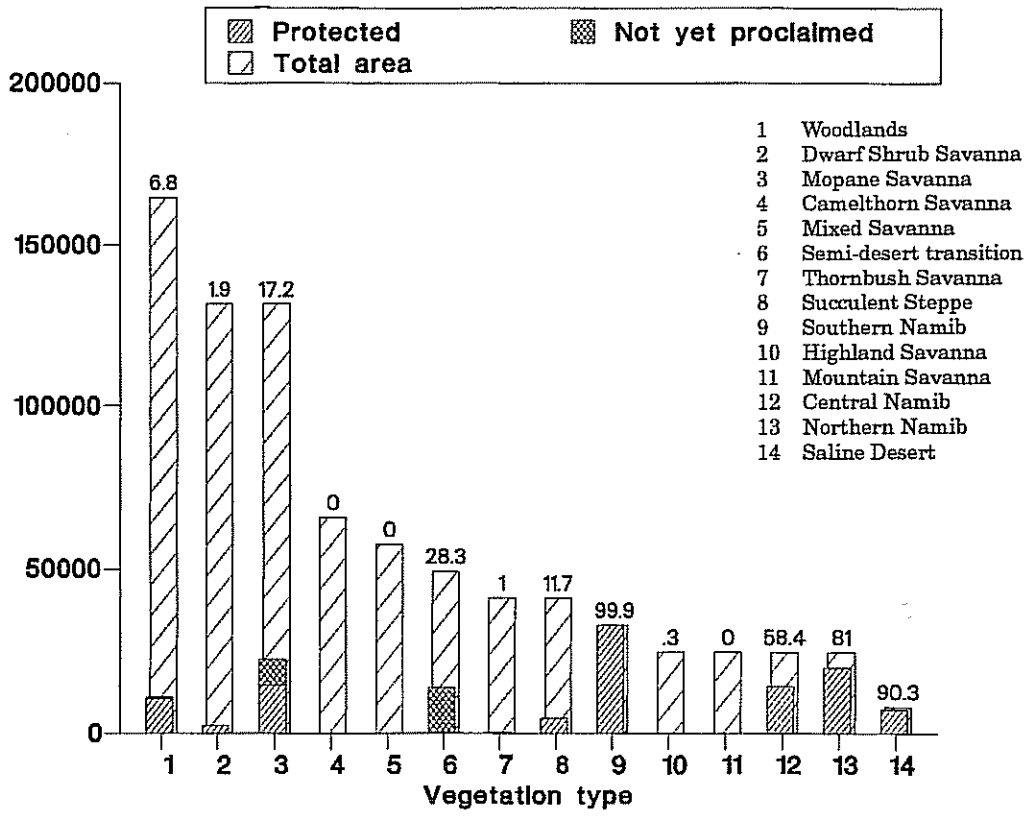
Priorities for which the government of Namibia will establish effective levels of protection through proclamation or alternative methods include:

- centers of biodiversity and places harbouring endemic species, e.g. Karstveld caves and lakes, wetlands, inselbergs, succulent communities in southern Namibia, riverine forests, grasslands, escarpments;
- critical habitat for important assemblages of wildlife, e.g. breeding sites for migrant birds, bat roosting caves, riverine oases in the Kaokoveld for large mammals, elephant and black rhinoceros habitat in Damaraland;
- representative examples of ecotypes not currently under any form of protection in Namibia, e.g. Kalahari thornveld, Mountain Karstveld, northwestern escarpment, islands and a variety of marine environments;
- places and systems presently inadequately protected due to the size, design and representation of existing protected areas, e.g. the palm savanna of Owambo, Cuvelai delta, northern Namib Desert, Khomas Hochland, as well as regional biotypes of which less than 5% is included in protected areas i.e. the dwarf shrub savanna, thornbush savanna, and highland savanna;

- places and systems not represented in the protected area network at present e.g. the camelthorn savanna, mixed savanna, mountain savanna;
- national monuments of special archaeological, historic and cultural importance, e.g. Brandberg, Twyfelfontein;
- bufferzones around protected areas to achieve a gradual transition of landuse practises from strict protection to multiple use;
- corridors linking protected areas as far as possible, to prevent the long-term isolation of populations and maintain genetic diversity;
- bufferzones around foci of desertification and veld types which have deteriorated due to unsustainable landuse practises.

Protecting Namibia's Natural Heritage

The existing protected areas are not effective in protecting the range of landscapes and biodiversity of Namibia. Individual areas do not fulfill their required roles due to a variety of factors including management goals,



Proportion of each vegetation type (numbered 1-14) proclaimed as part of the protected area network. The number above each bar is the percentage of each vegetation type protected.

Proclamation of land as parks is no guarantee that effective protection will ensue. Protection can only be achieved when the biodiversity and landscapes of Namibia are perceived as valuable resources. This will only happen when people see benefits coming from parks to themselves and their communities.

size, design and representation. Additional areas will be added to the network and the current units will be modified to attain conservation goals. Proclamation of land units as parks or reserves is by itself no guarantee that effective protection will ensue. Protected areas will have to be made as economically viable as possible, and relevant to the needs of user communities. The degree of protection of a system or special place will depend on the value assigned to it. It is the task of government to ensure that, if resources in parks are used to the benefit of the region, they are managed sustainably and with sensitivity.

The government of Namibia will:

- investigate the sustainable use and conservation value of land units currently included in the protected area network;
- rationalize the protected area network to consist of units effectively protecting representative examples of not less than 10% of all ecological regions and their major variations;
- establish a protected area network consisting of economically viable and self-supporting units where possible, using a range of management options appropriate to each case;
- explore and support forms of protection alternative to the appropriation of land as proclaimed areas under direct state ownership and management.

Further Actions For Protecting Special Places

The role of private and communal landholders in the protection of special places must be given greater recognition. It will not be possible to proclaim every unique or special place as a protected area. The key to protection in these cases will be the cooperation of landholders and an awareness of their obligations to protect special places. The concepts of conservancies and heritage sites as land belonging to one or more owner and managed for a conservation purpose can be the most effective forms of protection for any system and species. In addition, this form of conservation provides wildlife corridors and reduces the "island" effect where species within parks become genetically isolated from other populations. When a country's citizens protect resources, a government conservation agency has achieved most of its objectives.

Finally, an inventory of places requiring additional protection should be compiled as a first step to searching for appropriate means of establishing protection.

An inventory of biodiversity in Namibia is a vital requirement in the process of planning for effective protection of our natural heritage.

III b Preserving Our Biological Diversity

Namibia's goal is to maintain and improve the health and diversity of our wild plants and animals.

Introduction

The Namibian Government is committed to the maintenance of biological diversity, both in Namibia and globally. This policy is based on the knowledge and acceptance that the loss of biological diversity is impoverishing the world of its most fundamental capital stock: its genes, species, habitats, cultures, ecosystems and landscapes. This affects the ability of the biosphere to sustain itself and people, and reduces future options for wildlife utilization, land use and development. In addition, Namibia accepts that all ecosystems are ultimately interrelated, thus each country, Namibia included, is responsible for the protection of its own biotic diversity, as well as that of the environment.

The ethic of protecting biological diversity is enshrined in Namibia's Constitution. Article 95, entitled "Promotion of the welfare of the people" states: "The State shall actively promote and maintain the welfare of the people by adopting, *inter alia*, policies aimed at the following: "maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future;...".

Biodiversity Conservation Problems In Namibia

Some wildlife populations and habitats are under considerable pressure in Namibia. Many of the problems revolve around the fact that Namibia is primarily an arid and semi-arid country, where water is limited and localized. In many areas, communal farmers, commercial farmers, industry, and wildlife compete for the same limited resource. Some areas, because of their periodic aridity were visited irregularly in the past by nomadic people. Today, however, these same areas are inhabited by permanent settlements, areas which, in

The loss of biological diversity throughout the world is impoverishing the world of its most fundamental capital stock: its genes, species, habitats, cultures, ecosystems and landscapes. The Namibian Government is committed to the maintenance of biological diversity, both in Namibia and globally.

essence, are viable only during the wetter periods of the rainfall cycle.

A large number of rural Namibians live at a sub-economic level and still pursue a full-time or part-time hunter-gatherer existence. These life styles depend to a large extent on wild foods and are sustainable in character. However, since the Namibian human population is increasing rapidly, the ability of the natural environment to sustain such utilization strategies has been surpassed in some areas.

Outright over-exploitation of species of international economic value, black rhino (white rhino were extinct in Namibia by the late 1800's) for instance, and the eradication of certain predator species like wild dog and lion, which are in direct competition with man, are also factors leading to the degradation of Namibia's biodiversity. Less obvious, but perhaps more insidious is the abstraction of water and subsequent lowering of water tables in some areas, the Karstveld for instance, where endemic cave-dwelling water-dependent species may become extinct before they are even discovered. Many species have evolved a dependency on a particular habitat which itself is vulnerable: a notable example is the localized extinction of a fishmoth along the Skeleton Coast - because its required habitat, driftwood, has been methodically removed by picnickers and campers.

Other biodiversity conservation problems include deforestation, invasive alien plants and animals, the exotic pet & garden trade, use of pesticides, inappropriate development such as hydro-electric schemes, open water canals, and alteration of wetlands.

Although Namibia boasts one of the lowest human population densities in the world, the area is not suited to intensive agriculture and is subject to periodic droughts - leading some authorities to claim that at a population of around 1,4 million, Namibia is already exceeding its carrying capacity, i.e. Namibia is already over populated with people.

The concept of biodiversity conservation is one which generally enjoys universal support. In many situations, perhaps most situations, however, the concept runs contrary to current political and economic practices. Our societies' political and economic systems thrive on exploitation, and development is often the result of a net destruction of natural resources. We are now requesting Namibians as well as the entire global community, to suppress these attitudes of short-term gains, in favour of a future with maximum options and long-term returns. In effect we are asking them to invest in the future.

The conservation of biological diversity requires a change in human attitudes, from one of exploitation for short-term gain to one of retaining development options and planning for sustainable returns.

Biological Diversity Policy

The policy of the Namibian Government (implemented through the Ministry of Wildlife, Conservation and Tourism) is to ensure adequate protection of all species and races, of ecosystems and of natural life support processes through a variety of mechanisms. Firstly, inventories are being prepared for all groups of animals, plants, and habitats. These inventories are long term programmes and primarily involve museum-based taxonomists and herbarium-based botanists. The State Museum of Namibia and the National Herbarium of Namibia both play key roles in this process. These inventories lead on to monitoring, appropriate research, and education and extension. The policy futher provides for managing, assisting and advising on the management of land and resources, which ultimately leads to environment- and people-friendly national legislation.

Namibia belives that the most effective and efficient mechanism for conserving biodiversity (genetic, species, ecosystem and culture diversity) is to prevent the destruction of landscapes and ecosystems. To protect threatened individual species, populations and genes, however, habitat protection will have to be complimented by a wide array of other techniques. The options range from species-management programmes in the wild to off-site protection and captive breeding. An integrated approach to conservation - one that utilizes this entire range of techniques - is a cornerstone of biodiversity conservation.

Guiding Principles Of Namibian Biodiversity Protection

Research is encouraged, promoted, and directed toward:

a. The definition of biological diversity problems, and the identification of areas, regions and specific sites which are in need of protection in order to preserve specific aspects of Namibia's biodiversity.

b. The immediate objective of biodiversity research in Namibia is to define the conservation status of all species, races, and stocks of Namibian fauna & flora. The first step in this process is to gain a thorough understanding of every taxon's taxonomic, phylogenetic and biogeographic status.

c. The third aspect is the monitoring of resource utilization and determining whether this is sustainable.

The research outlined above is not the sole responsiblility of the Ministry of Wildlife Conservation and Tourism but requires collaboration with other institutions, especially the University of Namibia, the Ministry of Agriculture (and the National Herbarium), Ministry of Education (State Museum of Namibia), Ministry of Lands & Resettlement, and the Ministry of Mines & Energy (Geological Survey of Namibia) and NGOs. Visiting, as well as local researchers and students are

often encouraged to pursue aspects of local biodiversity research.

Habitat protection by means of land acquisition by the Ministry of Wildlife Conservation and Tourism, in the formal sense, is an option to enable the Ministry to legislate for a high level of environmental protection for representative samples of biotic and abiotic elements of Namibia.

Habitat protection by means of non-formal land acquisition should be actively and creatively explored. Consultative, cooperative or contractual strategies seek the willing consent and active participation of the people who are part of the landscape in question. Such strategies include the following:

a. A Natural Heritage Site Programme.

b. The establishment, where suitable, of co-operatively managed buffer areas surrounding proclaimed reserves (including proclaimed buffer zones).

c. A programme to promote and implement the conservancy concept.

d. The principle of sustainable development being promoted and adapted throughout Namibian society.

In some circumstances, it must be recognized that protection of biological diversity, ecosystems and important landscapes is of national and sometimes international importance, and this must override local interests. Where all reasonable methods fail to afford protection to these features, land or particular sites may be expropriated in terms of the concept of Public Domain (Article 6(2) of the Namibian Constitution).

The government accepts that development is necessary and vital for economic growth to improve the quality of life of all Namibians. All development programmes, however, must be sustainable and must be evaluated at an appropriate level by means of an environmental impact assessment, or by integrated environmental management procedures. This includes proposed developments within proclaimed conservation areas.

The evaluation of appropriate technology, for instance, hydro-electric versus solar or wind power generation, and appropriate agricultural practices, for instance, homogenous versus more genetically-rich traditional systems, is also a function of the Namibian biodiversity research programme.

Appropriate education and extension work is being carried out and expanded in Namibia in order to instill an environmental and conservation ethic

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about 11 Namibian NGOs work in the field of biodiversity conservation, and good relations exist between them and government. Namibia fully supports the "GLOBAL BIODIVERSITY STRATEGY", that is, we adhere to the view that biodiversity must be preserved, studied and utilized sustainably and equitably.

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Namibians recognize that the greatest threat to biodiversity is the non-sustainable ultilization of natural resources and uncontrolled development. These conditions are, in part, caused by poverty, which is itself largely a product of human overpopulation. Thus, the campaign to minimize biodiversity loss in Namibia is multi-pronged: protection of habitats and resources, sustainable utilization of renewable resources, environmentally sound development, family planning, and environmental education are the main components of the Namibian "Green Ethic".

Namibian Biodiversity - The Current State Of Knowledge

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Biodiversity surveys in Namibia began in the late 1800's during the German colonial era. It was not until 1962, however, that the State Museum (located in Windhoek) was formally established. Today the State Museum of Namibia (administered

f Namibia's biodiversity strategy are: protection of sustainable utilization of resources, environmen- family planning, and environmental education.

by the Ministry of Education and Culture) is the centre of animal biodiversity taxonomy & biogeographical research, as well as being the national depository for Namibia's biodiversity (animal & cultural) collection.

The National Herbarium of Namibia (located in Windhoek and administered by the Ministry of Agriculture, Water and Rural Development) was established in 1953, and is the centre for plant taxonomy & biogeographical research, and is the official depository for Namibia's plant collection. Under the auspices of the Herbarium, Namibia has now established a gene bank which is to act as a storage and accumulation centre for Namibia as part of the SADCC region.

Although biodiversity research has been conducted more or less continuously for the past 40 years in Namibia, this research has concentrated on certain groups of organisms, leaving others badly neglected. Marine biodiversity has been particularly neglected, especially the invertebrates and lower plants. The Ministry of Wildlife, Conservation and Tourism employs a fulltime senior researcher to co-ordinate and investigate biodiversity conservation matters. Filling in these gaps in our knowledge is the immediate goal of Namibia's biodiversity research programme.

Namibian biodiversity scientists estimate that less than 10% of Namibia's fauna and flora is presently known, described, and documented. In some groups, e.g. birds and mammals, the diversity is probably fully described, apart from taxonomic splits and changes, while in others, fewer than 5% is known.

Namibia's Protected Areas

About 13% of Namibia is currently proclaimed as protected areas. This figure hides the fact that the distribution of the protected network is skewed in favour of the Namib Desert, and that four of Namibia's fourteen plant communities have no protected status at all.

Based on an assessment of the number of endemic species, biodiversity richness and the extent of present protection, the priority areas for future protection in Namibia are:

- Western Damaraland
- Karstveld
- Bushmanland
- Thornveld Savanna
- Highland Savanna
- Southern Kalahari
- Dwarf Shrub Savanna

Namibia is very fortunate in that human population is relatively low, and the high extinction rates and severe environmental degradation experienced in some countries have not occurred here. Namibia is still in the enviable position of having a choice as to its future.

III c Protecting And Building Upon Our Archaeological And Historical Heritage

Namibia's goal is to foster a harmonious and sustainable existence. Studies of the archaeology and history of the country and its people can help to integrate traditional and modern knowledge and help people to understand one another.

Introduction

All knowledge of Namibian history is based on three primary sources of information, namely historical documents, oral traditions and the archaeological record. The importance of these sources and the relevance of the data they contain varies according to different period, regions and subjects of historical enquiry. Written documentary sources are available for only the last two centuries, a period which also saw the general destruction of indigenous knowledge and traditions. Some ethnological objects from the early colonial period have survived and certain of these are so rich in symbolic meaning as to constitute documentary sources in their own right.

A less intractable source is that of oral tradition which in some areas represents the sole source of historcal information, and in others a vital means to corroborate written records. For the more distant past, however, before the advent of colonialism and beyond the reach of human recall there is only one reliable source: the vast and largely unexplored accumulation of archaeological sites which cover much of the Namibian landscape.

Together, these sources provide an indispensable record of social and economic developments, from the earliest times to the liberation struggle for the independence of modern Namibia. It is important that the historical record is maintained, both in deference to the achievements of the past and as a salutary reminder of errors, whether in political judgement, economic planning or uncontrolled use of finite natural resources. The historical record is not, therefore, a static compilation of facts, value-free and without prejudice. Rather, it is something which is subject to constant reappraisal in the light of changing cir-

All knowledge of Namibian history is based on three primary sources of information, historical documents, oral traditions and the archaeological record.

cumstances and advances in basic knowledge. This continual process of revision is common to all science and in history as much as any other field it is vital that the materials of research are protected and used with insight and responsibility. The people of Namibia are therefore bound to adopt appropriate measures for the conservation and development of historical places and materials, and the furtherance of knowledge. To this end, the goverment of Namibia will pursue the following courses of action.

Conservation

Urgent steps will be taken to ensure the conservation of Namibia's historical resources, by actively promoting public awareness; by reviewing those practices which exploit or damage historical resources; and by adopting appropriate legislation to protect historical resources.

The necessity to promote public awareness of Namibian history is made particularly acute by the heritage of racial and cultural prejudice which has resulted in the continuing dominance of colonial historical values in post-colonial Namibia. These values play an important role in promoting a negative self-image of Namibian traditions, particularly with regard to land tenure and resource utilization. The help of all relevant Ministries is needed in order to cultivate a positive attitude to the historical contributions of different Namibian communities, especially the concept of teaching about the necessity for conserving archaeological and historical records. However, this public awareness should be based on sound knowledge and critical reflection, rather than mere reverence for tradition and antipathy toward new practices, or those derived from other cultural traditions. An essential component of this initiative is the maintenance of national museum collections and site museums which preserve and explain the significance of historical events and places. In this regard, it is important that the national monuments declared before national independence are re-evaluated, and that other sites reflecting the full diversity of the historical record are made accessible to the Namibian public.

An improved awareness of Namibian historical resources will lead naturally to a critical review of established practices which threaten the integrity of the historical record. School curricula should inform young Namibians about their historical and cultural heritage.

Traditional knowledge should be fostered and re-introduced into economic and social practices so as to contribute to sound administration of the country, whether in the planning of townships or the wise use of natural re-

Namibia's goal is to ensure the conservation of its historical resources by promoting public awareness and adopting appropriate legislation.

sources. Exploitative practices, such as the trade in valuable ethnological items, will have to be studied in detail before practicable control measures are devised. Where the only remaining evidence of historical processes is the archaeological record, the effects of economic developments, including construction, mining and tourism will have to be carefully evaluated and where possible field surveys should be carried out before development commences. *While the government shall itself initiate conservation-oriented research, it also encourages such initiatives by communities, non-government organizations and appropriately specialized research institutes.* However, the government, as the main controlling body, should remain alert to the finite nature of the archaeological record in particular, and critically examine the archaeological record in programmes. *Effective legislation will preserve the historical record without retarding the progress of research. The first priority of protective legislation would be to unambiguously establish Namibia's ownership of its historical record, or patrimony, including documents, ethnological items of unusual value, and archaeological remains. Where necessary the protection of materials will be defined by specific laws, treating separately the different materials and the circumstances in which they occur.*

While archival and archaeological materials may therefore resort under different laws, these will share common premises based on the sovereignty of the Namibian state. *Furthermore, these laws will take cognisance of international conventions through which Namibia will secure the return of historical material removed to other countries during the colonial era. In the pursuit of scientific knowledge, the government will encourage cooperative research by foreign institutions, particularly where such ventures help to develop the research capacity of Namibian institutions. To protect Namibian interests, whether in material or intellectual property, cooperative research ventures will be subject to clear and stringent agreements.*

Development

At the same time as it ensures the conservation of the historical record, the government of Namibia will promote the development of historical resources through education, research and the dissemination of new knowledge.

The development of appropriate school and university curricula is an important prerequisite for a full appreciation of Namibian history. At school level, young Namibians should

Traditional knowledge should be integrated into modern practices, as it contributes significantly to the wise planning of social administration and natural resource management.

learn to understand the historical processes which gave rise to the cultural diversity of modern times, and particularly to appreciate the intimate links which have developed between traditional subsistence economies and the natural environment. Students at school and university should become familiar with the major sources of historical data, as well as the theoretical concepts and techniques of research. Through gathering oral histories, students will learn to tap the archives of human memory, and in rural areas knowledge of the archaeological record will allow them to develop a new understanding of the human role in the shaping of the natural environment.

Outside the setting of formal education, public utilities like the media will combine with museums to cultivate a better appreciation of historical resources.

To counter the severe underdevelopment of historical disciplines prior to national independence, initiatives in research and institution - building will be actively supported.

This will involve not only material assistance towards the completion of existing research programmes, but also the encouragement of new research focusing on hitherto neglected periods, areas and subjects of Namibian history. Important priorities would be regional studies, particularly where historical and archaeological perspectives would have bearing on rural development plans, and studies which explore precolonial links between Namibia and her neighbours. In historical studies it is necessary to re-examine the premises of earlier research which justified the apportionment of land in colonial times, and to develop historical perspectives on settlement and landuse to the point where they become useful tools of modern planning and resource management. At the same time, Namibia needs to earn its place in the international academic world by realizing the significant contribution it can make to historical studies in general.

In contrast to the documentary and ethnological materials which have been removed in large quantities to other countries, the archaeological record in Namibia represents an almost untapped source of invaluable data. While there is much detailed archaeological evidence relevant to the history of human settlement in Namibia, there is also evidence of far wider significance. This includes fossil evidence of early hominoid evolution and a great wealth of rock art, including the earliest dated examples in Africa, material of some importance to studies of the development of the human intellect. Fortuitously preserved in its archaeological sites Namibia also

In addition to archaeological information on the history of human settlement in Namibia, there is also evidence of early hominoid evolution and a great wealth of rock art, including the earliest dated example in Africa; material important to studies of the development of the human intellect.

has a range of material evidence which is relevent to studies conducted elsewhere in Africa. Namibia needs to promote the dissemination of archaeological research results both in publication and in presentations at international forums where new standards are set for both the conservation and development of historical resources. By pursuing this course, the government of Namibia hopes to bring the history of its people to bear on the goal of a harmonious and sustainable existence.

IV

NAMIBIA'S UNIQUE STEWARDSHIP: THE NAMIB DESERT

Namibia's goal is to conserve and use the unique set of environments of the Namib Desert on a sustainable basis for the benefit of all Namibians, both present and future.

Introduction

Sand dunes sculptured by winds, breathtaking rocky landscapes extending almost to infinity, towering *Acacia* trees lining dry water courses, elephants traversing barren rocky plains, fog blowing landward over diverse fields of lichen, these factors encapsulate the essence of the Namib Desert. The Namib Desert is a unique set of environments dominated by sand dunes up to 300 m high, gravel plains exhumed by erosion that commenced at the break-up of Gondwanaland about 130 million years ago, and traversed by ephemeral watercourses. Dunes, rivers and plains alternate with one another along the desert's 2000 km length contributing to its unexpected biological diversity. Over this same distance, the climate of the Namib varies from temperate, winter rainfall in the south of Namibia, to subtropical summer rainfall in the north.

The Namib Desert is a narrow tract of land no more than 140 km wide occupying the entire coast of Namibia. Its eastern boundary is the Great Western Escarpment and its western boundary is the Atlantic Ocean. The Benguela cold-water upwelling system, in the eastern Atlantic Ocean immediately off shore, causes the regular advective fogs upon which so much of the Namib biota depend and moderates the desertic extremes of climate. Mean annual rainfall ranges from 20 mm on the coast to 100 mm inland. The diversity of habitats, the shape and extent of the desert, its great age, and the regular occurrence of fog all have contributed to the high biological diversity found in the Namib Desert.

The diversity of habitats, the shape and extent of the desert, its great age, and the regular occurrence of fog all have contributed to the high biological diversity found in the Namib Desert.

The sand dunes are inhabited by a variety of unique invertebrates and small vertebrates exhibiting bizarre adaptations. Unable to move great distances, these small organisms have evolved their adaptations specifically to the Namib dunes; spiders that escape from predatory spider-wasps by forming a ball and rolling away down the slipface of a dune; side-winding adders no more than 30 cm long that emerge from beneath the sand in the middle of the night to drink fog-water from their own body surfaces; day-active beetles that construct their own fog-trapping devices on the surface of the sand dune and drink water up to 40% of their own body weight in one night; vegetarian lizards weighing no more than 120 g that eat thorns of an evergreen shrub, consume plants with more than five times the osmolality of sea water, and escape beneath the sand surface in a cork-screw motion; a blind golden mole that "hears" its termite prey by detecting their movements transmitted through sand and that doesn't regulate its temperature for half of each daily cycle and assumes the temperature of the surrounding sand; all these amazing adaptations and many more have evolved in the sands of the Namib dunes.

Sulphur eruptions from beneath the Benguela cold-water upwelling system, the result of anaerobic decomposition of accumulations of rich organic nutrients, have led to the formation of a gypsum crust on the western, coastal half of the stable gravel plains. This crust has been developing since at least the full establishment of the Benguela system about 9 million years ago.

Here several hundred species of the plants known as lichens, a symbiotic combination of fungi and algae, grow, their moisture requirements derived from the fogs blown onto shore. A dwarf shrub that is endemic to the coastal, gypsum-plain Namib, flowers and sets seed throughout the year using fog-water taken in, not through its roots, but directly through its leaves. Wildlife such as oryx, ostriches, and springbok graze on annual grasses that germinate after the occasional episodic rainfall event. Dotted around the landscape are "inselbergs" or island mountains of granite, schist quartzite or limestone, each harbouring its own unique set of plants and animals, many endemic to this arid area.

Passing from east to west across the central and northern Namib Desert are a number of ephemeral rivers, each one with a character of its own, where surface water flows a few days at most each year. Most have their headwaters east of the Namib in farmlands used for commercial production of cattle or small stock. They then flow into the desert reaches through communal farmlands where goats share the habitat with a variety

"Inselbergs" or island mountains rise out of the Namib sand-sea and gravel plains, each harbouring its own unique set of plants and animals, many endemic to this arid area.

of game and larger animals such as rhino, elephant and giraffe. The rivers reach the coast in the Skeleton Coast Park in the north and the Namib-Naukluft Park in the central Namib.

In the desert-parts of their courses, underground water supports a riparian woodland that, in turn, supports a wide variety of insects, reptiles, mammals and birds that would otherwise not be able to exist in the desert reaches. In the northern Namib, elephants, giraffe, rhino and other large mammals range out from the riverbeds, sometimes traversing the tens of kilometers of desert that separates the river courses from one another.

People, too, find the watercourses the only place where they can live without extensive technological support.

The northern, summer rainfall Namib is particularly interesting because of the large game animals such as lion and elephant that still occupy the spectacular desert landscape. The southern, winter rainfall Namib within Namibia supports a great variety of succulent plants, many in the genus Mesembryanthemaceae, endemic to the Namib and some with very limited distribution ranges.

In the central Namib, a community of Topnaar people inhabit the spectacular scenery of the lower Kuiseb River Valley within the Namib-Naukluft Park. They are studying the possibility of incorporating ecotourism into their economy. In the northern Namib, the livestock of Damara farmers share water courses with a variety of game and larger animals. Ecotourism based upon landscape, wilderness and a variety of large mammals such as elephants and rhinos, and sustainable use of available game are already well established there. Further north, the cattle herding Himbas of Kaokoland also use wildlife and landscape- based ecotourism as an additional way to generate income and use the natural resources on a sustainable basis.

The coastal reaches of the Namib are also an important part of Namibia's unique heritage. Fishing in the rich Benguela cold-water upwelling system is the major attraction. A variety of sea birds, including the endemic Damara Tern, lichens, sandy beaches and scenery all contribute to the tourism value of the Namib coast.

Although full of amazing geomorphological formations and strange adaptations of plants and animals, the Namib is a fragile environment. Because of the small amounts of rain and flowing water passing through the system, growth of plants is slow and recovery from disturbance may take decades if it happens at all. Tracks of off-road vehicles, prospecting and

People living in and alongside the Namib are encouraged, in partnership with Government, to participate in sustainable ecotourism and wildlife management programmes, which broaden their resource base and bring them direct benefits.

The Namib is a fragile environment. Damage to the slow-growing plants and to the gravel plains leave long-term, if not permanent, scars to the desert landscape and ecological systems.

mining activities, extraction of unreplenished water from underground riverine reserves, the attention of too many tourists - all these factors leave long-term, if not permanent, scars on the desert landscape and ecological systems. Dams on the ephemeral rivers and increased farming in river linear oases all are being considered for the desert's future.

Meanwhile, the educational and research potential of the Namib Desert continue to be developed and used for the better understanding of the arid and semi-arid environments that comprise all of Namibia.

The Namib Environmental Strategy

In the face of the increasing interest in the Namib Desert, for tourism, for mining, as a water source and for other uses, strong action is required.

The Government of the Republic of Namibia is committed to protecting the Namib Desert and to ensuring sustainable use of its resources.

Ecotourism

Tourism is already a major user of the natural desert landscapes and wilderness areas of the Namib. Tourism has had a permanent impact on the desert landscape in the form of random tracks across the lichen-covered gypsum plains and the overuse of focal points of interest such as small water sources and groves of trees. Ecotourism, based upon the landscape, the unique adaptations of plants and animals, the wilderness areas and the interesting people living in the Namib, has great future potential for the area. In particular, ecotourism represents a major potential for additional income for the currently marginalised people inhabiting the Namib Desert.

The Government of the Republic of Namibia is committed to the provision of information concerning the value and interest of the Namib Desert to promote ecotourism.

It is also committed to describing to the entire nation the loss that will be incurred by the non-sustainable use of this fragile environment. Through enhancement of the experiences gained by tourists in the Namib - hiking trails, wilderness campsites, off-road areas and natural history information - more focused ecotourism, with its lower overall impact, can be encouraged to the advantage of both the Republic of Namibia and the Namib Desert itself.

Almost 70% of the Namib Desert is contained within proclaimed Parks. The Namibian Goverment is committed to protecting the Namib Desert and to ensuring wise and sustainable use of its resources.

Prospecting And Mining In The Namib Desert

The Namib Desert is known to harbour extensive, valuable mineral resources. To develop these resources, prospecting and mining are essential, though potentially destructive, activities that must be carefully evaluated and managed.

The Government of the Republic of Namibia is committed to minimising environmental impact while taking advantage of the mineral deposits of the Namib Desert.

Alternative, further use of landscapes must be kept in mind during prospecting for minerals, proving viability of a find, mining an ore body, and closure of a site. Through adequate prospect planning, regulated movement of vehicles and personnel and minimising surface disturbance, multiple use of prospecting and mining areas will be facilitated.

Infrastructure Development

Bordering the Atlantic Ocean, the coastal Namib Desert has potential for harbour development, increased recreation, holiday resorts, more roads, and other developments dependent on the use of the area's scarce natural resources. Water is the dominant limiting factor to humans living on the coast and in the desert, as it is to the wild plants and animals.

Careful extraction of water on a sustainable basis, conservation of water once it has been extracted, minimal disturbance to the fragile substrate, and maintenance of the integrity of the landscape are all considerations that the Government of Namibia holds to be important. Minimising negative impacts of road construction, non-toxic waste disposal development of towns and all other infrastructure is a major part of the development policy and strategy for the Namib Desert.

Structured Access And Use Of The Namib Plains

The apparent openness and "emptiness" of the Namib plains invites the unknowing to drive at random across its surface rather than restricting themselves to the designated, structured access provided by existing roads and tracks. Almost all activities that take place on the Namib Desert plains either contribute to the destruction of the landscape by causing tracks on the desert surface or are dependent on the landscape for its aesthetic appeal.

These two conflicting uses of one of the Namibia's major natural resources must be resolved while considering the long-term value and future potential of this unique set of habitats. The concentrated benefits

The Government of the Republic of Namibia is committed to the long-term sustainable use of the Namib landscape to the benefit of all Namibians, both present and future.

to a few, of unrestricted use and destruction of the landscape, must be balanced against the diffused costs to all present and future users interested in the biological integrity and aesthetics of the landscape.

Integrity Of Linear Oases

Ephemeral watercourses are the life blood of the Namib Desert and are essential support for humans living in this environment. Most originate in the interior highlands of Namibia and flow westward down the escarpment and across the Namib toward the Atlantic Ocean. They provide food for a variety of animals and water to animals and people living along the oases or nearby.

To maintain the functional and ecological integrity of these essential components of the desert landscape, underground waters must be assured, and humans and their domestic animals must be kept in balance with the carrying capacity of the habitat.

The Government of the Republic of Namibia will incorporate maintenance of the integrity of these habitats in all national development policies and strategies.

Environmental Education

The Namib Desert is the driest part of Namibia which, in turn, is the driest country in Africa south of the Sahara. As a result, the basic principles learned in the Namib Desert have application throughout the rest of arid and semi - arid Namibia. Information, examples, principles, and interactions that originate in the Namib Desert are relatively easy to understand in view of the comparative simplicity of the ecosystem.

The heuristic value of the Namib Desert, and hence its value to the sustainable use of natural resources throughout Namibia, is recognised by the Government of the Republic of Namibia.

V

THE IMPORTANCE OF WETLAND MANAGEMENT IN ARID REGIONS

Namibia's goal is to protect and manage its wetland systems by means of rational and integrated land-use planning in accordance with the philosophies of the Ramsar Convention, based on the principles of (a) preserving biotic diversity; (b) monitoring life-support systems; and, (c) ensuring sustainable utilization of wetland resources.

Introduction

A wetland can be defined as "land where an excess of water is the dominant factor determining the nature of soil development and the types of animals and plant communities living at the soil surface. It spans a continuum of environments where terrestrial and aquatic systems intergrade". Excluding the deep-water marine habitats that this definition encompasses, the concept of wetlands in a country as arid as Namibia may seem a contradiction. However wetlands, our rarest ecosystem type, make up approximately four percent of our landscape and are culturally, economically and environmentally important.

Namibia's general aridity means that many wetlands are ephemeral. Small semi-permanent waterholes, pools and seeps, where they do exist, are therefore, of relatively greater importance than their size would suggest. These small wetlands form vital oases that need to be carefully managed.

The perennial rivers of the north and the Cuvelai drainage system of Owambo support a high percentage of the population of this country, as well as supplying much needed water and electricity to the dryer central regions. Ephemeral wetland systems throughout the country provide important refugia and breeding sites for migratory birds, as do the coastal wetlands.

Wetlands are the rarest ecosystem type in Namibia, making up about 4 % of the surface area of the country. They are culturally, economically and environmentally important.

Namibia's only national park, Etosha, is founded on a wetland and attracts considerable economic income at the same time as providing valuable wildlife habitat.

In relation to wetlands throughout southern Africa, Namibia's wetlands are unlikely to be unique in their structure, functioning and biota, but what they provide in terms of sustaining local economies and communities, and their high environmental values warrant their careful management.

Namibian Wetlands - Diversity, Values And Threats.

Namibia has a great diversity of wetland habitats which vary widely in their hydrological functioning (the primary determinant of wetlands) and biota. Wetland habitats in Namibia include: the perennial rivers and their associated floodplains; the intermittently flowing rivers of the Namib and Kalahari Deserts and the linear oases these rivers form; artificial impoundments; the periodically flooded Cuvelai drainage system of Owambo and Etosha; the ephemeral wetlands of Bushmanland, the Grootfontein district and the Omuramba Owambo system near Tsumeb; the widely distributed but poorly known ephemeral pan systems of the southern Kalahari; and the wetlands of the Namib coast, including the Cunene estuary.

The wetlands of northern Namibia are the most important in terms of both supporting human populations and biodiversity. The population distributions of Owambo, Kavango and Caprivi is clearly influenced by wetland distribution. About 60% of Namibia's population lives in the extreme north of the country. Of these, about 75% live alongside perennial or ephemeral wetlands.

In Owambo some 44 % of the country's population lives within the Cuvelai drainage system, where a mixed subsistence economy is dependent on the flood regime to replenish the water table, regenerate grazing and provide a rich protein source of fish. The duration of flooding is dependent on upper-catchment rainfall in Angola which varies greatly from year to year. Although severely degraded by overgrazing and environmentally insensitive developments (road and canal construction across the main direction of flow) the system still supports a great diversity of biota, with some 47 species of fish occurring in the system and 300 species of birds, including endangered species such as Wattled Cranes. The Cuvelai ultimately flows into the Etosha Pan, Namibia's most important tourist attraction.

Careful and well planned management of the upper and middle drainages of the Cuvelai will ensure that the important human related functions in Owambo continue, as well as the irregular occurrence of floods in Etosha, which allow thousands of flamingoes, pelicans and other waterbirds to breed.

The Kavango River supports the highest density of rural people in Namibia. Some 100 000 people (about 80% of the Kavango population) live within 5 km of the river, and most of

these people are dependent, one way or another, on the Kavango River wetlands for food, shelter and employment. Although less dense, the population of the Caprivi is also heavily dependent on the wetland resources of the Zambezi and Kwando-Linyanti-Chobe River systems.

In both regions the primary protein source is fish and the demand for fish is high, providing the economic base for an expanding artisanal fishery. The development of these fisheries is, however, dependent on the maintenance of systems attributes which support the fish populations. Important systems attributes include the annual flood regime, water quality, seasonally inundated vegetated shallows which provide nursery areas for breeding fish and upland environmental quality off the floodplain. All these functions are threatened. Impoundments have been proposed on the Kavango and the Cunene Rivers and, together with water abstraction on a large scale, impoundments would severely alter flood regimes. As human populations have increased in both Kavango and Caprivi water quality has decreased, through pollution and increased siltation as riverine vegetation and upland sites, cleared for agriculture, have eroded. Heavy grazing of the seasonally inundated floodplain areas during the dry season has reduced the quality of fish breeding sites and this directly affects fish stock recruitment.

With the highest rainfall and high population densities Kavango and Caprivi are priority areas for agricultural and rural development programmes in Namibia. Many development projects, for instance irrigation, aquaculture, plantation and forestry schemes, are water based. These schemes as well as certain veterinary and public health programmes, have the potential to directly or indirectly affect the functioning of wetland systems in the region. Of particular concern is the accumulative affects of water withdrawal, the introduction of chemical pollutants such as DDT (used for mosquito control), endo-sulfan sprays (control of Tsetse fly) and silt from poor upland agricultural practices. If the local artisanal fisheries and other wetland resources (e.g. high quality water, reeds for building houses) are to continue to provide an

The wetlands of northern Namibia have high human-related values and functions. About 60% of Namibia's population lives alongside perennial and ephemeral wetland systems in the north. These wetlands provide water, a rich protein source (fish), grazing for livestock, building materials and have great cultural significance. All these values are threatened as overexploitation of resources and poor management practices alter systems functioning. Threats are related to escalating demands for food, water and shelter as rural populations expand in the face of declining economic conditions. The wetlands of northern Namibia support a high biodiversity of species found nowhere else in Namibia. The conservation value of these wetlands is also severely threatened.

important economic base for the peoples of the region, the continued quality of the river systems will have to be ensured through careful management and planning.

The west-flowing Cunene River is the least important of the perennial northern rivers in terms of supporting local economies, but it has high ecological values as it supports a unique assemblage of biota and has the only true estuarine system in Namibia. The planned construction of the Epupa dams hydro-electric scheme will directly alter these values. Only through careful environmental assessment and management planning can the effects of the scheme on the ecological values be minimised such that at least some of these values may be retained (e.g. estuary functioning through compensatory water releases).

The wetlands of the Namib coast comprise extensive mudflats, shallow marine and limited estuarine habitats. These wetlands have high ecological as well as human related functions and values. The coastal strip in the south of Namibia has been extensively altered by strip mining for alluvial diamonds. The effects on the inshore marine and intertidal zones is unknown, but it could be argued that other wetlands heavily altered or created by man along the coast (Walvis Bay wetlands and the Swakopmund salt works) have had their value for wildlife enhanced through the creation of a greater variety of habitats. Although a number of these wetlands have been extensively altered by man, they are internationally significant as they provide important feeding and breeding grounds for huge numbers of migratory wading birds and seabirds annually. The wetlands of Walvis Bay, Swakopmund and Luderitz have national economic importance as they support large exporting marine industries. Walvis Bay and Swakopmund are major producers of salt and oysters. In addition the Swakopmund works produces guano on artificial platforms. Luderitz wetlands support an expanding mariculture industry of oyster and seaweed farming. The appeal of the Walvis Bay lagoon area for water sport enthusiasts and eco-tourists (bird-watchers) underlies its importance as a tourist attraction. In these systems human related demands do not conflict greatly with ecological functions; it would be well to remember that all human related activities need not be detrimental to wetlands and their associated wildlife.

Artificial impoundments in Namibia are found only on the intermittently flowing rivers rising in the central region. These impoundments are of great economic importance. Although there is concern that these impoundments have negatively affected downstream groundwater levels, they provide important sources of water for industrial and domestic consumption in an otherwise water-poor region. Ecologically, these systems provide breeding sites for bird species normally only found breeding at the coast (e.g. pelicans, cormorants), but are generally species poor. The potential for developing the fisheries and recreational use of these systems has not been fully explored as yet, but through careful management these

functions should not compromise the ecological values.

The intermittently flowing rivers running through the Namib and Kalahari Deserts provide habitats which allow relatively mesic species to intrude deep into the very arid environments of these deserts. These linear oases with their relatively dense vegetation and elevated water tables support the highest levels of biodiversity within otherwise depauperate areas. The perennial rivers of the north provide similar linear connections with the tropics, supporting a number of tropical species found nowhere else in Namibia. The riparian vegetation of both the intermittently flowing and perennial rivers is the key to the biodiversity of these systems. These values are critically threatened. Excessive groundwater abstraction and upper catchment impoundments negatively affect the vegetation along the intermittently flowing rivers through the lowering of the water table. Along the perennial rivers general habitat degradation has severely denuded riparian forests.

The ephemeral pan systems of Bushmanland, Grootfontein and Tsumeb, and the southern Kalahari are our least known wetlands. This is largely due to the fact that the "wet" phase of these wetlands is of short duration and hence they have low human related values. They do not support fish stocks, have low salt producing capacities and generally have poor quality water. However, the ecological values of these systems should not be underestimated. Although the "wet" phase of individual pans is of short duration it is likely that a number of pans in a given area will be sufficiently wet in any one year to allow breeding of certain biota to take place and to provide watering and feeding grounds for other biota. These wetlands may well have been the key to the large scale migration systems of large mammals described in both the north and south of this country. Although this phenomenon is now a thing of the past, the wetlands continue to function and their value lies in providing rich feeding and breeding grounds especially for migrant birds. The wetlands of Bushmanland, for example, support large numbers of palaearctic waders during the wet

The wetlands of the Namibian coast, the ephemeral wetlands and seasonal rivers have high ecological values in comparison to their human-related functions. Coastal wetlands are internationaly important as wintering grounds for migrant waders and other waterbirds. These values may have been enhanced by human alteration, through the creation of a number of habitat types. The ephemeral wetlands support significant populations of nomadic waterfowl and wading birds during their "wet" phase and have regional importance as breeding grounds for several species. The seasonal rivers of the Namib and Kalahari Deserts are ecologically important as linear oases allowing the intrusion of essentially mesic species deep into very arid areas.

season, as well as significant numbers of Wattled Cranes and Slaty Egrets, both Red Data species in Africa.

That wetlands in Namibia have high social, economic and ecological values is without doubt. The maintenance of these values is however, not beyond doubt. To a greater or lesser extent wetland resources and values throughout Namibia are severely threatened. Threats are related to escalating demands for food, water and shelter as populations expand, in both rural and urban environments. Overexploitation of wetland resources occurs in many cases as these resources are regarded as "free", and the traditional controls regulating their use have fallen away.

Floodplain grazing along the perennial rivers of the north and the Cuvelai is overexploited during the dry season reducing nutrient inputs essential to fish breeding. Fisheries are being overexploited as modern harvesting techniques, which are often not selective, are used in preference to traditional methods. Water quality is reduced as erosion in catchments is increased through destruction of vegetative cover, both in the riparian zone and upland sites. This also affects fish breeding, reducing fisheries potential and depressing local economies.

The increasing demand for water and energy by the expanding urban population in Namibia threatens wetland functions and values in other ways. Groundwater resources are overexploited, causing depression of the water table, in some cases allowing saline water intrusion, and killing riparian vegetation. Impoundments in the upper catchments also affect the water table and hence the riparian vegetation. Environmentally insensitive developments have been initiated in the name of progress (canals, roads and dams) and these have negatively affected wetland functioning in some areas. There are plans to dam rivers to provide hydro-electric power, and this is likely to affect wetland functions in the systems affected.

In a developing country like Namibia it would, however, be naive to believe that environmental considerations will take precedence over schemes which will satisfy local demand for food, water and electricity for many years to come. Only through a clear understanding of wetland functions and attributes, can management/developments be formulated in such a way as to minimise losses in these systems. A clearly stated national wetlands policy may be the best way of achieving this.

A National Wetlands Policy For Namibia

Wetlands are recognised in the IUCN's World Conservation Strategy as an "essential life support system, playing a vital role in controlling water cycles, and helping to clean up our environment". Some of the world's most valuable and vulnerable wetlands are found in the arid and semi-arid regions of the world, and Namibia is the custodian of some of these. Namibia therefore, has both a national and international obligation to plan for the long-term stewardship of its wetland resources.

In order to manage and conserve Namibian wetlands effectively, a national wetlands policy and strategy should be formulated by the Ministry of Wildlife, Conservation and Tourism, in conjunction with other organisations. The strategy should:

implement a national inventory of wetlands, detailing their type, extent, distribution and biota;

determine the use of wetland systems and what the problems are associated with usage practices. This would require careful assessment of wetland resource values and attributes, and hence the economic potentials of these areas and their value for wildlife and how both these uses can be maximised without necessarily compromising one or the other potential;

emphasise the importance to primary users of wetlands and that wetland functions are inextricably linked to utilisation patterns and processes. Fisheries and water quality for example, are dependent on good floodplain management (fish breeding is dependent on vegetative cover which also acts as a sediment trap improving water quality);

emphasise the potential of wetlands for tourism development in Namibia. Botswana's third largest foreign exchange earner is wetland-based tourism: Namibia has a far greater dependence on wetlands for tourism than may be apparent. Major tourist attractions in Namibia include the following areas all with their attraction centred on or dependent on their constituent wetland systems: Etosha National Park; Popa Falls and the Mahongo Game Reserve (as well as other parts of the Kavango River); the Cunene River; the wetlands of the east Caprivi (including the Mamili and Mudumu National Parks); the Hoanib and other rivers of the western escarpment; the Namib-Naukluft Park, (Sossus Vlei, Sandwich Harbour, the Naukluft rivers, the Kuiseb River); Gross Barmen hot springs; the recreational resorts of Hardap, von Bach and Naute dams; the hot springs at Ai-Ais and the Fish River Canyon; the coastal wetland areas of Cape Cross, Walvis Bay, Luderitz and Sandwich Harbour. These areas are important in the maintenance of Namibia's tourism potential: only through careful management and appropriate

Namibia recognises the national, regional and international importance its wetlands of the country. Safeguarding these wetland values and functions is regarded as a priority and a national wetlands policy is being developed to ensure the long-term future of these systems.

planning will this value be maintained;

assess the conservation of wetlands and wetland systems, so that representative examples of Namibia's most important wetland types are afforded some form of conservation status;

ensure that wetland system attributes, functions, use and conservation are adequately covered by legislation. The Act must give recognition to the social, economic and ecological values of wetlands such that essential processes are maintained and effective and enforceable legislation is developed to adequately protect these systems.

Namibia cannot afford to view itself in isolation and be complacent about local achievements in wetland management and conservation. Wetland systems of greatest importance in Namibia lie along the borders of the country. All of these systems are either a shared resource and/or have their origins in neighbouring countries. To effectively develop a wetland strategy Namibia should:

continue to participate in co-operative programmes with neighbouring countries to ensure sustainable wetland management on a regional basis. For example, there is little use in promulgating legislation in Namibia to protect fisheries resources in the Kavango when abuses are carried out from the Angolan bank. These are essentially regional issues and are covered by Namibia's position in SADCC;

recognise and create an awareness of the international importance of Namibian wetlands and the obligation that this places on Namibia to conserve these wetlands. Most of the water birds occurring in Namibia come from elsewhere in the world. The coastal and ephemeral wetlands provide important wintering grounds and breeding habitat to thousands of palaearctic and inter-African migrant birds. Namibia is only a seasonal custodian of these resources: Namibia's obligation to the rest of the world is to provide adequate habitat for waterbirds such that one of the greatest phenomena of nature, migration, does not break down for lack of wintering habitat. The wetlands of Namibia are also significant in that they support major populations of certain species. For example, about 60 percent of the southern African populations of Chestnut-banded Plovers and Black-necked Grebes occur along the coast of Namibia; Wattled Cranes and Slaty Egrets, both listed as endangered in Africa have sizable seasonal populations within Namibia. Namibia has an obligation to the world to maintain the rich biodiversity of its wetlands. This may best be achieved by Namibia becoming a signatory to

the Ramsar Convention, an international convention pertaining specifically to wetlands. Becoming a signatory would give Namibia access to international expertise and aid for wetland management and research and would place Namibia firmly in the community of countries concerned with global environmental issues.

VI

THE THREAT OF DESERTIFICATION

Preserving Potential Productivity

All of Namibia's environment is arid and semi-arid and desertification is a very real threat over much of the country. Namibia's goal is to manage natural resources in a sustainable manner to prevent desertification and retain productivity of the renewable natural environment.

Introduction

Desertification is an involved process of land degradation whereby the potential biological productivity of the land, and its ability to support populations, is severely reduced or destroyed. It can be identified by (a) declining biological production, (b) deterioration of the physical environment, and (c) increased hazards for human settlement and life. Desertification is brought about by the coincidence of three factors: (a) a fragile arid or semi-arid system (<500 mm rain/year), (b) increased human pressure often resulting from an increase in population or a change in life style (e.g. from nomadic to resident) or generally inappropriate land use, and (c) low rainfall for a prolonged period.

Desertification does not originate within deserts. It is most commonly associated with areas where the rainfall ranges between 350 mm and 600 mm per annum, rainfed agriculture is practiced, human populations are high, and resources are being seriously over-exploited. The highest natural potential for desertification exists on the edge of deserts, but this is subject to human settlement and land-use practices. In some areas, desertification is a slow and insidious process while, under some conditions, it can move very rapidly.

The desertification process is usually the result of conflict between the public interest and long-term resource use on one hand, and private short-term resource abuse on the other.

The Government of the Republic of Namibia is committed to stopping desertification through wise management of its natural resources.

Where there is no reconciliation between these two interests, the desertification process continues. Desertification can be slowed down or arrested, whereas the end result of the process is very difficult and expensive to reverse, and is sometimes irreversible.

Fragile environments are vulnerable to deterioration. They often exhibit extreme seasonality of climate (each year has a wet season and a dry, rainless season) and extreme between and within year variation of rainfall - as does most of Namibia. Fragile environments often experience low rainfall - known as drought - an unpredictable climatic event. Drought is not synonymous with desertification. Nevertheless, when drought coincides with excessive exploitation of a habitat (overgrazing, overcultivation, overcutting) the rate of environmental degradation (desertification) usually accelerates.

Desertification usually includes:

- deterioration of rangelands and pasture lands (including overgrazing, soil erosion and bush encroachment);
- degradation of dryland farming (rainfed croplands);
- deforestation and destruction of woody vegetation;
- declining availability or quality of water supplies;

and might also include:

- waterlogging and salinization of irrigated lands;
- growth and encroachment of mobile sand dunes.

Although desertification is evaluated in terms of the environment, it is, nevertheless, a human-induced process caused by people's constant efforts to adjust to difficult environmental conditions associated with the occurrence of prolonged droughts. Economic and social processes predominate over purely environmental causes. Poverty is usually a contributing factor.

Only people can slow down or stop desertification and management of desertification relates primarily to improved land use. A component of this is the management of recurring drought which must be done by society organising insurance against natural hazards. Both management processes must be supported by national policy and considered in all facets of national development strategy.

'Drought' is a commonly used and often incorrectly applied term. In arid and semi-arid environments rainfall is naturally very variable and this variability increases as annual rainfall decreases. Mean rainfall reflects occasional high rainfall values, hence rainfall is often 'below the mean' in arid and semi-arid areas, but this is a natural occurrence and not a drought. The term drought should be reserved for a long series of years when rainfall is very low and potential for desertification very high.

Deserts and Desertification - Namibia is in the paradoxical situation of proudly encompassing the unique Namib Desert within its borders yet, on the other hand, being threatened by desertification in other parts of the country. The Namib has been a desert for millions of years, and the plants and animals living there have evolved to the hyper-arid conditions during all that time. The Namib Desert is very productive relative to the limited amount of rain that falls there. In contrast, in those areas where desertification is taking place today, the productivity is reduced to much less than it should be and the plants and animals are not in equilibrium with their environment. While people can enjoy the Namib Desert for its unique scenery and unusual biota and profit from its sustained use for ecotourism, people can only lose as the productivity of the land for any purpose is reduced by desertification.

Namibia appreciates that desertification must be classed with deforestation and greenhouse warming as anthropogenic contributions to climatic change.

Namibia's Desertification Strategy

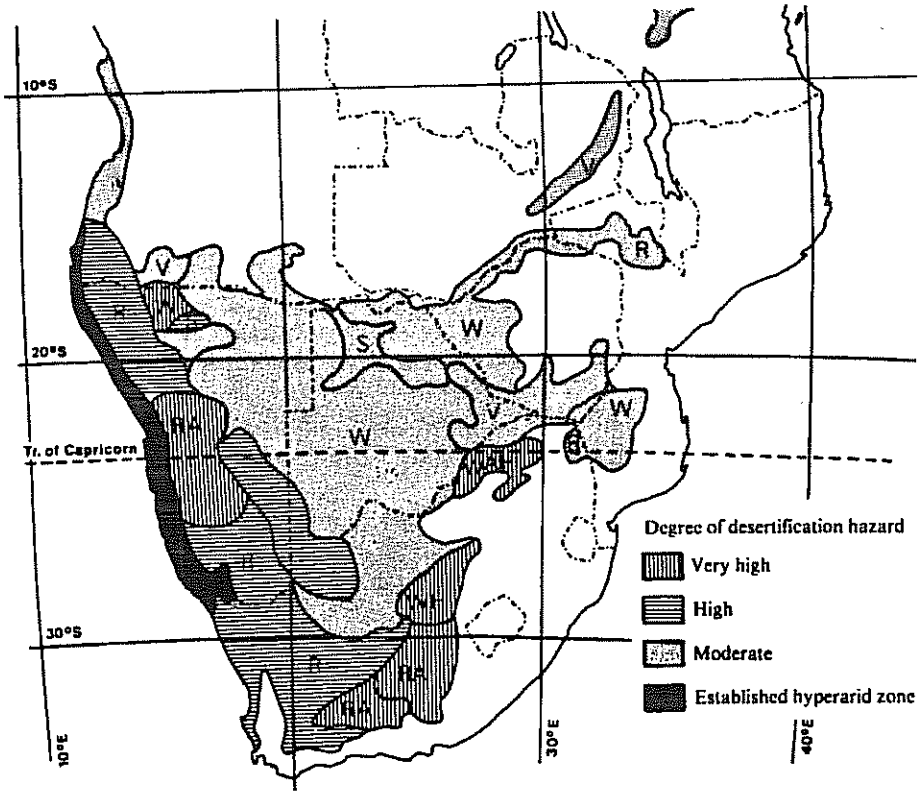
Namibia's strategy on desertification recognizes that poverty, population growth and desertification are closely linked. The strategy will be incorporated as an integral part of Namibia's overall development strategy acknowledging that a long time frame and long-term policies and measures are required. The strategy will be holistic and a participatory design approach will be used. It will be firmly based on local evidence and research, consider the human carrying capacity of the environment and take into account probable rather than average conditions and predicted outcomes.

Evaluation of Potential for Desertification

The potential for desertification throughout most of Namibia is high, and in some areas the process is well advanced. To arrest the process of desertification where it is currently taking place and to prevent initiation of the process in other areas, further detail concerning local potential should be established. *This information, monitored regularly, would serve as the basis for national and local planning initiatives and strategies as well as education and extension programmes.* The evaluation of desertification will take into account:

- human population

Namibia recognizes that poverty, population growth and desertification are closely linked.



Map of desertification potential of the biophysical environment in southern Africa prepared forUNCOD. Desertification is here defined as the 'intensification or extension of desert conditions; it is a process leading to reduced biological activity, with consequent reduction in plant biomass, in the land's carrying capactity for livestock, in crop yields and human well-being'. LEGEND: W - surfaces subject to sand movement; R - stony or rocky surfaces subject to aerial stripping by deflation or sheet wash; V - alluvial or residual surfaces subject to stripping of topsoil and accelerated run-off, gully erosion on slopes and / or sheet erosion or deposition on flat lands; S - surfaces subject to salinization or alkanization; H - subject to human pressure; A - subject to animal pressure.

The direct threat of desertification in Namibia is ameliorated somewhat by the fact that most of the major population concentrations do not coincide exactly with those environments in Namibia that show the greatest potential for desertification.

- human carrying capacity
- land use patterns
- vulnerability of land to desertification including climate, soil and vegetation

Ongoing monitoring and evaluation of the state of the desertification process in Namibia will contribute valuable information to national policy and national development strategy, and to education and extension programmes.

Land Use Planning

Extensive efforts to alleviate the human suffering that has resulted from desertification and to halt the desertification process itself have diverted attention from the more promising

strategy of developing profitable land management systems in dry areas. Alternative and innovative land use systems incorporating soil and water conservation, social forestry and other profitable yet sustainable land use strategies, such as wildlife management and ecotourism, should be integrated into Namibia's policy guidelines for sustainable natural resource development. This is in keeping with 'Africa's Common Position' in which land-use practices appropriate for arid and fragile systems would be promoted in preference to more convential forms of agriculture.

National land use policy and management strategies in Namibia should include consideration of the potential for desertification and the relationship of drought to land use systems. Moreover, although climatic change in Africa has not yet been established beyond doubt, national land use policies and management strategies should acknowledge this possibility. These policies and strategies should not continue to ignore the relationship between cause and effect with respect to the processes contributing to desertification. They should adopt the necessary, but politically unpopular, long-term perspective of land use necessary for sustainable use of natural resources. National land use policy and management strategies should incorporate education and extension services as essential land-use planning tools to support the arresting of ongoing desertification processes and for preventing expansion thereof.

Land use planning will include an integrated approach to the use of natural resources. For example, use of fuel-efficient stoves and other alternative energy sources, development and support of appropriate marketing structures and value-added processing of natural resources will be an integral part of Namibia's national land use policy and strategy.

Planning 'Drought Insurance' for Dry Years

Droughts are a normal aspect of climatic variability in arid and semi-arid areas. The short-term measures necessary for dealing with several dry years with inadequate rainfall should be in accordance with established guidelines of comprehensive national policy and incorporated within development planning at a national, not sectoral, level. Recovery of the environment from short-term drought is possible. Long-term drought that is not properly managed usually leads to permanent impoverishment of biological, economic and social productivity.

Prolonged drought leads to the land degradation that is desertification. Major policy initiatives should be established by Government to prevent further reduction of the productivity of the land during such periods while sustaining communities directly or indirectly affected.

Drought, an exacerbating factor in desertification, must be defined in terms of the land use system affected. Sustainable land use practices take

the normal occurrence of drought into consideration.

'Drought insurance' or 'drought proofing' in Namibia will be an integral part of overall national development policy. This will incorporate:

- use of early warning systems including monitoring by remote sensing supported by ground checks;
- socio-economic monitoring;
- development of self sufficiency;
- multiple alternatives to usual patterns of natural resource use;
- preparation of a feasible, current emergency plan;
- avoidance of market displacements by emergency food aid;
- research, education and extension.

Water Management

To improve water management in Namibia, individuals, communities and industries must take responsibility for their water usage. *Education, community involvement at all stages of planning and development, and an appropriate pricing structure are necessary to achieve this. A comprehensive water conservation policy should be established by the Government of the Republic of Namibia to ensure sustainable levels of water use.*

In Namibia, it is important to understand the process of ground water recharge in relation to the sustainable development and use of local aquifers. The development of techniques for large and small scale desalination is essential and should be carefully investigated.

Desertification, exacerbated by drought, can be further exacerbated by mismanagement of groundwater and surface water supplies. The Government of the Republic of Namibia recognises this essential link and is committed to wise use of Namibia's limited fresh water resources.

Desertification in arid regions can be managed by:

(a) an evaluation of high risk areas and regular monitoring;

(b) wise land-use planning that promotes appropriate land-use practices;

(c) planning for low rainfall years as part of a survival strategy for arid regions;

(d) a sound water and agricultural management policy based on sustainable production;

(e) research, education and legislation that supports the above.

VII

GLOBAL ENVIRONMENTAL SECURITY

"No man is an island, entire of itself" - Doune (1571-1631)

Preamble

While recognising that Namibia is listed by the United Nations as one of the least developed countries in the world, having limited numbers of skilled people, with unemployment, education, health and housing demands in excess of the country's ability to sustain itself without foreign aid, these very shortcomings should be viewed as challenges.

An inescapable fact is that the Namibian Constitution is seen as a model of democracy for Africa and other independent states in the world. Furthermore, the Namibian Ministry of Wildlife, Conservation and Tourism is the Government agency responsible for the protection of the environment and operates in accordance with the tenets of the World Conservation Union.

Being mindful of the fact that excessive and non-sustainable utilisation is causing irreversible environmental damage both within our borders and internationally, we should therefore vigorously pursue a policy of "Reduce - Re-use - Recycle". Consequently, Namibia is in a position to support the international community in its attempts to secure global environmental stability and advocates a proactive instead of reactive approach at national, regional and international levels.

Introduction

Since the natural systems which drive the earth's unique ability to support life are common to all countries and every plant or animal, including each individual human, it is essential to identify key areas where perturbations have occurred or are occurring and then make practical recommendations for restoring as much as possible the natural balance which is thought to have existed. Six factors

Namibia advocates and supports a proactive instead of reactive approach to global environmental stability at national, regional and international levels.

account for the majority of the world's environmental problems, four of them being due to excesses and two because of a paucity. Over-population, excessive use of fossil fuels and deforestation, pollution, and global warming are the areas in which humans have indulged, seemingly with little foresight of the consequences. Depletion of the upper layers of atmospheric ozone and failure to educate the majority of the world's population of people about understanding and caring for the environment are two glaring examples of human shortcomings. Namibia puts forward the following recommendations to deal effectively with these factors which are universally recognised as being responsible for the degradation and possible imminent collapse of natural support systems in many parts of the world.

Over-population

Namibia, despite its small population, recognises the universal need to curb uncontrolled growth of human numbers. As a member of the United Nations, Namibia therefore subscribes fully to the organisation's policy on population control. This emotive issue, complicated by social, ethical, ideological, political and religious arguments, is seen as the basic cause of most of the global environmental crises. Over-population has reduced the planet's biodiversity by ongoing extinction of species at a rate which threatens to leave only the hardiest and most adaptable plants and animals as survivors. Because *Homo sapiens* may not be amongst the survivors of an environmental holocaust, it is patently obvious that unless people are taught to control their reproductive capabilities, all other issues become of minor consequence. Just as there exists a Strategy for Sustainable Living by Caring for the Earth (IUCN, UNEP, WWF), so a Global Strategy on Human Population Control will facilitate the attempts of governments to address this issue. The earth needs to rest and rehabilitate if the quality of life, which all societies strive for, is to be sustained. The past and present "right of the individual to procreate" should be replaced with the concept that it is a "privilege to replace".

Bearing in mind that only 3% of Namibia's land surface area is sub-humid (above 600 mm average annual rainfall) and 32% is semi-arid (400 to 600 mm rainfall), the remaining 65% is clearly unsuitable for cultivation of crops without supportive irrigation. Consequently, the Namibian population, estimated at approximately 1,4 million in 1991, may already be approaching the long term carrying capac-

A Global Strategy on Human Population Control would facilitate the attempts of governments to address the issue of over-population. The past and present "right of the individual to procreate" should be replaced with the concept that it is a "privilege to replace".

ity of its water and soil. Water is a major limiting factor in the Namibian environment and the demand of an increased population in relation to the ability to supply sufficient water must be predictable.

Global over-population is a widespread phenomenon, as is evidenced by increasing famine, disease, unemployment, crime and the breakdown of social structures. This illustrates the concept that population growth is not necessarily compensated by an equivalent growth in the economy. Illiteracy can only be countered by accepting that, in the national budget, an infinite number of children cannot be educated. Just as the world recently accepted the overnight collapse of a major ideology, it will be able to accept the shift from the "right" to the "privilege" to have children. All values are in a state of flux at present and so the time is ripe, as never before, to advocate sound family planning. Mankind either starts now to control its numbers and survives ... or doesn't. The first step towards averting a conflagration resulting from unlimited numbers of humans, will be to aim at Zero Population Growth (i.e. a stable population size, where births equal deaths - usually a maximum of three children per family), and ultimately at a reduction in the world population.

Namibia is willing to subscribe to a global commitment in this respect and to maintain her population, albeit small in the overall context, at a level which does not exceed the capabilities of its renewable natural resources.

Namibia will strive to educate its citizens about the value of quality of life within the constraints imposed by the country's harsh environment. The consumptive life styles of many first-world communities are not desirable role models for Namibia. The elitist core of Namibians who enjoy a high standard of living should set an example by developing a lifestyle based on appropriate technology and minimal impact on, and use of, natural resources.

The Namibian Ministry of Health and Social Services views planned families and responsible parenthood as its top priority in the National Primary Health Care Programme and will continue to provide free contraception at its clinics and to encourage family planning by a proactive approach.

A further incentive to controlling population growth would be by way of introducing tax benefits for families who limit their number of children.

Education

Just as all countries strive to educate their peoples, Namibia recognises the need to obliterate ignorance and illiteracy as the first step towards an improved quality of life. Realising that its educational resources are finite, Namibia follows the premise that education is essential for survival and education is for all people, regardless of age. Additionally, environmental education must become part of every subject taught in class and not necessarily be a formalised "separate" subject. If the teachers are not trained to incorporate the concept

Environmental education must become part of every subject taught in class and not a formalised "separate" subject. If teachers are not trained to incorporate the concept that everything that people do depends upon or affects their environment, then the teaching of everything else remains academic.

that everything the child does depends upon or affects his or her environment, then the teaching of everything else remains academic, with little relevance to the practicalities of survival. One such project in Namibia is termed "Enviroteach". *Its themes are linked to the school curricula and are expected to expand into the lives of children, parents and the community at large.* This approach has the approval of the Namibian Ministry of Education and Culture.

Energy

Although a small user of energy by global standards, Namibia must not add to the abuse of non-renewable energy sources. Namibia relies heavily on fossil fuels and wood, natural gas and hydro-electric power for its energy requirements. Collection of large amounts of firewood for cooking, warmth and traditional practices have rapidly depleted the limited forests in parts of the higher rainfall areas of the country and along many of its drainage lines. In communal areas the family fire is the centre of many social and cultural activities and may be kept burning virtually continuously. While fossil fuels are finite reservoirs of energy and uncontrolled gathering of firewood promotes desertification, Namibia has two energy sources which cannot be over-utilised in the human context, namely solar and wind. Namibia is in an enviable situation with regard to high levels of incoming solar radiation and, along the entire coastline and large tracts of the interior, the wind regimes are predictable and have a high energy value.

Furthermore, whilst hydro-electric power is arguably "cleaner" than burning of fossil fuels and natural gas, it has significant drawbacks in a region as arid as Namibia. Hydro-electric power may be obtainable from five major river systems, all on the borders of the country: the Orange, Kunene, Kavango, Kwando and Zambezi. Only the Kunene's geomorphology lends itself to large-scale electricity generating in Namibian territory, however the price paid for this includes the damming of substantial amounts of water, thereby reducing the natural flow rhythms downstream. This may produce severe ecological and silting problems which can be further compounded by the occur-

Namibia has access to two reliable high-energy sources which cannot be over-utilized, the sun and the wind.

rence of droughts, a regular but unpredictable feature of the Namibian climate.

Appropriate technology, such as locally produced, efficient wood-burning stoves, is being introduced at the family level of the community. Moreover, it is recommended that tax benefits be introduced which encourage the appli- cation of energy-saving measures.

Pollution

Pollution does not recognize international boundaries. Any air or water pollution by Namibians will enter the global pathways. Consequently, pollution control is of major concern to us. If Namibia is seen by the global community as a model political state, then there is no reason why it should not strive to be a model environmental state. Given Namibia's ideal potential of having a sparse population of people, some of whom are fortunate to live in a relatively pristine environment, the way is open to keep pollution to a minimum. Again, viewed in the international context, Namibia has an insignificant influence on the world-wide pollution crisis. Nevertheless, by displaying to the world its willingness to follow a policy of "Reduce - Re-use - Recycle", the country can symbolically be an example to others.

Matters which are of concern to Namibians include the continued use of chlorinated hydrocarbon pesticides for malaria control plus the use of other synthetic compounds, including herbicides, for tsetse fly control in the north-east of the country. The majority of pesticide applications are carried out in well-watered areas with the highest rainfall, the greatest river run-off, and the densest human population. Many of these compounds accumulate in water, soil and living tissues. They can have an acute or an insidious effect on plants, animals and people. Some pesticides in use in Namibia have been banned in many countries, yet are still liberally applied locally, without due regard for the destruction they cause to beneficial plants, insects, fish, reptiles, amphibians, birds and mammals. Examples abound in other countries where pest problems have increased rather than diminished due to the indiscriminate application of pesticides. This is because strains resistant to the pesticide have appeared, as well as increases in undesirable species which were caused by destruction of their natural enemies. It seems that the sensible approach to pest control in Namibia should be one of employing biological agents such as natural predators, introducing sterilised individuals into the pest population, and improved prophylactic measures against disease transmission.

The need for environmental education at all levels of the community is again evident.

The problem of pollution can be contained by following the policy of "Reduce - Reuse - Recycle".

In the past there has been introduction of factory effluent from some fish factories in the South African enclave of Walvis Bay into the ocean, and also dumping of low-grade or excess fish by trawlers along the Namibian coast. This is alarming, not only because of blatant wastage of a highly nutritious source of protein, but also because the effects of effluent on the diversity of marine life in the Benguela current, one of the richest in the world, are unknown. Namibia has little control over the enclave, due to political constraints, but will assuredly move to rectify the situation when Walvis Bay, the largest harbour and manufacturer of commercial fish products on the Namibian coast, becomes an integral part of the country.

One of the most serious forms of pollution in Namibia is littering, especially of glass containers. In 1991 the Wildlife Society of Namibia, a non-Governmental, non-profit making organisation set an example of recycling glass products at the coastal town of Swakopmund. *A national recycling organisation will, in future, oversee all future efforts in the country. Within one year three Namibian towns have engaged in glass recycling, with 35 "bottle banks" established.* At the same time this Society launched another laudable action by implementing a re-usable shopping bag project after it had been established that the small town of Swakopmund (population 22 000) used at least 60 000 plastic bags for shopping every month. These campaigns may be insignificant by world standards but they display Namibia's willingness to participate in the battle against pollution.

Global Warming

Namibia's contribution towards the Greenhouse Effect is negligible, nevertheless the country is particularly vulnerable to predicted changes of warming and increased aridity. *It is our intention to:*

- encourage industrial nations to develop suitable technology to reduce emissions of harmful "greenhouse" gases and to aid developing countries such as Namibia to install cleaner equipment.

- reduce deforestation and desertification and promote reafforestation to increase the contribution Namibia can make as a "sink" for carbon dioxide.

- increase our energy efficiency by utilising the copious amounts of solar and wind energy available, and requesting assistance in the development of this technology.

While Namibia's contribution towards Global Warming is negligible, the country would be particularly vulnerable to predicted changes of warming and increased aridity.

- undertake the improvement of our national rail transport system to reduce the necessity for extensive road haulage, and to increase and improve Namibia's public transport system.
- aid international research initiatives into global climate and assess the likely scenarios involving climate changes. An action plan to mitigate the worst of any climate changes will be developed.
- assess the socio-economic consequences of possible sea-level rise on Namibia and plan accordingly.
- co-operate internationally to promote the instigation of these points.
- aid and assist other countries to reduce the risks of global warming.
- abide by any acceptable international agreements which will reduce the risks associated with global warming.

Ozone Depletion

Although her contribution to ozone depletion is minuscule compared to world levels, Namibia undertakes not to ignore the dangers associated with the release of CFCs (chlorofluorocarbons) into the atmosphere. We are willing to:

- encourage industrialized nations to develop suitable technology to reduce the production of ozone-depleting gases.
- reduce our own use of ozone-depleting gases and promote awareness amongst consumers.
- investigate recovery, recycling and safe disposal of ozone-depleting gases.
- investigate the impact of significant ozone depletion on the quality of life in Namibia and plan accordingly.
- co-operate internationally to promote the instigation of these points.
- aid and assist other countries to reduce the risks of ozone depletion.
- abide by any acceptable international agreements which will reduce the risks associated with ozone depletion.

Conclusion

In keeping with the policies adopted by other SADCC coun-

Namibia's contribution to Ozone Depletion compared to world levels is minuscule. Nevertheless Namibia will participate fully in meeting global obligations to reduce the use of ozone-depleting gases.

It is the responsibility of the First World countries to solve the global problems they have created, such as global warming and ozone depletion. Namibia undertakes to honour its role as a member of the United Nations to protect its environment against irreversible degradation and to learn from the mistakes of the First World.

tries, Namibia will work to develop stronger bilateral relations on environmental issues. We wish to build on existing international partnerships by becoming signatories to conventions such as those practised by IUCN, CITES and Ramsar. By forging links with our SADCC neighbours we envisage symbiotic benefits which will accrue with such concepts as cross-border conservation areas, joint management of common water- catchments, and a regional commitment to an improved environment similar to that envisaged by the European Community.

Finally, although it is the responsibility of the First World countries to solve the global problems they have created, such as global warming and ozone depletion, Namibia undertakes to honour its role as a member of the United Nations to protect its environment against irreversible degradation.

"Nobody made a greater mistake than he who did nothing because he could only do a little" - (Edmund Burke, in "The State of the Ark" by Lee Durrell).

Key to acronyms and words used in text:

IUCN	International Union for Conservation of Nature & Natural Resources (The World Conservation Union)
CITES	Convention on International Trade in Endangered Species of Wild Fauna & Flora
Ramsar	International Convention to Protect Wetlands, sponsored by UNESCO (United Nations Educational, Scientific, and Cultural Organization) and ratified in Ramsar, Iran, 2 February 1981
SADCC	Southern African Development Coordination Conference
UNEP	United Nations Environment Programme
WWF	World Wide Fund for Nature

VIII

ENVIRONMENTALLY RESPONSIBLE DECISION-MAKING

VIII a Partnerships Equal Solutions

Namibia's goal is to strengthen existing environmental partnerships while building new ones.

Introduction

Every Namibian is responsible for the environment of this country. Yet it is clear that individual action alone will not secure a healthy environment. We need to develop partnerships at all levels of society which enable us to pool the enthusiasm, energy, expertise and financial and human resources at our disposal. Through working together we can coordinate action to ensure that sustainable development is achievable.

At the same time as developing domestic partnerships, Namibia needs to cooperate with other countries over environmental issues. Neighbouring states can affect our environment in several ways, as we can affect theirs.

We also have a commitment to ensuring that development within Namibia does not contribute to global environmental problems. We therefore need to maintain and develop our links with international conservation organisations and research institutes.

Partnerships Within Namibia

Government

There is a clear need for coordination and cooperation within Government over environmental issues. In the past little attention was given to an integrated approach and legislation has developed piecemeal within a variety of sectors. Development programmes were planned and implemented with scant regard in many cases for environmental impacts. There was also no single Ministry which was tasked with environmental affairs.

Now that responsibility for environmental affairs has been vested in the Ministry of Environmental Conservation, Wild-

National co-ordination of environmental issues will be achieved by creating an Interministerial Committee within the National Planning Commission under the chairmanship of the Ministry of Environmental Conservation,

life and Tourism, the way is open for the effective coordination of environmental issues and monitoring of the environment.

The Government will ensure that co-ordination over Environmental issues is achieved through the creation of an Interministerial Committee for the Environment within the National Planning Commission.

The committee will be chaired by the Ministry of Environmental Conservation, Wildlife and Tourism, and will provide policy direction, ensure co-ordination, as well as ensure broad governmental participation in achieving sustainable development.

The Ministry of Environmental Conservation, Wildlife, and Tourism will develop its environmental protection capacity in line with its new responsibility. It will:

- consolidate and where necessary develop environmental policies, legislation and programmes;
- develop national environmental objectives and standards in order to ensure that a consistent level of environmental quality is maintained across the country;
- ensure that effective strategies are developed to address environmental issues of national and international importance;
- ensure that Namibia's environmental policies and programmes are compatible with international approaches;
- develop environmental assessment and review procedures.

Partnerships With Non-government Organisations

Namibia has a wide variety of Non-Government Organisations (NGOs), some of which focus directly on environmental issues. There are many others, particulary in sectors such as rural development, which work with people who are using natural resources and reshaping the environment on a daily basis.

There are at least 170 NGOs in the country with perhaps 30 being in some way connected with environmental issues and there are 19 NGOs which can be described as fully Environmental NGOs (ENGOs).

Environmental groups play a vital role in raising the level of environmental awareness across the country and will continue to have an impact on policies within government and industry. Some ENGOs are playing an important role in providing services which the government is unable to supply, particularly in the fields of

wildlife conservation and environmental education.

In order to further encourage healthy partnerships with ENGOs, the Government will:

- Establish a regular forum for liaison between ENGOs and the Ministry of Environmental Conservation, Wildlife and Tourism;
- Encourage joint programmes between Government Departments and ENGOs (particularly in the fields of community-based conservation, Environmental Impact Assessments, Environmental Education and Environmental Research);
- Establish within the National Planning Commission, a register of NGOs working in the country. The register will serve as a source of information on NGOs for donors, government and other organisations wishing to support NGOs or initiate partnership projects with NGOs.

The government is fully committed to building effective partnerships with all organisations which are involved in activities related to the environment.

Partnerships With Industry

Industry potentially has a major impact on the environment, but can also contribute much to solving environmental problems, through research, the use of environmentally responsible processes, and the manufacture of environmentally friendly products.

As Namibia moves into a new era of responsible environmental management, it is imperative that government and industry develop a relationship based on consultation and trust. In some cases, this relationship already exists. Some mines, for example have adopted environmental safety practices over and above those required by law. Others, however, have taken advantage of the lack of environmental control exercised in the past.

The Government of Namibia will foster the development of an environmentally friendly industrial sector through:

- encouraging the development and diffusion of new and more efficient technologies;
- providing the necessary mechanisms for consultation with industry over environmental issues and policies;
- developing appropriate legislation.

The government is committed to building effective partnerships with NGO'S and the private sector to more effectively manage and protect natural resources and to ensure their sustainable use.

Improving Public Consultation

For real partnerships to develop over environmental issues, Namibians need to be consulted over the development and implementation of national environmental policies and legislation.

The Ministry of Environmental Conservation, Wildlife and Tourism began this process in 1991 when it held two national conferences, one on the development of new environmental and wildlife policies and one on the development of new tourism policies for the country.

Participants were drawn from a wide range of sectors, from rural community leaders to professional hunting associations and professional Safari operators. The process of consultation needs to be continued at both national and regional levels.

The Government of Namibia will investigate ways of continuing the consultation process so that as many Namibians as possible can be involved. This will be done at both national and regional levels.

Partnerships With Communities

Individuals who are part of rural or urban communities are often primary resource users and thus have a tremendous cumulative impact over time on the environment.

In many communities there is some form of basic organisation or leadership with the potential to mobilise community members on environmental issues. Local communities often have a considerable amount of environmental knowledge, much of which remains untapped. They are also often fully aware of the causes of the environmental problems which they face, but due to poverty have no option but to continue with what they know to be harmful or destructive practices.

The government needs to develop partnerships with rural and urban communities, as well as with the NGOs that often work with the communities. Through partnerships in which there is consultation and shared decision-making, the goal of sustainable development can be reached at the community level. In particular, the government needs to involve groups of people previously neglected, such as women and young people.

The Ministry of Environmental Conservation, Wildlife and Tourism has begun to develop partnerships with rural commmunities on communal land in northern Namibia aimed at joint management of natural resources such as wildlife. There is potential for similar partnerships to be developed with local communities over the management of forest, fish, water and other resources.

Through a policy of consultation and the promotion of joint-decision making, the government will encourage the development of partnerships with local communities in the management of renewable natural

The government promotes a policy of consultation and joint decision-making on environmental matters with the general public and specific communities. in particular, government encourages the development of partnerships with communities in the management of natural resources to the direct benefit of individuals in those communities.

resources, and the maintenance of a healthy environment.

The Government will make the necessary legislative changes which will enable local communities to share decison-making over natural resources and gain financial benefits from their utilisation.

International Partnerships

Namibia is a member of world conservation bodies such as the International Union for the Conservation of Nature (IUCN), the Worldwide Fund for Nature (WWF), and the Convention on International Trade in Endangered Species (CITES). It is also a member of technical committees on Wildlife and the Environment, of regional bodies such as the Southern African Development Coordination Conference (SADCC) and the Southern African Regional Commission for the Conservation and Utilisation of the Soil (SARCCUS). Namibia also has bilateral relations with neighbouring countries regarding conservation issues such as cross-border parks and research on resource management.

Namibia encourages foreign researchers to carry out environmental studies of benefit to the country and to science in general. The Etosha Ecological Research Institute in the Etosha National Park has developed a good working partnership with the San Diego Zoological Society of the United States, while the Desert Ecological Research Unit of Namibia is situated within one of the country's game reserves and attracts a wide range of international scientists.

The Government of Namibia will continue to build on these international and regional partnerships, particularly in the area of environmental monitoring, research and protection. There is scope for the development of cross-border conservation areas with Angola, Zambia and Botswana and negotiations to establish such areas will be a priority.

The Government will also continue to establish funding partnerships with international development and environmental donor agencies, ensuring that the needs of the country are paramount in determining the relationship with donors. Relationships with donors need to be well-defined so that they result in a true partnership, rather than dominance by the donor's own requirements.

VIII b Africa's Common Position

The Republic of Namibia stands firmly behind the common position taken by African countries on Environment and Development and recognises that humanity has a common heritage that is based on ecological interdependence.

Introduction

The Republic of Namibia gained its independence on 21 March 1990. From this date it began to critically review its administration, its policies and legislation. The Ministry responsible for the environment likewise began a review process by means of public consultation, from which new objectives and policies were developed. During this time, many countries and organisations were preparing for the United Nations Conference on Environment and Development. Namibia was not able to participate because its own position was still being determined. However, we have watched the rest of the world prepare for the UNCED with great interest, particularly the African countries.

General Principles

In the spirit of African integration and inter-dependence as reflected in the Charter of African Unity (OAU), the Republic of Namibia recognises that humanity has a common heritage that links it ecologically to the African continent and the entire world. For a sustainable common future we must individually and collectively protect this common heritage.

Namibia recognises the need to promote and foster dialogue between industrial, commercial and environmental policy makers. There is a close link between development and environment, and sustainable development must be based on wise management and appropriate environmental protection. Namibia has committed itself to this philosophy by including

Namibia is committed to the philosophy of sustainable development and wise environmental management and protection. This committment is enshrined in the National Constitution which instructs the state to safeguard biological diversity and essential ecological process, and to ensure that the utilization of living natural resources is on a sustainable basis for the benefit of all Namibians, both present and future.

environmental protection clauses in its constitution which safeguard biological diversity and essential ecological processes and which state that the utilization of living resources should be on a sustainable basis for the well-being of both present and future generations of Namibians.

The environmental guidelines which contribute to Africa's common position were drawn up before Namibia's Independence in March 1990 (e.g. the Monrovia Declaration 1979, the Lagos Plan of Action 1980, the African Ministerial Conference on the Environment (AMCEN) Cairo 1985) and Namibia was not able to participate. These guidelines are nevertheless accepted as being useful in directing common policy, as is the Bamako Convention on the ban of imports into Africa and the control of trans-boundary movement of hazardous wastes within Africa by the OAU Heads of State and Government.

The Republic of Namibia stands firm with the rest of Africa in reaffirming the legitimate rights of our people to health and development and rights to a healthy environment and its associated natural resources.

We accept that sustainable development requires, for its implementation and management, full participation and commitment at the political level, as well as collaboration with NGOs, women's and youth organisations and the private sector. It requires policies and legislation that encourage development while conserving the resource base. To support a programme of sustainable development, Namibia must improve its access to science and technology, and extend the expertise in these fields within the people of Namibia by education and training. Further, we must extend international links to achieve effective international solidarity, real cooperation and mutual understanding.

As a frontline nation to the desert environment, the Republic of Namibia is fully aware of the consequences of desertification. We deplore the declining biological production, the deterioration of the physical environment and the increased hazards to human settlement and life that result from desertification. Conditions of desertification hamper development efforts of people and compel them to adopt environment-damaging survival strategies. Careful management of arid systems are needed, as well as new and innovative measures to reverse trends towards desertification.

In accord with Africa's common position, Namibia reaffirms the sovereign right of states over their natural resources, and their rights to use these resources sustainably for the development and well-being of their people. Sustainable development must be supported by measures aimed at satisfying essential needs and aspirations of all people without compromising the resources needed by future gen-

Namibia firmly believes that all its citizens have a legitimate right to health and development, and the right to a clean and productive environment.

Namibia proclaims its sovereign right over natural resources, and its right to use these resources in a sustainable manner for the development and well-being of all its people.

erations to attain a decent lifestyle. Investment made towards the conservation and wise management of the environment is a responsibility not only of government, but of all people that derive benefit from resources linked to the environment. To ensure a social, participatory process for the management of the environment requires an integrated, intersectoral and thus interdisciplinary approach.

Poverty and over-exploitation of the natural resources of Africa are interlinked and lead to a loss of biodiversity and unsustainable patterns of production and consumption. Poverty can be regarded as a severe form of pollution, and policies should be sought for the eradication of poverty while introducing sound environmental management.

Namibia is committed not only to implementing policies for sustainable development and wise ecological management, but also to supporting the common African position, including activities and negotiations during and after the UNCED.

Africa's Priority Concerns

While Africa's priority concerns relating to the Environment and Development are varied, the following are important considerations for most African countries, including Namibia:

a. The achievement of food security

b. The development of energy security

c. The achievement of sustainable economic growth and productive employment

d. The security and stability of financial resources for development

e. The improvement of the quality of life of people and the environment

The living conditions of poor and vulnerable groups, in particular children, have deteriorated, mainly as a result of mediocre results from the agricultural sector which has been seen as the pivot of growth in most African economies. These problems are worsened by population pressures, inadequate analytical and institutional capacity and irrational management of resources such as forests, woodlands, savannas and water.

African countries have identified the following key factors as major con-

Poverty and over-exploitation of natural resources are interlinked. Poverty leads to a loss of biodiversity and unsustainable patterns of production. Poverty can be regarded as a severe form of pollution. Any environmental policy should strive to eradicate poverty.

straints to economic development on the continent:

a. Declining agricultural production

b. Inappropriate production techniques in agriculture, mining and industry

c. High dependence on primary commodities and collapse of commodity prices

d. Inappropriate policies and measures to address the African economic crisis

e. A debt burden of $270 billion which in 1990 cost Africa $23 billion to service

f. Activities by trans-national corporations with high financial and ecological costs

g. The net resource outflow from Africa to the rest of the world

h. The impact on natural resources of demographic changes and population pressure

i. Negative impacts of natural and man-made disasters

j. Environmental and developmental problems encountered by landlocked countries

Many of these factors are directly pertinent to Namibia. In order to have a tool to measure sustainable growth, it is necessary to urgently revise our system of economics so as to introduce a system of natural resource accounting. Such a system would reflect in economic terms the condition of the environment and the status of natural resources.

In accordance with the rest of Africa, Namibia intends to participate in the UNCED negotiations process in a spirit of cooperation and solidarity with other nations and regions, but without compromising our interests. We believe in and call for a new era of development strategies that emphasise economic growth and that combine poverty alleviation and environmental protection.

African Environment And Development Agenda

This agenda comprises the strategies, priority actions, programmes and negotiation mechanisms which Africa will implement in order to achieve sustainable development nationally as well as regionally. Sound environmental management and rehabilitation, and sustainable development in the 1990s and beyond will require considerable resources, strong institutional and technological support as well as enhanced training and research activities and capacities. This means that development agencies working in Africa on social and economic mandates must integrate environmental concerns and wise resource management fully within their terms of reference.

A new method is needed for measuring sustainable economic growth in Namibia. A method of natural resource accounting should be introduced at national, regional and local levels.

Priority Programme On The Africa Environment And Development Agenda

a. Provision of food self sufficiency and food security,

b. Efficient and equitable use of water resources,

c. Management of marine and coastal resources, as well as the protection of the marine environment,

d. Securement of greater energy self sufficiency,

e. Managagement of demographic change and population pressures,

f. Development of human settlement; planning and management of human resources,

g. Optimisation of industrial production, pollution prevention and control,

h. Management of biodiversity and bio-technology,

i. Mitigation of global warming and climate change,

j. Rational management of forest resources,

k. Reversal of desertification in Africa,

l. Environmentally sound development of mineral resources,

m. Popular participation and enhancement of the role of NGOs, youth and women,

n. Development of environmental legislation,

o. Capacity building, environmental education, training and public awareness,

p. Management of solid and hazardous wastes,

q. Additional resources for environmental rehabilitation,

r. Eradication of poverty,

s Drought monitoring,

t. Development of science and technology,

u. Health implications of development,

v. Mitigation of the impacts of refugees on environment and development.

The priority objective of African countries is to eliminate poverty and thereby combat famine and malnutrition, and reduce pressure on natural resources. Second, it is vitally important that people from all sectors of society participate in this process and that the public mobilises itself to bring about change consistent with the objectives of sustainable development. Third, it is clear that for a positive and effective contribution to global environmental development by African countries, a cross-sectoral approach is necessary. Table 1 lists the priority programmes of this Agenda.

The African Environment And Development Agenda And Post Conference Follow-up

In a world of increasing global interdependence, Namibia and Africa's futures are inextricably linked to those of other continents. As part of Africa, the Republic of Namibia is prepared to play its part in international relations so as to better defend national, regional and continental interests.

Namibia fully supports the common position that commits African countries to:

a. Integrate environmental criteria systematically into every aspect of economic decision-making so as to make development truly sustainable,

b. Take steps to improve the economic situation of our people by placing the provision of basic necessities of life (food, water, shelter, energy, security, education, health) at the highest political level,

c. Formulate and implement development programmes linking environment and development for sustainable growth,

d. Develop infrastructure, particularly to support technological and human skills and information networks,

e. Support and promote Science and Technology, especially through bi-lateral, multi-lateral, regional or international programmes on research and development,

f. Implement the African Environment and Development Agenda,

g. Accelerate the dialogue on links between environment and trade policies in the promotion of sustainable development.

In addition, it is important that:

The priority objectives of a sustainable development programme are to eliminate poverty and famine, to improve the level of education, to encourage public participation in community and national development and environmental management pojects and to reduce pressure on natural resources to sustainable levels.

- popular participation and full democratisation is encouraged at all levels of governance, during decision making and implementation,

- and that economic empowerment is promoted at all levels (including individual, village, district, national and regional), by allowing people to participate more effectively in matters of environment and development.

Namibia recognises that environmental policies must be based on a precautionary principle that should govern the development and use of science and technology for implementing environmental measures by anticipating, preventing and eradicating the causes of environmental degradation, even if firm scientific proof is lacking because proof may come too late. We further recognise the legitimate right of African countries to exploit their natural resources on a sustainable basis for development purposes, and to continue to participate in the management and conservation of global environmental "commons" for this and future generations.

While it is accepted that Africa is confronted by a difficult economic environment, particularly with reference to mass poverty, inadequate technology and limited scientific capability, it must participate fully in the global approach to environmental management for the common future of all humanity, and redress global inequalities that hamper international co-operation. In particular, we expect our global partners to adopt the principle of "polluter pays".

In the national, regional and continental interests, and in support of Africa's Common Position, Namibia will discuss and negotiate on the following topics for an Earth Charter, that should spell out the ethics of inter-generational development and the conservation of a healthy environment:

a. The establishment of an ecologically-orientated Diversification Fund for promoting structural transformation of African economies,

b. The development of an environmentally sound Regional Energy Strategy,

c. The prohibition of the importation of toxic and other hazardous wastes in Africa, in consonance with the Bamako Convention and in the spirit of the Basel Convention,

d. The adoption of strategies for promoting popular participation and for putting people first in all components of development programmes

e. The formulation and signing of an International Convention on Halting Desertification in Africa by the creation, through collective international effort, of green belts north and south of the Sahara, and adjacent

to the Kalahari and Namib Deserts,

f. The transfer of clean technology to African countries,

g. Support and encouragement for the protection of mineral and biological resources in African countries,

h. The strengthening of scientific and development institutions, training and research.

In conclusion, the Republic of Namibia fully endorses the aspirations of all participating African countries that the UNCED should usher in a new era of international co-operation and action for putting humanity on a path of sustainable development as we move into the next century.

VIII c Environmental Citizenship

Namibia's goal is to develop an environmentally literate society in which citizens have the knowledge, skills, and values necessary for appropriate action.

Introduction

Namibians at all levels of society must become involved in making decisions about environmental issues and must participate in ensuring a healthy environment. To do this successfully, they need access to accurate information about the environment as well as an understanding of how the environment works. They also need to develop environmental values and the motivation to take action. They need to develop the necessary skills for solving environmental problems, and to develop the ability to evaluate environmental conditions and measures. This is true for policy makers at the highest level of government as well as for rural subsistence farmers.

The Government of Namibia is committed to meeting the challenge of developing an Environmentally Literate Society.

Collection And Dissemination Of Information

The collection and dissemination of environmental information to all appropriate levels of society are the first steps in the process of working towards an environmentally literate public.

The information required for sound environmental decision-making depends on a well developed research capacity. Once the research has been carried out, the information needs to be shared with the public in an understandable form. Environmental data and information must be seen as a national resource rather than the property of government agencies or private companies.

The Government will review the country's research capacity for environmental monitoring and expand this where necessary.

The Government will ensure that environmental information is accessible to the public by launching appropriate information campaigns at national and regional levels.

The Government will make available to the public on request any information or data collected for environmental monitoring purposes, such as

pollution levels, except in cases of genuine national interest.

Environmental Accounting

National Accounting systems traditionally look at the direct economic costs of development and fail to take into account the hidden costs of potential environmental degradation or damage. New systems of accounting are being developed internationally which place a value on natural resources and other components of the environment. Such systems enable policy-makers and the public to realise the full cost (particularly over the long-term) of development activities and help us to evaluate development proposals in terms of sustainability.

The Government will investigate ways of placing an economic value on environmental quality and natural resources so that environmental costs can be incorporated into national accounting systems.

State Of The Environment Reporting

An important means of collating and disseminating essential environmental information will be through a national State of the Environment Report. This report will indicate the general health of the Namibian environment, progress in achieving environmental goals and objectives and identify environmental threats and problems and areas which need attention.

The Government will investigate the introduction of regular State of the Environment reporting to Parliament.

The Government will investigate the development of a set of national indicators / standards by which the health of the environment can be measured.

Environmental Education For All Namibians

To enable Namibians to move from environmental awareness to understanding and action, the Namibian Government will aim to provide all Namibians with access to environmental education, whether at the formal or non-formal level.

This will involve partnerships between Government Ministries, NGOs and the private sector. The role of the Government will be that of a catalyst and facilitator in many respects. It will however, take the necessary steps to ensure that environmental education is included in the school curriculum and is a high priority of the Ministry of Environmental Conservation, Wildlife and Tourism.

The participation of all Namibians in environmental education will be one of the key factors in ensuring that sustainable development is achieved. This is because environmental education is one of the essential instruments for empowering individuals

The government will provide as much environmental information as possible, will investigate methods of environmental accounting and environmental reporting that clearly express the national position regarding sustainable development. The government strongly supports the promotion of environmental education at all levels of society.

and communities to take meaningful action and positively shape the future of their own environment.

- The Government will support the calling of a National Conference on Environmental Education to be held in 1992.
- It will support the development of a National Environmental Education strategy as a means of strengthening the growth of environmental education in Namibia and drawing together the different organisations and individuals involved in environmental education.
- The Government will support the establishment of a National Environmental Education Association which will facilitate networking, the dissemination of information and the promotion of environmental education.
- The Government will encourage the development of teaching programmes and materials suitable for inclusion in school curricula and relevant for teacher training.
- The government will encourage the development of environmental education centres which can provide non- formal environmental education relevant to the needs of specific communities and to the needs of schools and other learning institutions.

VIII d Supporting Science And Research

Environmental health in Namibia requires a sound knowledge of processes and constraints that mould the physical and biological nature of the region. Such knowledge can only be produced by active, critical science and research within Namibia. Namibia will, therefore, actively promote, encourage and fund science and research that improves knowledge, and therefore management of its environment.

Science and research are tools and activities used to improve our knowledge of life - past, present and future. In an environmental context, such knowledge is required to manage our environment on a healthy basis to allow for sustainable and equitable use of limited resources. Past experience in Namibia bears witness to many mistakes which have caused severe damage to our environment, reducing its carrying capacity for long periods and harming the lives of people. Given adequate planning, using appropriate environmental knowledge and concepts, most of these mistakes could have been avoided.

Why science and research?

The need for Namibian science and research on environmental issues is especially critical for several reasons.

- The great majority of Namibians live very close to the natural environment. Our people use natural resources to a much greater and more immediate degree than people living in "developed" countries. Even the great majority of commercial agriculture and the fisheries industry relies on indigenous resources, while the mining industry relies entirely on these resources. Thus, a great many people are directly dependent on indigenous sources of fuel, water, food and shelter. Moreover, many of these resources are in short supply, requiring optimal management to ensure sustained availability. Science and research are not luxuries but necessities, if we are to develop capacities for optimal management in order to ensure that resources remain available to the majority of Namibians.
- The Namibian environment is an unpredictable and harsh one. Processes, especially abiotic ones, that fashion the Namibian environment vary unpredictably. Simple models developed in more stable environments cannot readily be applied to Namibia. In addition,

the "highs and lows" that occur as processes, factors and inputs to the environment are more extreme. Famines, floods, droughts and plagues occur both more unpredictably and severely under these conditions. As a first step, the unpredictability and severity of the Namibian environment must be recognised, while, as a second step, science and research need to improve our knowledge and understanding of these features.

- The Namibian environment is fragile, being especially characterised by a thin layer of fertile soil and plant growth. Damage to this layer, due for example to over-grazing, soil erosion or the salinisation of the soil, will result in lasting injury which reduces the productivity of the environment over very long periods. Similarly, populations of plants and animals reduced by deforestation, drought, or excessive hunting will not recover rapidly.

- Namibia has a recent history of scientific endeavour. It is also a young country with a short history of independent action and enterprise. The scientific basis to environmental management is therefore limited, requiring obvious and urgent expansion.

- Rapid growth of the Namibian population means that pressures on environmental resources are increasing quickly. A concomitant growth in scientific knowledge is needed to ensure that environmental and resource management practices improve at a similar rate.

Present capacity and background to Namibian science and research

In tackling the challenges facing Namibian environmental science and research, we should build upon present assets, but avoid past mistakes, especially where limited capacities for research have been used suboptimally.

Namibia has a respectable record of descriptive research. Much of this is relevant to environmental knowledge, since it provides documentation on our plants, animals and geography. Large collections of specimens and information have been assembled in museums and libraries, and a good deal of these resources are available in several Namibian research institutions. Capacities amongst Namibian scientists have largely been developed with the aim of serving this descriptive work.

In addition to descriptive science, much research has focused on ques-

Environmental science in Namibia must grow at a rate similar to that of the escalating pressure on environmental resources caused by an increasing and developing population.

tions related to the interests of the commercial sector, for example in agriculture, veterinary science, marine fisheries and geology. The primary aim of this work has been to improve the economic viability of the commercial sectors, with a view to improving the wealth of Namibia. There has, however, been relatively little research on the environmental consequences of these economic activities, for example on carrying capacities and soil erosion. Namibia's ability to plan and implement intensive economic enterprises on an environmentally healthy and sustainable basis in thus limited.

Many scientific resources have also been directed to the conservation and management of spectacular components of the environment, especially large animals in nature reserves and on commercial land.

Very little research activity has been devoted to questions concerning the environments of people living communally. These Namibians constitute the great majority of the population, and depend almost entirely on resources obtained from their immediate environment to meet their daily needs.

Finally, there has been almost no development of theory, synthesis or models of environmental processes and constraints in Namibia. Planning and management of resources in Namibia has been done largely on the basis of theory and models formulated in quite different environments, societies and economies. Our ability to make useful predictions and decisions, based upon a good understanding of local, relevant environmental processes, is thus limited.

Environmental science and research in the future

Much science and research must be done in Namibia. A primary aim of this work must be to investigate, document and understand the *partnerships between Namibians and their environment.* Failure to address this interaction will result in a repetition of past mistakes, and even greater problems as pressures on the environment increase.

Science and research must address issues that concern the Namibian environment, *locally and relevantly.* There are many such issues, but a few examples suffice: variation and predictability of climatic processes; the dynamics and timing of growth of plant and animal populations required for sustainable exploitation; hydrological processes; environmentally benign technologies; optimal use of soils; desertification; and nomadic strategies in arid lands.

In addition to local relevance, science and research must focus on *processes*

Namibian science must produce models that provide robust predictions on processes and constraints that affect the environmental health of this country.

and constraints in Namibia's environment. Many environmental processes in Namibia differ from those that have been well-studied in temperate latitudes, and a body of knowledge and concepts is required for us to use these processes. Namibia's environment is replete with severe constraints; these must be documented and understood.

Future environmental research on locally relevant processes and constraints will serve the interests of Namibia's people well. However, this work will also contribute to international science, strenthening our understanding of global conditions, and strategies for environmental management in regions with conditions similar to those of Namibia. *The development and promotion of environmental science in Namibia will therefore contribute to the health of our planet and mankind as a whole.*

Strategies for developing and maintaining environmental science and research

It is clear that restrictions on funding and trained manpower limit Namibia's ability to conduct sufficient research to meet the challenges of the present and future.

Notwithstanding these limits, the Namibian Government commits itself to the following courses of action to meet our requirements for a sound scientific basis to the management and conservation of the environment.

The Namibian Government will actively train scientists to address issues of environmental science in Namibia.

These Namibian scientists will aggressively tackle urgent problems, doing this in collaboration with foreign science and resources.

Existing research capacities and facilities in Namibia will be further strengthened and aligned to meet the needs of environmental science.

Environmental science research at the University of Namibia will be stimulated and developed. Work at this centre will aid in the training of Namibian scientists and help to focus, co-ordinate and stimulate research done at other organisations in Namibia.

Namibia actively encourages foreign scientists to study environmental issues in this country. Every effort will be made to use the expertise and experience of these people to develop a sound body of knowledge on environmental matters. Research conducted by foreign scientists should be collaborative with local scientists, where possible.

Namibia will stimulate and promote research that focuses on the environment and technology of rural people, especially those living close to the land and depending on its re-

Foreign scientists are actively encouraged to contribute to research and science training in Namibia, thus helping to build a sound knowledge of environmental processes and constraints in this country.

sources. As much as possible of this research should involve communities and rural people, the work being done with these people, and not simply for them.

Namibia assumes full responsibility for the health and sustainability of its environment. In taking this responsibility, Namibia will develop the necessary scientific and research tools to produce the knowledge and understanding required for optimal management of its environment.

CONCLUSION

Namibia's goal is to secure for present and future generations a safe and healthy environment, and a sound and prosperous economy.

Namibia's Green Plan sets out an ambitious national programme for achieving sustainable development in this country. Namibia is in the fortunate position of having a small human population and a relatively healthy environment. We still have a wide range of options for our future development. This situation could, however, change very quickly. Our population growth is at about 3% per year, and our environment is arid and fragile. If the Namib Desert were to expand eastwards at the same pace and to the same extent as the Sahara Desert did in the Sahel region, then in 10 years we would lose our entire country.

The Government of Namibia is prepared to take a leading role in achieving this country's environmental goals. Our Green Plan has identified actions that government ministries, the private sector, NGOs and individual citizens will need to think about and act upon. The actions required will need to be integrated into the everyday lives of individuals, organisations and government ministries. These actions are aimed at:

- helping to ensure that Namibia has clean air, water and land;
- supporting the sustainable use of our natural resources;
- protecting our special spaces and species;
- preserving the integrity of the Namib Desert;
- highlighting the importance of wetlands in arid regions;
- guarding against the threat of desertification;
- promoting global environmental security; and
- encouraging environmentally responsible decision-making at all levels of society.

The main issues for sustainable development and wise environmental management in Namibia in the immediate future include the following:

Social requirements

- reduce and ultimately eradicate poverty;
- reduce the human population growth rate and achieve a stable population size;

- achieve a high standard of education (including environmental awareness) across the country;
- achieve a high level of primary health care across the country;
- improve the capacity for training, research and technological development;
- achieve a high level of public participation in environment and development issues, and involve people in resource management for their direct benefit.

Environmental requirements

- develop a national water conservation policy and strategy;
- develop a national policy and legislation on sustainable agriculture, addressing the problems of soil erosion, deforestation, bush encroachment and desertification, and fully integrate the constraints of climatic variability in arid and semi-arid environments;
- develop a national policy and strategy for the resettlement of people, based upon environmental constraints and sustainability;
- develop a policy and appropriate controlling legislation on sustainable fisheries, both marine and inland, that consider environmental effects as well as human exploitation.
- extend the protected area network of proclaimed parks to incorporate representative samples of all vegetation and habitat types and thus ensure the protection of the nation's biological diversity;
- develop a programme, policy and legislation for handling toxic and hazardous waste substances produced within Namibia, and for conducting environmental impact assessments of development programmes.

In addition to the main issues listed above, there are a number of cross-cutting and supportive issues that need to be included. These are:

- the need for land-use planning at national, district and local levels, and which should encourage a multi-sectoral and participatory approach;
- natural resource accounting, to evaluate resources and natural systems prior to and during exploitation, and to determine environmental costs in economic terms so as to evaluate real economic profits and growth;
- Quality of life accounting (social accounting), to evaluate real improvements in the social and economic levels of poor people. This transcends an evaluation of the national GDP and should include issues such as nutritional status, health, education, services, commu-

nity and individual empowerment, household income, etc.

- Improved co-operation, co-ordination and support within and between environmental and developmental organisations, within Namibia, within the region and internationally.

In all these areas, new policies, programmes and regulations are needed or should be expanded. Leadership in the execution of our *Green Plan* does not mean exclusive responsibility for the Ministry of Environmental Conservation, Wildlife and Tourism. This Ministry is prepared and eager to do its part. However, the government does not have a monopoly on good ideas when it comes to achieving our environmental goals.

The environment is not, in the final analysis, the responsibility of any order of government, organisation or individual. It is the responsibility of all inhabitants of this country and indeed this planet. Our *Green Plan* emphasises that we must all work individually, together with our countrymen, and with our international neighbours to meet our shared responsibility.

Namibia's Green Plan is optimistic about our environmental future. The achievement of sustainable development will be a challenge for Namibia - and through commitment, partnership and consultation, that challenge can be met.