MINISTRY OF ENVIRONMENT & TOURISM
Directorate of Environmental Affairs

PROPOSAL for:
DEVELOPMENT OF AN OPEN-AIR MUSEUM and BIOTECHNOLOGY in
the NAMIB DESERT

Enhancing Community benefits from the management of natural
resources and marketing of genetic resources & traditional knowledge

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A PICTURE OF A HOODIA PLANT IN THE NAMIB DESERT AND THIN PHETAMINE- A WEIGHT-LOSS PRODUCT. ONE OF MANY COMMERCIALY-AVAILABLE PRODUCTS MADE FROM THIS PLANT.
RATIONALE

Community-based Natural Resources Management (CBNRM) and the advent of Biotechnology in the 21st Century provides many opportunities for some of the world’s poorest communities that inhabit very unique environments such as the Namib Desert to manage these global environmental assets in a sustainable manner, and also to stimulate local socio-economic emancipation through natural resources-based industries. Income generation from eco-tourism and trade in desirable local resources, products and traditional knowledge is proving highly marketable as epitomised by the $32 million rights-agreement between the CSIR, San Community and a USA-based pharmaceutical giant (Pfizer) that markets synthetic products from this plant. Other equally prosperous ventures include the $ 2 million annual trade for Namibian rural communities in material from the Devils’ Claw plant that is exported to a pharmaceutical company in the United Kingdom.

The Namib Desert being one of the oldest known deserts in the world and also one of the most diverse has immense potential for eco-tourism. Fauna and Flora in the Namib Desert also display some of the world’s most unique adaptations that would attract tourists, and also have wide-ranging applications in many industries including food & beverage, pharmaceuticals and even space technology (See Section 2). Some plant species that also occur in the Namib Desert such as the Aloes have been used by man for Centuries. Greek scientists recognised the healing powers of Aloes more than 2000 years ago. Even Alexander the Great fought for the Island of Socrota to secure Aloe resources for treating his soldiers while Cleopatra also attributed her beauty to products made from Aloe.

The development of technologies derived from Namib desert species, adaptations, traditional knowledge as well as the creation of the proposed local community-operated Open-air Museum and guided-tourism in parts of the central Namib Desert would help to provide much-needed income to the Namib Desert’s Topnaar community. This will also provide incentives for sustainable management of natural resources-

Safeguarding one of mankind’s most unique heritages. The project is also intended to design and promote a model approach to socio-economic empowerment of marginalized indigenous people that can be replicated in other unique areas such as the Kalahari Desert (San communities).
1 INTRODUCTION

The Namib Desert is one of the oldest deserts in the world, and also one of few protected areas with a resident indigenous community. It also has an uncommon variety of habitats including inland & coastal sand dunes and gravel plains that are found in both fog-occurring and non-foggy areas as well as ephemeral river habitats. These diverse habitats have a multitude of fauna and flora that makes the Namib one of very few deserts environments with such a rich biodiversity.

Many plants and animals in the Namib Desert display unique adaptations to this arid environment, and the indigenous Topnaar community also has a lot of traditional knowledge on the use of these local resources. Both these have immense potential for eco-tourism and for development of products in such industries as food, water treatment, pharmaceuticals and many other applications that are essential for the advancement of biotechnology.

This programme seeks to empower the Topnaar community in the Namib Desert to derive much-needed income from the management of parts of the Namib Desert as an OPEN-AIR DESERT MUSEUM and guided tour-route, as well as to investigate and market the local genetic resources, traditional knowledge and skills to the wider international market. This approach would go a long way in addressing the current abject poverty among this community, support sustainable livelihoods and provide incentives for sustainable natural resources management, biodiversity conservation and safeguarding of one of mankind’s unique common heritages.
Past and ongoing scientific investigations in the Namib Desert indicate that adaptations in fauna and flora of the Namib Desert as well as the traditional knowledge of the local Topnaar people have vast potential for contributing towards development of commercially valuable products. Indeed, other less resourceful regions of Namibia are already benefiting from biotechnology by supplying raw material and products such as material from the Devil’s Claw plant (*Harpagophytum procumbens*), which is used in a number of pharmaceutical products in the United Kingdom (*See Appendix for the variety of drugs*). A number of other plants such as the Hoodia *sp.* are also currently being commercially exploited throughout the world in the production of appetite-suppressing ingredients that are used in a number of pharmaceuticals including weight-loss products. Most of these natural resources are more abundant in the Namib Desert than in the rest of the country.

The Namib Desert is also much older and has more severe climatic and ecological constrains than the semi-arid environments where most of the current resources being exported from Namibia originate. These conditions dictate that endemic species are highly adapted, and would therefore contribute new knowledge and products that would find uses in a wide-range of applications. Some of the known adaptations in the Namib Desert species and their potential applications include for instance:
A discovery made during an award-winning doctoral study and investigations at Oxford University which show that adaptations on the surfaces of fog-basking beetles could be used to increase fog collection in man-made collectors (for water supply to human settlements in foggy deserts) and that they would also enable development of highly efficient industrial condensers and cooling systems (See Appendix for other scientific literature);

- Ongoing PhD work with Oxford University on the navigation techniques in endemic spiders that could be used in outer space navigation technology;

- Chemical analysis of a traditional fruit and seeds that are currently used in the chocolate industry show that they can be used to produce cooking oil that is of better quality than the common cooking oil, and that the seeds could also be used in pharmaceutical and cosmetic industries;

- Post doctoral studies on venom in local scorpion species (some of the most dangerous in the world) provide information that can be used to develop commercially viable anti-dotes for scorpion bites, spider, snake and other lethal bites;

- Studies on the wheeling spider has wide-ranging applications in mechanical engineering (curls into a small wheel and rolls away from any suspect danger at the highest speed per unit volume ever recorded in animals);

Other findings in the Namib desert such as the occurrence of pre-historic human settlements, artefacts and most importantly, some of the oldest known geomorphologic information on parts of the earth which were not affected by glaciation all have immense value to humanity’s understanding of human evolution, archaeology, geomorphology and climatic changes.

ABOVE: ADAPTATIONS IN ENDEMIC SPECIES SUCH AS THIS FOG-BASKING BEETLE (Onymacris unguicularis) ARE ALREADY BEING EXPLORED TO PROVIDE SOLUTIONS (e.g. fog collection for water supply to local settlements) TO PEOPLE IN THIS HOSTILE (WATER DEFICIENT) ENVIRONMENT.
3 APPROACH TO MANAGEMENT OF NATURAL RESOURCES AND THE NATURAL INFORMATION DATABASE

PICTURES SHOWING WHEELING SPIDERS IN MOTION.

3.1 Natural resources management

The Government of Namibia recognizes that the natural resources and the vast database of knowledge and environmental information in this world asset (The Namib desert) is valuable to the development of larger humanity, and that it needs to be used sustainably so as to ensure inter-generational equity by not jeopardising opportunities for future generation. The government is also aware of the deplorable socio-economic conditions that prevail among the indigenous people that reside in the Namib desert, and therefore seeks to implement a programme that guarantees socio-economic development of the indigenous community without compromising the areas uniqueness and value to all Namibians and larger humanity.

The approach herewith proposed is that of Community-based Natural Resources Management (CBNRM) that would empower the local Topnaar community to set-up a jointly operated (with the Ministry of Environment & Tourism) Open-Namib Desert Museum in an agreed area of the Namib Naukluft Park. The planned CBNRM project is in line with our national policies on environmental protection and sustainable development that recognise that biodiversity conservation and sustainable development can only be achieved by empowering the inhabitants and custodians of the land to oversee the sustainable utilisation of natural resources in their respective areas. This includes, among others, the management, local consumption and trade in agreed natural resources and their products, including wildlife, forests, grazing and the local genetic resources that are found in the agreed/demarcated areas-‘Conservancies’.

CURRENT COMMUNITY-BASED NATURAL RESOURCES MANAGEMENT IN ‘CONSERVANCIES’ ARE PROVIDING ECONOMIC INCENTIVES IN RURAL COMMUNITIES SUCH AS THIS ONE IN NORTH-WESTERN NAMIBIA TO ENABLE ENDANGERED WILDLIFE POPULATIONS SUCH AS THE BLACK RHINO TO RECOVER FROM OVER-EXPLOITATION (See Shanyengana, Barnard and Shikongo (2003)) IN APPENDIX).
3.2 Benefits to the Topnaar community

This project aims to empower the Topnaar community to derive much-required income from joint management and tourism in an agreed section of the Namib Naukluft Park. It should, however, be emphasised that this proposal does not call for the consumptive use of natural resources such as occurs in many Conservancies but rather, that it provides for derivation of income from guided tourism and genetic resources in the given area.

The income generated would contribute to the socio-economic emancipation of this marginalized group. Some of the income would for instance be used to strengthen the local schooling infrastructure, support local entrepreneurship, initiate new community programmes and through all the above, improve living standards in this community.

3.3 Summary of benefits to humanity

The programme would also contribute towards:

- Enhancing the protection of our common heritage, and promote research and understanding of human evolution, and physical global phenomena;
- Collection of information and development of products that would solve some of our current problems and thus, contribute to larger human development;
- Provision of a workable model for poverty alleviation and sustainable human capital development for indigenous communities in other parts of the world;

THE UNIQUE NAMIB ENVIRONMENT WITH SOME OF THE WORLD’S OLDEST SPECIES SUCH AS THIS PLANT, Welwitschia mirabilis, CAN BE USED TO GENERATE INCOME THROUGH TOURISM, AND AID BIOTECHNOLOGY BY ENABLING DEVELOPING OF CROPS THAT CAN THRIVE IN ARID ENVIRONMENTS.
4 PROGRAMME ACTIVITIES

Phase 1: *(Design Museum, Opportunity assessment & Bio-prospecting).*
- Stakeholder consultations;
- Delimitation of the area of operation;
- Formulation of final development proposal;
- Investigate tourism potential & develop a natural resources management strategy and business plan (in collaboration with a well-established desert museum such as in Arizona);
- Development of an architectural plan (use of natural designs and local material & techniques);
- Conduct an environmental assessment; development of a proposal for the structure of the CBNRM authority;
- Conduct a comprehensive assessment of the local natural resources, traditional knowledge and skills that could be used in commercial applications.

*(Period = 6 Months).*

Phase 2: *(Development of infrastructure)*
A central outdoor museum, Namib Desert-appropriate tourist accommodation & related facilities) and acquisition of the necessary equipment such as tour buses and others;

*(Period & Cost to be determined during Phase 1).*

Phase 3: Project initiation. Commence operations; Development of marketing mechanisms and package including video, brochures and signing of Memorandums of Understanding with other internationally acclaimed nature parks and/or community initiatives. *(Period = 4 Months)*

*(NB. Also establish links with a renowned nature programme producer such as NATIONAL GEOGRAPHIC or BBC and a renowned composer & singer to market the programme internationally).*

5 FINANCIAL PROPOSAL

The financial resources necessary to implement this programme would be amassed from both national and international funding institutions. Where possible, material contributions such as building material and transportation would be acquired from the local industry and other institutions in the spirit of Corporate Social Responsibility and involvement of the local industry in sustainable development activities. In addition to facilitating the realisation of the activities in this proposal, the government will also commit itself to provide the necessary support for a year until the project becomes self-sustaining.
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<th>Programme activities</th>
<th>Duration</th>
<th>Rate</th>
<th>Total (R$)</th>
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<tr>
<td>1. Development of the 'TOURKMAT Tourism' plan</td>
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<td>2. Development of the 'TOURKMAT Tourism' plan</td>
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<td>3. Tourist route and site selection</td>
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<td>4. Development of a natural resources management strategy and business plan</td>
<td>6 months</td>
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<td>230,000.00</td>
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<td>5. Preparation of an architectural plan</td>
<td>2.5 days</td>
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<td>150,000.00</td>
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<td>6. Environmental assessment</td>
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<td>7. Business Community Assessment &amp; Ecotourism</td>
<td>6 months</td>
<td>Average of a 1,600 euros/week</td>
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<td>8. Consultation with an established guest house such as Airport</td>
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<td>9. Additional funds required</td>
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<td>10. Vehicle expenses for tour guide &amp; transport, etc.</td>
<td>6,000.00</td>
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<td>230,000.00</td>
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<td>11. Accommodation fees, etc.</td>
<td>100,000.00</td>
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<td>12. Cooperation &amp; Signing Memorandum of Understanding with similar international tourism, etc.</td>
<td>100,000.00</td>
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<td>13. Establish partnership with technology centres &amp; initiate technical cooperation</td>
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6 CONCLUSION

This programme will provide much-desired financial benefits, which in-turn will provide incentives for sustainable management of the Namib Desert resources by the local Topnaar community for the benefit of all of humanity. The programme will also provide the necessary income to enable their sustained socio-economic emancipation, and serve as a workable model for empowering other marginalized communities that reside in unique, protected habitats such as the San community of the Kalahari Desert.

7 REFERENCES


Schemenauer, R.S. and Cereceda, P. Fog collection's role in water planning for Developing countries, Natural Resources Forum 18: 2, pp. 91-100.


8.1 *International interest in Hoodia plants* (also found in the Namib Desert).
8.2 International interest in the Devil’s claw plant of Southern Africa.

Devil’s claw is a perennial plant, common in the southern and eastern parts of Africa, particularly the former Transvaal. In heavy rain it grows luscious leaves and beautiful, trumpet-shaped, red-violet blossoms. During the rainy season it stores water in its tubers, providing a reservoir for periods of drought. The plant grows on sandy soil and the tubers, which are of medicinal value, are harvested in the autumn. Care is taken to harvest only these as the roots are ineffective. The plant gets its common name from the tough, thorny barbs which grow on its fruit – Devil’s claw is a translation of the German, Teufelskralle. A German farmer, G.H. Mehnert, introduced the herb into Europe having observed its use by the African peoples.

Therapeutic Uses

Devil’s claw has a long history of use in the traditional medicine of southern Africa. Various peoples there use it as a tonic, particularly to the digestive system, for arthritis and rheumatism, to reduce fevers, and for headaches. It is also made into an ointment and applied to sores, boils and ulcers. Hottentot, Bushman and Bantu women applied it during labour to relieve pain. (Warning: do not take during pregnancy) A decoction, made by simmering the tubers in boiling water, is normally drunk.

Current use in the Western world has focussed on its application to painful conditions of the musculo-skeletal system and digestive problems. It is frequently found in prescriptions for arthritis of different sorts, for rheumatic complaints and for low back pain, especially associated with spondylosis. Lumbar, sciatica, fibrositis, neuralgia and polymyalgia may benefit from the inclusion of Devil’s claw in the prescription.
Examples of high-level scientific findings from adaptations in local species and their potential applications.

Desert-dwelling organisms often exhibit striking adaptations to their and environs—consider the superb water-storage capabilities enabled by the cactus's succulent stem. Now a new study has revealed an equally remarkable feature for water collection in beetles inhabiting southern Africa's Namib Desert. Scientists have long observed that certain beetles in this rainless region bow into the wind to collect drinking water from the early-morning fog on their backs, letting the mist form droplets that then roll down to their mouthparts. But exactly how the creature converts fog water into the relatively large droplets remained a mystery. Research published today in the journal Nature reveals that the beetle's bumpy outer covering does the trick. The finding could inspire designs for commercial water-collecting devices.

Andrew R. Parker and Chris R. Lawrence of the University of Oxford in England took a long, hard look at the surface of the fused overwings, or elytra, of a beetle belonging to the Stenocara genus. The elytra are covered with an array of bumps visible to the naked eye. But examined under a microscope, a more complex structure emerged. Whereas the peaks of the bumps appear smooth and naked, their sides and valleys are textured and coated in wax. This microstructure, the researchers report, creates a highly hydrophobic surface akin to that exhibited by lotus leaves, which are well known for their ability to repel raindrops. Video recordings showed that fog water settles on the water-loving, or hydrophilic, peaks and then forms fast-growing
Philips and QUALCOMM choose Agilent for testing of next-generation devices

Did you know?

Commercial applications for a water-harvesting bee

Bees in the Namib Desert in southwestern Africa have a covering that captures water from the environment—and their system can be easily made and may have commercial applications.

The Namib Desert, which has the highest sand dunes in the world, gets almost no rainfall. But it does have early morning fog, which normally would be lost to the wind and sea.

But the bees studied at the University of Oxford research are able to collect water from the fog using a honey surface on their backs. The bees have a half a roll of water in their bodies. The beehives are made of small tubes, which are covered with a substance that is water-loving, hydrophilic. The water is stored between the tubes, and it is then replaced as it evaporates. As fog passes over the bees, the tubes collect water and accumulate into large droplets until they are in a position that they can hold the water and roll it into the beehives. The droplets are also large enough to reach the water collector, which is at the bottom of the beehive, and roll down the back to the bees' mouth.

The researchers experimented with their own version of this system and found it easy to incorporate. Such a system, they say, has potential uses in water trapping and building covering for use in harsh environments.

Philips Semiconductors, a world leader in silicon systems for wireless communications, selected the Agilent 93000 SOC Series for volume testing of Philips Semiconductors' next-generation cellular baseband integrated circuits (ICs).

And QUALCOMM, pioneer and world leader of Code Division Multiple Access (CDMA) digital wireless technology, has added two new Agilent 93000 SOC Series test systems to its existing array of 93000 systems. This will enable characterization and test development of next-generation cellular baseband processor IC (integrated circuit) devices.

The purchase will enable QUALCOMM CDMA Technologies to characterize devices on the same platform used for production test. Using the Agilent 93000 for both engineering and production test will accelerate time to market by avoiding lengthy test plan conversions and ensuring correlation between characterization and production test.

For Philips Semiconductors, the yield and throughput results achieved using the Agilent 93000 for testing the complex, mixed-signal devices demonstrated the tester's speed, site-to-site and tester-to-tester correlation, and its measurement repeatability. These strengths provide Philips with the competitive advantage needed to continue delivering high-quality, cost-effective products to the wireless market.

"The Agilent 93000's high reliability and stability makes it an ideal platform for high-volume production testing. The flexibility of the system aligns with our widely varying testing needs to address multiple market segments, now and in the future," said Janne Hylkens, director of Test Operations ATO, Philips Semiconductors.

The 93000 significantly reduced test time, thereby driving down cost of test, by supporting both multi-site test and concurrent test for multi-site test, where more than one device is tested simultaneously, and concurrent test, which enables several functional elements on a single device to be tested in parallel.

"QUALCOMM's selection of the Agilent 93000 for high-volume production test was driven by QUALCOMM's need to continuously reduce cost-of-test," said Don Schrock, president of QUALCOMM CDMA Technologies. "The Agilent 93000's ability to support both multi-site test and concurrent test for high-volume production testing was an important factor in QUALCOMM's selection of the Agilent 93000."

"The wireless market is constantly changing, and integration levels for baseband processors continue to increase dramatically every year with increased systems and many other functional elements soon to be added to already complex baseband processors," said John Swope, senior vice president and general manager of Agilent's Automated Test Group. "The Agilent 93000 has the capability to test highly integrated device that can have digital, analog, RF, and embedded memory on a single chip or in a single package, enabling the 93000 to meet future integration challenges."
8.4 ‘Diary of a tourist to the Namib- Wild Africa’ (Source: BBC Nature programmes)

**Namib Magic**

I found the Namib the most impressive desert I visited for Wild Africa. It’s such an ancient desert, that the animals and plants show adaptations that make them almost other worldly. The Welwitschia plant has only two leaves but may live for more than 1,000 years, and it derives all its water from fog. In the Namib, all plants and animals are dependent on fog, either directly or indirectly. If you climb the dunes on a foggy morning and are lucky, you may see headstander beetles lining the dune tops harvesting water droplets. Then there is the spider that turns itself into a wheel to escape from wasps... the list goes on.

The desert is also justly famous for its landscape. In 25 years of wildlife filmmaking, I have never seen anything to compare with the dune fields of the Namib. At Sossusvlei, the dunes are up to 300m high, the largest in the world.
8.5 Paper for United Nations Trondheim Symposium on biodiversity conservation - technology transfer and awareness creation.

**Biodiversity conservation in Namibia: Providing incentives for sustainable utilisation of natural resources & Biotechnology.**

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**Abstract**

The sustainable and equitable utilisation of biodiversity and traditional knowledge as well as BioSafety has become prominent issues in environmental discourse. Namibia, like many developing countries, is endowed with a variety of natural resources that can be used to provide essential life support resources including food, shelter and medicine as well as products that can be used to boost our economy. This use of natural resources also presents major incentives for enhancing biodiversity conservation by providing much-needed financial benefits to biodiversity custodians, particularly the rural poor. The latter would go a long way in alleviating poverty, which is a key threat to sustainable development in Namibia. It would also help to restore pre-colonial era user-rights, intrinsic and aesthetic values of natural resources that have existed among our indigenous communities for time immemorial. This paper highlights Namibia’s approach to biodiversity conservation with the aim of sharing experiences with other nations as well as to inform the CBD on issues pertinent to successful implementation of the convention in developing countries.

In an effort to achieve biodiversity conservation, the country embarked on a multi-pronged approach by adopting policies and actions that seek to restore community user rights and management of natural resources, and promote research, education and awareness creation among resource users and high-level decision makers. Our experiences indicate that effective biodiversity conservation requires tangible economic returns to the resource custodians as well as noble applications of local genetic resources in biotechnology so as to cultivate the desired political commitment. The above requires concerted local efforts and international collaboration on technology transfer as well as establishment of fair benefit-sharing mechanisms that reward the custodians of the resources who are predominantly the rural communities.
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ABBREVIATIONS

ACTS: African Centre for Technological Studies
CBD: Convention on Biological Diversity
CBNRM: Community-based Natural Resources Management
DEA: Directorate of Environment & Tourism (Namibian Ministry of Environment & Tourism)
EMIN: Environmental Monitoring and Indicators Network
EONN: Environmental Observatories Network Namibia
FAO: United Nations Food and Agricultural Organisation
GRN: Government of the Republic of Namibia
MET: Namibia’s Ministry of Environment and Tourism
NBSAP: National Biodiversity Strategy and Action Plan
NINA: Norwegian Institute for Nature Research
NTNU: Norwegian University of Science and Technology
SBSTTA: Subsidiary Body on Scientific, Technological and Technical Advice (under the CBD).
UNEP: United Nations Environment Programme
1 INTRODUCTION

The government of the Republic of Namibia recognises that biological diversity and traditional knowledge are key strengths that can be used to alleviate the prevalent poverty and environmental degradation in Namibia, and to improve food production, human health and overall quality of life of its inhabitants. The government also recognises that most of the country’s inhabitants (about 70% of the total population) lead a rural lifestyle and therefore depend directly on the extraction and exploitation of natural resources for their basic needs. It therefore follows that effective biodiversity conservation in Namibia can only be achieved by empowering the rural communities and other custodians of the land (e.g. commercial farmers) to oversee the sustainable utilisation of the country’s natural resources.

In an effort to achieve biodiversity conservation in Namibia, the Government adopted policies and actions such as the National Biodiversity Strategy and Action Plan (NBSAP), The National BioSafety Policy and Community-based Natural Resources Management Policy (CBNRM) that seek to promote inter-ministerial and cross-sectoral collaboration on biodiversity issues, community user rights and management of natural resources, promote research, education and awareness creation of resource users and decision makers. These policies also seek to encourage cooperation with Non Governmental Organisations (NGOs) and other private organisations in the establishment and/or consolidation of CBNRMs and development of biotechnology.

This paper presents a summary of Namibia’s experiences with biodiversity conservation. It particularly discusses a few key examples that epitomise the involvement of rural communities in biodiversity conservation in Namibia, the national biodiversity awareness creation strategy and related experiences that could be of interest to international biodiversity conservation experts and institution that are participating in the Trondheim Conference on technology transfer and capacity building. The paper is also intended to present a preview of our national strategies and actions towards achieving both socially equitable and environmentally sustainable biodiversity conservation, and highlight some of our key concerns and recommendations with regards to the effective implementation of the convention on biological diversity and the BioSafety protocol.

2 BACKGROUND to biodiversity issues in Namibia

2.1 Historical Perspective

Indigenous Namibian communities depend on the local natural resources for food, shelter and medicine, among others. This cultural knowledge of the local biodiversity has traditionally been passed-on from generation to generation over the centuries, and in so doing, has enabled rural communities and cultures to thrive in this arid climate where the availability of food and other life-supporting natural resources is both limited and highly variable. Indeed, biodiversity and traditional knowledge continue to serve as a critical buffer during periods of drought by providing alternative sources of food and essential nutrients and products to the rural inhabitants.
Most of these age-old practises were, however, disrupted in the mid-20th century due to such factors as population growth and the resultant competition and over-utilisation of natural resources as well as due to the introduction of ‘apartheid’ colonial laws. These factors distorted community property-ownership regimes and also restricted large numbers of people in confined areas (‘Homelands’ and/or ‘Bantustans’) that were often of low productivity. The end-results were replacement of the traditional natural resource utilisation regimes with opportunistic and non-sustainable ones because of the high demand for natural resources, and the opportunistic over-exploitation because natural resources were no longer perceived as communal goods. Most importantly, over-utilisation of natural resources and environmental degradation became rampant in adjoining state areas that were neither communal nor commercial-demarcated areas designated for specific purposes mainly agriculture, and belonging to specific individuals and/or groups.

Given this historical background, it was therefore crucial for the Government to introduce policies and strategies that would reinstate land and natural resource user rights. The latter was seen as one of the best options to encourage sustainable utilisation of natural resources, remedy environmental degradation and provide a solid foundation for poverty alleviation among the rural communities.

### 2.2 Climatic trends and challenges

Namibia is the most arid country in sub Saharan Africa with two prominent deserts, the Namib and Kalahari Deserts. Arid and Semi-arid landscapes make up about 97% of the country and as a result, rainfall is minimal and highly variable in both time and space such that drought, crop failure and food shortages are a common phenomena.

Droughts are currently experienced every three to five years, and even in years of good rainfall, the rainy season is increasingly shortening. The rainfall regime is consistently characterised by early or late rains that do not provide for the duration of moisture required for crop cultivation and livestock rearing. It is also important to note that these climatic conditions are anticipated to deteriorate due to global warming.

The above-mentioned climatic conditions also present severe challenges for biodiversity conservation and the availability of naturally occurring life-supporting resources. It is therefore essential that the country make use of biotechnology to investigate and develop crop varieties and other life-supporting resources that can thrive the foreseeable adverse climatic conditions.

It is equally important to design strategies and actions to mitigate the environmental consequences of the changing climatic conditions such as the loss of biological diversity due to bush encroachment¹ (‘brush encroachment’ - the proliferation of tree species and unpalatable bushes that forms thick impenetrable areas on previously open Savannah rangelands). This process reduces the carrying capacity of the land because the unpalatable bushes take over from native vegetation including grasses.

¹ Bush encroachment currently affects many areas in Namibia and is estimated to cause income losses to farmers of more than N$ 400 million per annum (US$ 50 million).
The thick bushes also render vast tracks of the land inaccessible to wildlife and livestock and as a consequence these animals are restricted to much smaller grazing areas than what is naturally available in these Savannahs.

3 Overview of Biodiversity planning, conservation and use in Namibia

Namibia’s shift towards sustainable development commenced immediately after independence in 1990 when the country became one of the first in the world to incorporate environment and sustainable development issues into its Constitution. This was later followed by the endorsement of supporting environmental legislation such as the Green Plan of 1992, Namibia’s 12 Point Plan for Integrated & Sustainable Development Issues of 1993 and others such as the Environmental Assessment Policy, Environmental Management Bill and the CBNRM Policy.

All of the above-mentioned policies, strategies and action plans re-iterate the national commitment to sustainable development as reflected in the Constitution. This commitment is manifested in a number of the national programmes of which a few that relate to conservation of biodiversity are discussed in the following sections.

3.1 Biodiversity planning

Biodiversity planning is central to Namibia’s Strategy and Action Plan for Biodiversity Conservation. This strategy document presents priority programmes and actions that are to be implemented during a ten-year period from 2001 – 2010.

The current action plans concern primarily the strengthening of national institutions dealing with biodiversity conservation in the country to effectively implement the national strategy, awareness creation as well as the provision of legislative, regulatory and economic incentives. The actions cover the following themes:

- Capacity building including development of human capital and infrastructure necessary for implementation of the strategy;
- Designing the necessary policy framework such as the Policy on Biosafety and others that are necessary for successful biodiversity conservation;
- Identification of biodiversity conservation priorities;
- Identification and provision of incentives for biodiversity conservation;
Awareness creation of resource users, managers and high-level decision-makers;
Designing mechanisms for monitoring and predicting environmental change and threats;
Designing management plans for all types of ecosystems found in the country and forming linkages with other regional governments and institution in order to enable cross-border conservation of biodiversity through the Trans-frontier Parks and other cross-border agreements;
Identification of additional national strengths, weaknesses and opportunities, and our role in global biodiversity conservation.

All the biodiversity actions are incorporated into the larger five-year national development plans which are the country’s medium-term plans towards a long-term vision of realizing sustainable development by the year 2030 (Namibia’ Vision 2030).

3.2 Community-based Natural Resources Management (CBNRM)

The Government of Namibia recognizes that effective biodiversity conservation in the country can only be achieved by building the capacity of the resource users, who are the custodians of the land, to manage their natural resources. The national policy on CBNRM was therefore adopted in 1995 in order to devolve natural resources management to organised regional groupings of resource users (Conservancies) while maintaining resource planning and decision-making at national level through a multi-sectoral coordinating body consisting of:

- Government departments and institutions;
- Non Governmental Organisations;
- Community-based Organisations;
- The afore-mentioned conservancies; and
- National research and development institutions.

The legislation on conservancies empowers organised communities living in a given area to form natural resources management units that have user-rights of the area’s natural resources. This requires that such natural resources management units are legally constituted, restricted to a specific area and posses or develops thereafter an integrated natural resources management plan for the area, outlining a sustainable natural resources management strategy for the area. The user rights cover an agreed selection of natural resources typically including wildlife, forest resources and grazing, and the use of agreed genetic resources.

To date, fifteen conservancies covering a total surface area of about 4 million hectares have been approved while about 35 more are in the pipeline. Some of the conservancies already generate enough capital to cover for all their running costs including paid employment for the conservancy owners, and are being operated as profitable businesses. A few others, particularly the more recently created ones are still partially dependent on donor funding.
It is important to note that the benefits of conservancies cannot be judged by the financial returns alone but rather by the combined economic, social, ecological and aesthetic benefits that are not possible to price. Indeed, some of the additional benefits include the recovery of previously severely endangered species such as the black rhino and a significant increase in the populations of species such as giraffe, springbok and zebra that were almost exterminated from these areas due to excessive hunting. In some cases, wildlife numbers have recovered sufficiently to allow for occasional hunting, providing food for local consumption and game for trophy hunting, which is proving to be a highly profitable source of income in many conservancies.

The experiences in Conservancies are also being applied in the re-introduction of wildlife in other areas such as commercial farms and public nature parks where they once existed. This is proving to be highly profitable in the re-establishment of biological diversity in these areas as well as in support of wildlife-based tourism including trophy hunting. Work in the above-mentioned natural resources management units also provides invaluable information such as ecological indicators of the status of the local biodiversity and others such as human development indicators that are used for long-term monitoring in national and international programmes such as the Environmental Observatories Network Namibia (EONN) and the Environmental Monitoring and Indicators Network (EMIN).

3.3 Biodiversity education and awareness creation

The national strategy on biodiversity conservation recognises that effective biodiversity conservation also requires education and awareness creation particularly among the younger generation- the future resource users, managers and decision-makers. This is being pursued through the promotion of environmental education including biodiversity conservation at primary, secondary and tertiary education levels as well as through public literacy programmes that include public lectures, and programmes in the print and electronic media.

Syllabi that specifically target environmental education at primary and secondary school levels were developed while environmental education and management tertiary institutions were also erected throughout the country. A number of public and private institutions such as The University of Namibia, Polytechnic, NGOs and municipalities are also involved in the development of environmental study material, literature and the design of environmental awareness programmes for the youth and scholars.

Specific programmes and activities such as exposure trips, public lectures and information brochures were also designed to target decision-makers particularly our parliamentarians and regional authorities. Currently, brochures (‘UPDATES’) on environmental issues particularly the main global concerns and trends are made available to the parliamentarians and other policy makers on a monthly basis. This information is highly appreciated by our policy makers, and the efforts are beginning to show positive results in the development of environmental and sustainable development legislation.
4 Future plans of the Namibian programme

The experience from the Namibian programme indicates a need to strengthen CBNRM and related approaches with programmes that seek to diversify sources of income. This includes among others, the harvesting of medicinal plants such as devils claw (*Harpagophytum procumbens* and *H. zeyheri*) [B] and others that are currently used in the manufacturing of commercial drugs. Other projects also involve the processing of traditional fruits such as the Marula fruit [A] to produce oil that is used in traditional dishes, skin moisturisers as well as other valuable ingredients for cosmetic companies in the United Kingdom. This particular project is operated as a women’s Cooperative that is composed of about 2 500 women from several village associations. Work is currently underway to establish a regional cooperative including other countries in Southern Africa, and also to set-up regional Marula processing centres.

The national biodiversity programme also plans collaborate with international institutions to identify more natural resources, and special properties and adaptations that are found in endemic species that could have wide-ranging applications in biotechnology. The latter would enable development of viable commercial products and crop varieties that are necessary to improve food security and health as well as bring about the much-desired socio-economic benefits to the rural poor.

5 Conclusion and Recommendations

Our experiences indicate that resource users can be motivated to conserve biological diversity by empowering them to derive income from the natural resources and their products. It is, however, essential to establish international collaboration on technology transfer and capacity building so as to enable local value-addition to local resources and goods. Such efforts would go a long way in raising the awareness and changing the mindsets of resource users and governments on biodiversity conservation, and in so doing, bring about successful implementation of the Convention on Biodiversity.

Following is a summary of the general issues, concerns and recommendations to the CBD that our national programme deems necessary for the successful implementation of the Convention on Biological Diversity in Namibia and other Developing Countries.
**General issues and concerns:**

Our experiences indicate that:

- The rural poor appreciate the benefits of biodiversity conservation, however, there continues to be very limited understanding of the bigger picture including the potential benefits from biotechnology particularly among the policy makers. *(Biotechnology is still seen as a small-scale industry that can only benefit small rural communities)*;
- There is still a general lack of information on the significance of our local genetic resources, knowledge and products to the international biotechnology market;
- There is inadequate infrastructure, expertise and capital to carry out bioprospecting;
- Benefit-sharing in biotechnology is currently limited to short-term employment in the extraction and preparation of resources as opposed to a more holistic form that includes joint ownership of property rights and technology transfer;
- There are inadequate mechanisms to effect a holistic benefit sharing from the use of local resources and knowledge and as a result, the custodians of the resources and/or knowledge often lose what is due to them.

**Recommendations:**

- The SCBD should identify and/or strengthen Regional centres of excellence in biodiversity conservation and use, as well as biotechnology centres;
- Support the Regional centres to conduct assessments of local resources, skills and knowledge that could be beneficial for the development of biotechnology;
- Support the identification of technology gaps ('Technology needs/gap assessments') including identification of priority areas where intervention could be most effective to developing nations;
- Support international marketing of genetic resources, traditional knowledge and skills of Developing Countries among Developed Nations, and disseminate information on potential areas of cooperation;
- Encourage and support cooperation/partnerships between academic and technological institutions in developed and developing countries in order to enhance capacity building and technology transfer to developing countries;
- Assist developing countries to acquire expertise and consolidate their institutional and legal instruments that are necessary for successful implementation of clauses in the CBD particularly ones such as [41] to [43] that deal with property rights and benefit sharing so as to enhance incentives for biodiversity conservation.
6 References


