

**Environmental Monitoring and Indicators Network (EMIN)  
For Namibia's State of the Environment Reporting**

Proceedings of the EMIN Workshop  
Midgard Resort, Okahandja District, Namibia  
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Compiled and edited by Juliane Zeidler, Louisa Nakanuku, Mutjinde Katjiua and Ester linana

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## List of abbreviations

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AHP	Analytical Hierarchy Process
CFC	chloroflourocarbon
CSO	Central Statistics Office, GRN
DEA	Directorate of Environmental Affairs, GRN
DRFN	Desert Research Foundation of Namibia
EIS	Environmental Information Service
ELTOSA	Environmental Long-Term Observatories of Southern Africa
EMIN	Environmental Monitoring and Indicators Network
GLIDE	Global Litter Invertebrate Decomposition Experiment
GOFC	Global Observation of Forest Cover
GRN	Government of the Republic of Namibia
GTOS	Global Terrestrial Observatory System
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
IECN	Integrated Environmental Consultants Namibia
ILTER	International Long-Term Ecological Research
Infocom	Information and Communication for Sustainable Development
LTER	Long-Term Ecological Research
MET	Ministry of Environment and Tourism, GRN
MFA	Ministry of Foreign Affairs, Republic of Finland
Na-LTER	Namibian Long-Term Ecological Research
NAPCOD	National Programme to Combat Desertification
NCEI	National Core (set) of Environmental Indicators
NDP	National Development Plan, GRN
NGO	Non-governmental organisation
NPC	National Planning Commission, GRN
NPP	Net Primary Productivity
SoE	State of the environment
TCO	Terrestrial Carbon Observatory
UN	United Nations
UNCED	UN Conference on the Environment and Development
UNCSD	UN Commission for Sustainable Development

## Foreword

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The Environmental Monitoring and Indicators Network (EMIN) Workshop, held at the Midgard Resort in the Okahandja District on 11 and 12 June 2001, marked the natural progression of the State of the Environment Reporting Project initiated by Namibia's Ministry of Environment and Tourism (MET) in 1998. A great number of individuals as well as public and private institutions have contributed to Namibia's state of the environment (SoE) reporting over the past few years, and their concerted efforts are set to continue.

The June 2001 Workshop provided participants with the opportunity to review and evaluate national-level environmental indicators which had been proposed as being important by individual SoE reports, and which had been agreed upon by a large number of experts in a series of public workshops reviewing the SoE reporting process as a whole. However, the list of prioritised indicators, evaluated and scored according to agreed selection criteria, is still long and requires refinement. The process of defining a national core of environmental indicators (NCEI) for annual SoE reporting, therefore, will still take some time.

The Workshop participants also discussed mechanisms that would operationalise annual national SoE reporting, especially through the formation of EMIN as a partnership programme. Clearly, the MET will continue to offer or, indeed, take a leading and coordinating role in this effort, through strengthening its Environmental Information Service Unit within the Directorate of Environmental Affairs, under which the Information and Communication for Sustainable Development (Infocom) Project operates. The MET perceives its role as being that of an "information broker": it aims to link all key players from environmental and environment-related fields in Namibia. In fact, the MET's commitment in this regard is evident from the fact that both its Deputy Minister, Hon. Petrus Ilonga, and Permanent Secretary, Mr Tangeni Erkana, made the effort to address Workshop participants.

These Workshop proceedings have been published in order to supplement the relatively few published outputs from the SoE Reporting Project to date, and begin to meet a broader audience's demand for the information the Project generates.

The proceedings of the EMIN Workshop presented here will guide further development of the Infocom and SoE Reporting Projects in particular, since they summarise the input of more than 50 experts who participated in the Workshop. The continued contribution of these experts to this national effort will be highly valued.

Louisa Nakanuku  
Infocom Project/MET

Juliane Zeidler  
IECN

## Official opening address

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Good morning, Ladies and Gentlemen, Comrades and Friends:

Let me extend my warm welcome to all of you to this important Workshop on the Environmental Monitoring and Indicators Network (EMIN) of the Ministry of Environment and Tourism here at Midgard.

I am glad that most of you could make it to this important Workshop, even though it has been scheduled so early on this Monday morning!

Despite the prevailing difficult natural conditions in Namibia – i.e. the arid, the extremely variable and unpredictable climate, the scarce fresh water resources, poor soil conditions in certain areas – all Namibians depend on this natural resource base for their livelihoods. Most pillars of Namibia's economy are also directly or indirectly dependent on the natural resources and the environment. We, therefore, have a commitment, as Namibians, to carefully utilise these resources and optimally manage what we have, to support sustainable development for Namibia.

Over the past few years, the Ministry of Environment and Tourism has taken a pivotal role in contributing to Namibia's policy, planning and decision-making processes. We have achieved a broad recognition of environmental concerns as the foundation of sustainable development in Namibia and that has been widely accepted by other line ministries. We see it as our responsibility, as the Ministry of Environment and Tourism, to provide guidelines for the sustainable management of the natural resource base, as well as to contribute to these public processes by providing relevant information on environmental benchmark data and concerns. This is, for example, why the Environmental Management Bill was drafted, and we will seek its implementation. The Bill states that our Ministry will provide an annual, up-to-date report on Namibia's state of the environment to guide decision-making and, ultimately, achieve economic development, without destroying the natural resource base.

It is within this framework that in 1998, Namibia, together with the support of the Finnish Government, launched the State of the Environment Reporting Project, which has since then produced six expert reports on this issue. As you all know, these are the ones on –

1. water in Namibia
2. the socio-economic environment
3. the industrialisation environment, i.e. mining, industry, energy and transport
4. agriculture and land resources
5. parks, tourism and biodiversity, and
6. waste management and pollution control (which is forthcoming).

A seventh report, on marine, fisheries and coastal resources, is currently being prepared.

At this stage I would like to point out that we regard environmental monitoring, through the SoE reporting process, as one of the most important tools guiding environmental management in Namibia. However, we realise that it is not sufficient only to generate expert reports; it is also essential to transform this knowledge into information that is easily accessible to the public, decision-makers, technocrats and learners alike.

In the past there were those that blamed the Ministry for not taking the SoE reporting process forward, and this was largely (mis-)interpreted as a lack of commitment from the Ministry to the issue. As the Ministry of Environment and Tourism, we are happy to announce that we have recently been able to broaden our

own capacity to take up and further develop our role not only as a policy-making body, but also as an information provider. We should really work as genuine partners in the management of our environment.

Thus, concerted efforts for training and skills transfer need to be optimised within all donor-funded programmes to ensure that expertise is retained within the Ministry. It is with this in mind that the Environmental Information Service Unit, housed at our Directorate of Environmental Affairs and chiefly responsible for the SoE reporting process, has been allocated two permanent posts in the Public Service staff establishment to strengthen the work of that Unit. Additionally, there are currently negotiations between the Finnish and Namibian Governments under way that aim to further the cooperation between our two countries in the environmental sector and, particularly, the SoE Reporting Project.

The Ministry of Environment and Tourism places great importance on this Workshop, as the outcomes of your inputs will further guide the development of Namibia's SoE reporting process started in 1998 and shaped largely by your inputs ever since. We are grateful that so many representatives of different line ministries, non-governmental organisations (NGOs), the private sector – including industry – have contributed to this process over the past few years and that they are present at this Workshop today. We hope that during the discussions over the coming two days the Ministry of Environment and Tourism, together with your help, can further develop the tools for environmental monitoring and reporting. These monitoring systems will play a vital role in measuring Namibia's environmental performance, and will accelerate Namibia's progress towards sustainable development and the Vision 2030 project initiated by His Excellency Comrade President Sam Nujoma.

Ladies and Gentlemen, Comrades and Friends:

I believe that, together, we could define strategies on how to strengthen the SoE reporting process. I am of the opinion that through active collaboration, partners such as the different line ministries, NGOs and the private sector will be willing and able to make data available to allow Namibia to have a comprehensive Environmental Information System. This way, we could easily monitor long-term changes and trends in our fragile environment.

Without further ado, I would like to wish you every success in your deliberations.

With these remarks, I now have the honour to declare the Environmental Monitoring and Indicators Network Workshop officially open.

I thank you.

Petrus lilonga  
Deputy Minister  
Ministry of Environment and Tourism

## Introduction

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### The Infocom Project as part of the Environmental Information Service Unit

In January 1998, the Directorate of Environmental Affairs (DEA) of Namibia's Ministry of Environment and Tourism (MET), jointly with the Government of Finland, launched a national programme entitled Information and Communication Service for Sustainable Development in Namibia (Infocom). The main objective of the programme is to provide pertinent information to all stakeholders on the trends and health of Namibia's environment, using simple – but vigorous – indicators for long-term tracking and monitoring of the resource base and changes in the condition of the environment.

During 2000, the DEA decided to establish the Environmental Information Service (EIS) Unit. This new, overarching structure would consist of the Environmental Profiles and the Infocom Projects. The latter has three branches: the SoE Reporting Project, the DEA's web site, the Meta-database Management Unit, and the Environmental Atlas Project. The Governments of Namibia and Finland jointly fund the Infocom and Atlas Projects, while the Environmental Profiles are supported by the Governments of Namibia, France and the Netherlands.

As Namibia progressively seeks to achieve sustainable development, promoting the health of its people and the environment, there is an increasing demand of such environmental information. Currently, there are a number of environmental monitoring programmes in place in Namibia, although major gaps remain. The overall project purpose is to establish an effective EIS for Namibia, which would make available and manage environmental meta-database and, eventually, database systems. It aims to coordinate the efforts of the various stakeholders in the environmental fields in Namibia, such as other line ministries and government institutions, technocrats, decision-makers, politicians, university and college staff and students, the general public, and the private and NGO sectors.

The overall objective of the EIS Unit is to promote environmentally sustainable development practices in Namibia by providing appropriate and up-to-date environmental information to policy, planning and decision-making processes, and to the public. On the other hand, the SoE reporting process aims to offer credible environmental information to regularly measure and report on progress towards the sustainable utilisation of natural resources and sustainable human and economic development.

Through the SoE reporting process, mechanisms ought to be developed for detecting essential changes in the environment. Recommendations for mitigation activities are also sought, e.g. through developing and implementing sound and environmentally sensitive policy.

Initially, seven themes were chosen for a thorough study of the state of the environment in Namibia. The following topics were covered by the SoE reporting process between 1998 and 2001:

1. Freshwater resources
2. Social and economic environment
3. Agriculture and land resources
4. Biodiversity, parks and tourism
5. Mining, industry, energy and transport
6. Waste management and pollution control
7. Marine, fisheries and coastal resources

The SoE report on marine, fisheries and coastal resources is currently being prepared and should be finalised towards the end of 2001.

In the scope of each thematic SoE report, a number of potential key indicators were identified for long-term monitoring purposes. These indicators now need to be reviewed and evaluated. Furthermore, the monitoring and data acquisition of the suggested indicators needs to be guaranteed and done. Some of the suggested indicators are already being monitored on a regular basis by various institutions. However, the accessibility and sharing of data amongst institutions and individuals throughout Namibia needs to be formalised and fostered. It was with this aim in mind that the EMIN Workshop was held.

### **Workshop objectives**

The Workshop had the following objectives:

- To further elaborate, select and prioritise suggested key indicators from the SoE reporting process to monitor Namibia's SoE over the long term.
- To tap into a network of technical and key stakeholders to help create an NCEI by defining an indicator development process, and so contribute to SoE reporting.
- To officially launch EMIN.
- To discuss and further develop mechanisms and managing structures to update the indicator data annually.
- To promote the use and sharing of information.
- To prepare for a thorough meta-database survey in support of establishing Namibia's Environmental Information Service (EIS).

### **Workshop structure**

On Day 1, the "Indicator" day, the focus of the Workshop was to critically review and elaborate on the indicators suggested in the various SoE reports, as well as those from a few other similar initiatives in Namibia and elsewhere. In preparation of the workshop a summary of the most relevant indicators proposed previously were summarised in a small brochure. Lists of these suggested indicators were provided to the participants and were used in the indicator evaluation process. A total of 99 indicators stemmed from the SoE reports, with an additional 85 synthesised from elsewhere. Thus, altogether 184 indicators were listed in the brochure.

It was clear after the Workshop that the indicator process was a long-term undertaking. Nonetheless, the Workshop outcomes presented in the scope of these proceedings already form an important part of the process.

Day 2, the "Monitoring" day, addressed more logistical matters. Establishing the indicators to measure was only the first step: it was as essential to develop an operational programme guaranteeing the regular collection, updating and processing of data. It was also essential to present the end-products of the process, e.g. in the form of visually attractive, easily digestible publications. Considering the scope of the EIS Unit and the MET per se, these efforts could clearly be coordinated by the Unit with the support of the various stakeholders collaborating in EMIN.

A flowchart of Day 2 illustrates the steps taken towards operationalising the EIS Unit and annual SoE reporting.

### **Structure of the publication**

This publication is divided into an Introduction and three Chapters. Chapter 1 constitutes a summary of resource papers presented at the Workshop. These papers

guided various Working Groups constituted from participants during the Workshop proceedings. Chapter 2 reflects the outcome of four Working Group sessions, while Chapter 3 presents the main recommendations made by Workshop participants as regards the SoE reporting process.

## Chapter 1: Resource papers

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This chapter provides a summary of seven resource papers presented during the Workshop. They formed the foundation for Working Group discussions, and were an essential part of the proceedings.

The first paper is by **Tapio Reinikainen**, who hails from Finland. He currently serves as a Technical Advisor to the MET's EIS Unit, and has many years of international experience as regards determining environmental indicators and establishing national-level monitoring systems. His paper gives an overview of how important environmental indicators are as decision-making and planning tools, in addition to illustrating how Namibia would go about developing its NCEI and the SoE reporting process.

**Pekka Salminen** is currently employed as an Environmental Advisor to the Finnish Ministry of Foreign Affairs. His paper gives a global perspective on environmental monitoring and indicators, and explains why Finland – as a party to various United Nations Conventions on the environment – considers SoE reporting a priority in development cooperation. Pekka Salminen has participated in international efforts relating to the development of environmental and sustainable development indicators and databases.

As a representative of the Vision 2030 Task Force, **Dr Chris Brown** of the Namibia Nature Foundation gave an overview of the Vision 2030 project. This project, an initiative of His Excellency President Sam Nujoma implemented under the auspices of the National Planning Commission (NPC), aims to develop a common and interdisciplinary vision for sustainable development in Namibia. SoE reporting may be a useful contribution to Vision 2030.

**Patrik Klintenberg**, Research Coordinator of Namibia's National Programme to Combat Desertification (NAPCOD) at the Desert Research Foundation of Namibia (DRFN), prepared a background document analysing the SoE reports produced in Namibia to date, and assessing the suggested indicators in terms of their applicability (see the Appendices for the full paper).

**Dr John Mendelsohn** of the MET's Directorate of Environmental Affairs shared his experiences on data acquisition and treatment. As undoubtedly the most experienced person in respect of environmental data matters in Namibia in general, having co-authored two environmental profiles of the country as well as the MET's ongoing environmental atlas project, Dr Mendelsohn offered some critical remarks on how the EIS Unit and SoE reporting, for example, could be driven forward. The Environmental Profiles Project is meant to form the basis for the SoE Reporting Project and other projects of the EIS Unit.

**Dr Joh Henschel** of the DRFN coordinates the Namibian Long-Term Ecological Research (Na-LTER) network, amongst other activities. Na-LTER is seen as an important model for networking and information exchange amongst key players in the environmental fields in Namibia and beyond. In his review of Na-LTER, Dr Henschel indicated how EMIN and Na-LTER could complement each other's efforts by working closely together.

In their joint paper, **Louisa Nakanuku** (MET), **Mutjinde Katjiua** (IECN) and **Dr Juliane Zeidler** (IECN) elaborated on how they envisaged building an EMIN meta-database and integrating it into the EIS Unit. Their suggestions included the further development of a survey tool, as well as improved data-sharing and data-exchange.

## ***Resource paper 1***

### **Information and communication for sustainable development**

Tapio Reinikainen (Summarised by Juliane Zeidler)

Information is an important tool – and not only for environmental management. We know there is much information available on the environment; however, this information is not necessarily readily available to those who need to use it.

There is also a notion that the gap between scientists and decision-makers continues to widen, posing a serious threat to decision-making – especially in developing countries. To help bridge this gap, the decision-making sciences have evolved as a new discipline. Under the environmental fields in this new discipline, a new method to emerge has been to develop indicators that would allow one to measure and visualise environmental performance in an easily understandable and interpretable way.

Since the United Nations Conference on the Environment and Development (UNCED) held in Rio de Janeiro, Brazil, in 1992, the concept of environmental monitoring through indicators has been integrated into a number of UN Conventions on the environment. Many countries have already developed comparable NCEI and supporting monitoring systems to measure their own environmental performance and make the measurements comparable internationally. In this regard, the Finnish Government has committed itself to help developing countries establish workable environmental information systems.

Namibia has now initiated such a process as well. The aim is to publish an annual SoE report using agreed-upon and essential indicators to illustrate trends in environmental and development performance in Namibia. Such information has by and large either not been available or not been accessible to decision-makers to date.

This Workshop has a tight agenda. Firstly, we are attempting to add impetus to the launch of SoE reporting. Secondly, we seek to confirm the mandate of the SoE Reporting Project, and will try to establish whether the initially agreed-upon scope, framework and procedures are not only still acceptable, but are also on track. The overall purpose of the Workshop is to create a Namibian NCEI, based on the existing information. Additionally, indicators for as yet undefined future needs are to be identified, while monitoring systems to track environmental threats need to be put in place.

We have changed our way of thinking about indicators from taking a general, topic-based approach (which, in Namibia, resulted in the thematic SoE reports) to a more systematic one, which should optimally be based on environmental issues. The change in approach is expected to help streamline the dissemination of environmental information to decision-makers and their problem-centred way of thinking.

It is important to realise that the national and international body of knowledge and experience continuously evolve, and that, as elsewhere, we in Namibia have to adjust our programme to incorporate such changes and improvements.

## **Resource paper 2**

### **Environmental indicators and databases in an international development context**

Pekka Salminen (Summarised by Juliane Zeidler)

Various international efforts have supported the development of indicators for environmental and sustainable development monitoring and reporting. International environmental initiatives, conventions and treaties set requirements for developing and developed countries alike to report their progress on environmental management and performance. Signatories to the various international agreements are obliged to adhere to set standards on environmental performance.

Under the UN's Commission for Sustainable Development (UNCSD), a process of developing and testing indicators for sustainable development was commenced in 1995. During 1996-99, altogether 22 countries participated in the testing of an initial list of 134 indicators. As a result, a draft list of 57 indicators was drawn up. During the UNSCD's Ninth Session, held in April 2001, the continued work on the development of such indicators worldwide was encouraged. Developed countries and international organisations were also urged to intensify their collaboration with developing countries, and assist them to establish applicable indicator and monitoring systems on a national level.

As part of the International Development Targets and Indicators of Progress initiative introduced by the Development Assistance Committee of the Organization for Economic Cooperation and Development in 1996, two international goals for improved environmental performance have been defined:

1. By 2005, every country shall have implemented a National Strategy for Sustainable Development, in order to
2. reverse trends in the loss of environmental resources by the year 2015.

Maps that reported on six accepted international environmental indicators were displayed during the presentation. These maps showed –

- countries with effective processes for sustainable development
- the percentage of the population with (sustainable) access to safe water
- forest areas as a percentage of a national surface area
- biodiversity: percentage of land area protected
- energy efficiency: Gross Domestic Product per unit of energy use, and
- carbon dioxide emissions per capita.

The maps illustrated not only the differences in performance and extent of environmental problems internationally, but also the extent to which certain countries had already established monitoring systems and data-collection in support of some agreed-upon international indicators.

Reference was also made to recent discussions initiated by the Global Environment Facility and the UN Environment Programme in regard to the usefulness and power of the Internet for exchanging information and sharing data on international environmental cooperation. All development partners – including developing countries' environmental organisations, international development agencies and consulting companies – were encouraged to provide information on environment-related development cooperation on their web sites. Besides increasing transparency, this would facilitate coordinating with, and learning from the experiences of, other countries.

Some of the recommendations made to the Infocom Project were to –

- establish links, as appropriate, with international processes and frameworks
- learn from the experiences of others
- ensure the links are clear between the indicators and national development goals on the one hand, and the related (political) decision-making processes on the other, and
- include information on environment-related development cooperation in the (meta-)database.

## **Resource paper 3**

### **Namibia: Vision 2030**

Chris Brown (Summarised by Peter Tarr)

At Independence, the Government of the Republic of Namibia adopted planning as a management tool to ensure that decision-making was effectively coordinated for the promotion of social and economic development. Starting with the Transitional National Development Plan (1991/92–1993/94), and then the First National Development Plan (1995/96–1999/2000), the planning process has been based on consensus-building and popular participation. Government responsibility in our planning process is to give guidance on how the resources of the country can best be utilised for the benefit of all citizens.

Ten years after Independence, it is appropriate to plan from a longer perspective and to do this in the context of a vision for the future. In January 1998, His Excellency the President, Dr Sam Nujoma, called on Cabinet to deliberate on a vision that would take Namibia from the present into the future, and that would guide us in improving the Namibian nation's quality of life to the level of their counterparts in the developed world by the year 2030 (NPC, 2001).

Formulating what has become known as *Vision 2030* should involve broad participation, including politicians, government officials, intellectuals, business persons, trade unions, women, the youth, communities and NGOs. This will ensure the evolution of a shared national vision.

#### **Objective**

To realise Vision 2030, the process will entail carrying out national, long-term perspective studies that will identify not only strategic issues, but also the wishes and aspirations of the people. Such studies will also describe future scenarios and develop broad strategies to ensure Vision 2030's goals are attained.

These objectives will require –

- consensus between government and civil society on the long-term future of the country and the role of all stakeholders in actualising Vision 2030
- a national study of Namibia's past, present and future development options
- a widely supported vision statement and long-term development strategy for Namibia
- improved mechanisms for national participation in order to prepare long-term goals and keep them updated
- an integrated database on development issues affecting Namibia
- a civil society sensitised to the need for, and the process of, strategic development management, and
- mechanisms and modalities for translating the national vision into medium-term development plans.

#### **Links between EMIN and Vision 2030**

It is envisaged that EMIN's work and SoE reporting should feed into the Vision 2030 process. Vision 2030 provides the necessary long-term time frame for the required annual reports on the environment. Moreover, Vision 2030 includes natural resources as a focal area, addressing many issues essential to EMIN and SoE reporting.

EMIN is similarly important since the mechanism for tracking progress towards achieving Vision 2030 is Namibia's system of five-yearly National

Development Plans (NDPs). As part of this NDP planning process, Namibia will have the opportunity at least every five years to reflect on where we are, where we are going, and if we are closing in on the target. To do this effectively and efficiently, indicators – and, in this context, environmental indicators – are essential.

## ***Resource paper 4***

### **Analysis of the development of indicators in SoE reports for Namibia for the period 1998-2000<sup>1</sup>**

Patrik Klintonberg (Own summary)

Between 1998 and 2001, the MET commissioned the compilation of seven thematic SoE reports. Working within NAPCOD on a national-level monitoring system that ultimately aimed to build on the SoE reports meant reviewing those reports and the general approach taken by their compilers.

After a thorough review, it was concluded that most teams had developed a theoretical framework and identified potential indicators in close cooperation with relevant stakeholders. Different criteria were developed to evaluate and select indicators for inclusion in the national environmental monitoring system.

A total of 99 indicators were suggested in five out of the seven reports included in this analysis. Each indicator was evaluated in terms of (1) scientific relevance, (2) data availability, (3) historical data and/or time series, (4) accuracy/sensitivity, and (5) threshold values. It was found that 67% of the indicators fulfilled the criterion of scientific relevance, 90% of the indicators had available data, and 82% had fulfilled the criterion of historical data/time series. Only 33% of the indicators were regarded to be accurate enough to give useful information regarding the SoE, and even fewer of the indicators, some 24%, had defined threshold values. The paper concludes that the 99 indicators defined in the SoE reports form a sound basis from which to refine and further develop an NCEI for a functioning Namibian environmental monitoring system.

Namibia's acceptance of indicators being a tool capable of rendering the status of complex systems has been one of the SoE reports' most prominent achievements. The reporting process has also led to a relatively standard approach being adopted for developing environmental indicators. Furthermore, the SoE Reporting Project has resulted in the compilation of a comprehensive inventory of accessible data sets, although the quality of these sets still needs to be evaluated. Each report summarised current knowledge within each sector, highlighting aspects that impacted on the environment and, therefore, required continuous monitoring. This information formed a useful baseline for the further development of indicators.

There are also a number of shortcomings of SoE reporting that have become apparent through this review. Firstly, the number of indicators suggested is too high. In order to make a monitoring system cost-effective and usable in a developing country, the total number of indicators to be included should be decreased from 99 to not more than 30, for reasons of practicality. This should not be too difficult as many of the indicators suggested have either no or only limited relevance to the SoE, and can easily be excluded. However, as mentioned above, an unacceptably high number of the suggested indicators have a low accuracy/sensitivity rate, while an even higher number of the indicators have no defined threshold values. These two aspects will negatively influence the functioning of the monitoring system and have to be improved.

Secondly, based on findings from this analysis where only 9 indicators fulfilled all 5 criteria and another 16 fulfilled 4 out of 5 criteria, it is important to ask whether these 25 indicators are the answer to environmental monitoring in Namibia. The answer, unfortunately, is "No". There is still a long way to go before Namibia will have a functional core set of indicators that generates relevant information about the SoE in the country. Not that the indicators presented so far should be disregarded: they should rather form the basis for discussion amongst experts and stakeholders,

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<sup>1</sup> The full text is attached as Appendix 1 hereto.

leading to refinements and adjustments that will hopefully result in a more useful core set of indicators.

The writing of the SoE reports was a first step in an ongoing process towards developing a national environmental monitoring and information system. The development of this system was to be continued by the DEA; however, there is very little evidence of progress since the reports were submitted. For instance, none of the reports has been published for general circulation.

It is essential that the process of environmental monitoring be taken further. This Workshop is an important step into the right direction.

## ***Resource paper 5***

### Observations on the Environmental Monitoring and Indicators Network

John Mendelsohn (Own summary)

This short presentation offers observations on three issues, as set out below.

1. Much of the work of the environmental indicator programme has been based on a number of key assumptions, namely that –
  - various ministries and other organisations will have data that can be used to monitor indicators
  - the data in question will be of an adequate quality to meet the needs of the indicator measurements
  - these ministries and organisations will have the capacity and interest to continuously collect the data required, and
  - these organisations will be willing to provide these data to the environmental indicator programme.

I contend that these assumptions are flawed for most of the indicators in question. If I am correct, the SoE Reporting Project will not be a success and will end up spending much of its energy in pursuit of issues that are beyond its control. This is because it will continuously depend on external sources of information.

My recommendation, therefore, is for the Project to redirect its energy away from depending on external data sources and to rather start collecting its own data. This will have a number of advantages:

- The provenance of the data will be clearly known.
- The quality of the data will be clearly known.
- The structure of the data collected can be tailor-made for purposes of monitoring the indicators.
- The Project will have ownership of the data.
- The Project will become a data provider rather than just a consumer of data, and will be in a better position to gain access to those few useful sets of data in other organisations.
- The Project will be seen to be productive.
- People working on the Project will have much more job satisfaction and are likely to remain in their jobs longer.

One major disadvantage of my suggestion is that the Project may be more costly, since potentially expensive data-collecting work will have to be done. That it will cost money is certainly true: but just how much will depend on what data are to be collected, on the nature of the samples, on the frequency of data-collection, and on the number of indicators to be monitored. The issue of cost will also depend on the perceived importance of the Project (everyone is happy to pay for things that are important, but unhappy to pay for things that are not rewarding) and its success (we are happy to pay for success, but not for poor performance). One possibility is to collaborate with the Central Statistics Office (CSO) and use the national survey programme to collect data on environmental health. The CSO has run a number of successful sample

surveys over the past few years: one on income and expenditure, another on the labour force, and an intercensal one on demographics.

2. Most environmental problems in Namibia are the result of the excessive consumption of resources such as land, water, wood, grazing, and nutrients in the soil. Most of the consumers of these resources live in rural areas as communal and commercial farmers. These are also the ones that suffer most from the depletion of resources. My recommendation, therefore, is for the Project to focus more of its activities on consumption patterns in rural areas.
3. Little attention appears to have been paid so far to how environmental indicators vary spatially, and there is often the assumption that a single indicator value for the whole country will be adequate. I contend that the environmental indicators need to have as much spatial resolution or differentiation as possible. Environmental pressures vary enormously because of variation in population density, consumption patterns, livestock numbers and the fragility of the environment. In addition, politicians and other decision-makers will be able to respond more adequately if the indicators immediately provide information on the locations of environmental problems. This is quite different from a situation where a single indicator for the whole country suggests a problem: much more work needs to be done to find out where it is.

The maps reproduced in Boxes 4, 5 and 6 illustrate some of the points made here.

## **Resource paper 6**

### **Long-term ecological research: Local, regional and global networks of environmental observatories**

Joh Henschel (Own summary)

The Namibian Long-Term Ecological Research (Na-LTER) network was formed in August 1999 as the first national LTER network in Africa. This followed planning since 1993 in consultation with the International Long-Term Ecological Research network (ILTER – <http://www.ilternet.edu/>). Na-LTER became the 19th member of ILTER.

A workshop on 24 February 2000 in Windhoek, attended by 29 representatives of 16 environmental institutions, defined the characteristics of Na-LTER as a Working Group of the National Biodiversity Programme. It was agreed that while Namibia currently has only one formal LTER site that complies with LTER requirements, namely the Gobabeb Training and Research Centre, several other Namibian sites show great potential for becoming part of a country network in the very near future. Furthermore, there are numerous sites in Namibia where monitoring is being conducted, and it was agreed that Na-LTER should be involved in maintaining the LTER focus of such sites by facilitating the integration of the relevant information, as well as continuity, where this was warranted (for more information on Na-LTER, see the web site <http://www.drfn.org/Gobabeb.html>).

#### **The general characteristics of LTER**

The general aim of LTER is to monitor, detect, validate and analyse change in the final stage in environmental parameters. LTER concerns the natural environment, including social and environmental factors that affect the natural environment. The emphasis of LTER is that it is site-specific and repeatable over time, including the distant future. LTER tends to be broad in scope and to involve numerous collaborations, being multidisciplinary and inter-institutional both on national and international levels. It is fundamental for LTER to involve data-sharing at these levels.

LTER has a time horizon of decades to centuries, and concerns spatial scales ranging from a few square metres to ecosystems, subcontinents and the entire globe, involving both direct monitoring by people and instruments in the field as well as remote sensing. Examples of prominent global LTER programmes are Nett Primary Productivity (NPP), the Terrestrial Carbon Observatory (TCO), the Global Observation of Forest Cover (GOFC) and the Global Litter Invertebrate Decomposition Experiment (GLIDE). Namibia has formally been part of GLIDE since the beginning of 2001 and is about to join the NPP initiative. Thus, LTER's role of facilitating the monitoring and understanding of environmentally important factors on a long-term basis clarifies EMIN's involvement with Na-LTER as partner networks.

#### **LTER networks**

1. **Local networks**

Formal site: Gobabeb

Potential formal sites: Etosha, agricultural research stations, several wetlands programmes that monitor and share data, such as the Weather Bureau and the Save the Rhino Trust.

2. **Country networks**

Na-LTER constitutes 16 organisations, organised under the umbrella of the National Biodiversity Programme.

3. ***Regional (Southern African Development Community) networks***  
The Environmental Long-Term Observatories of Southern Africa (ELTOSA) constitutes a discussion forum between Botswana, Mozambique, Namibia, South Africa, Tanzania, and Zambia.
4. ***International networks***  
ILTER constitutes 21 members of the Global Terrestrial Observatory System (GTOS), as well as 24 applicant members.

### **Requirements and factors affecting the choice of LTER sites**

#### **1. *Significance of the site***

- Its global, regional or national importance (natural environment, use/management and policy)
- Nature of its ecosystems/gradients/interfaces between ecosystems
- Its degree of uniqueness
- Type of long-term patterns of ecological processes
- Its ability to demonstrate that change takes place
- It has baseline monitoring and indicators
- It has regular, scientific quality checks

#### **2. *Institutional factors relating to the site***

- Institutional responsibility is guaranteed for each site
- Technical and scientific institutional capacity (physical, programmatic, human)
- Existing data heritage
- Site accessibility, tenure, funding, control
- Land use, land management, land contrasts
- Programme management and collaboration
- Data management

#### **3. *Network capacity of the site***

- Meta-data are recorded and made available
- Data-sharing is conducted between sites
- Cross-site synergy (comparisons/gradients/contrasts) is possible
- National, regional and global linkages are assured

### **A Namibian data-sharing policy**

Establishing a meta-database and a policy of data-sharing are fundamental principles for both Na-LTER and EMIN. The following list contains an abbreviated version of principles established by Na-LTER at the 2000 Workshop for such a policy (see also the Na-LTER web site):

- Information on all data to be made available to the meta-database
- The meta-database to be maintained
- Unrestricted data to be directly available via the Internet
- Other data to be conditionally available

- Restricted data to be listed in the meta-database but access to them to be tightly controlled
- Access to the meta-database to be free of charge, however, cost recovery for providing the actual data
- Documentation and format of data to be user-friendly
- Data provided by researchers are to remain available for use by others once those researchers depart
- Recipients of data not to be given the right to distribute data further
- Investigators to be granted priority in the use of data, provided this is done within a reasonable time
- Data sources to be properly acknowledged
- Data-source institutions to receive resulting publications

#### **Properties of the meta-database: Information on data**

- To be centrally located, managed and accessed
- To provide information on the nature of data, where and when they were obtained, and by whom
- To provide information on how and where to obtain data
- To specify the conditions of using data from the meta-database

#### **Na-LTER and EMIN: The overlaps**

Both networks have several things in common, including that they are multi-institutional networks. Both networks focus on environmental change, monitoring, as well as the management and sharing of data. EMIN emphasises indicators of change, while Na-LTER places greater emphasis on ecosystem function and understanding natural systems in the light of change. The latter includes baseline monitoring. Thus, Na-LTER programmes provide important data to EMIN, while the EMIN requirements for certain kinds of data influences the planning of Na-LTER sites.

The function of facilitating data management, data inventories and data-sharing need not be duplicated. In this respect, Na-LTER and its member sites should combine its efforts with EMIN's and support the EIS programme to form an effective meta-database and an advisory body for data management in Namibian environmental institutions. Na-LTER, and its connection to LTER initiatives both regionally and worldwide, can provide invaluable background information and connections to other data-management and data-sharing efforts as a resource of information to the EIS.

With its site-based focus as well as international networking, Na-LTER continues to play a useful role in Namibia – distinct from those of EMIN and the EIS. Na-LTER's principal aim of establishing a comprehensive meta-database for environmental data in Namibia is now being met by the EIS programme. Na-LTER continues to focus on data procurement and management per se, and to facilitate the effective management and monitoring of important national sites in Namibia.

## **Resource paper 7**

### **Environmental monitoring in Namibia**

Louisa Nakanuku, Mutjinde Katjiua and Juliane Zeidler  
(Summarised by Louisa Nakanuku)

There is a profound need for the MET to facilitate and encourage public awareness and participation by making sound environmental information widely available to support decision-making.

Namibia is a signatory to Agenda 21 and other UN Conventions. We are also in the process of passing the Environmental Management Bill, which would oblige the Namibian Government to update Namibia's SoE reports annually. This annual reporting can be achieved by identifying the NCEI and standardised mechanisms to monitor long-term changes in the condition of the environment. The SoE reporting processes, based on the creation of the NCEI, could also guide the NPC's Vision 2030, which was initiated by His Excellency the President, Dr Sam Nujoma. However, the MET cannot achieve all these goals alone. We would need to foster programme partnerships and contributions from all stakeholders, to help develop a practical and sustainable mechanism for data facilitation.

The Infocom Project of the EIS Unit, which would be dealing with this programme, currently obtains financial support from both the Finnish and Namibian Governments. The fact that this Unit is situated within the DEA guarantees the programme's long-term sustainability. The MET also has a stronger mandate to deal with public data than a private agency. Moreover, the MET could use the EIS Unit as a channel for government to develop and strengthen its capacity, especially within the new DEA's structure. The idea of the EIS Unit is to have environmental information flowing among users such as technical specialists, researchers, the public, other line ministries, NGOs, decision-makers, politicians, and universities and colleges.

This Workshop is a continuation of the SoE reporting process started in 1998. The Workshop aims to establish EMIN, an informal association that, by way of quarterly or annual meetings, for example, could contribute to the meta-database survey to be launched after this Workshop. EMIN's objective is to help plan and develop a support structure for environmental monitoring in Namibia. The network would strive to –

- share expertise
- further discuss and develop the NCEI and monitoring systems
- collaborate with data-collection, processing, and end-product development
- help to streamline resources, and
- be part of developing demand-driven environmental information products that are needed in Namibia, such as the annual SoE report.

Pertinent questions to ask when setting up a meta-database are what it is, and what it requires. In short, a *meta-database* is a database for data about data: it describes the attributes and contents of the database, and supports information searches. It also helps disseminate information, it promotes data-sharing and it furthers a partnership network.

Predictably, a meta-database has both advantages and disadvantages. One advantage is having a "directory" of data, which helps searching for data and data sources. A meta-database would also help identify where to find needed data, by establishing a link between the potential user and the data-holder. An additional advantage would be that the source data remain with the owner, i.e. the source institutions, reducing problems encountered clarifying data ownership and user

rights. At these institutions, resource persons could describe the nature of their own data, including a description of the quality of both socially and institutionally kept data.<sup>2</sup>

Among the disadvantages of having a meta-database is that, although inventoried in the meta-database, data may not necessarily be accessible to a user. This would be pronounced in the absence of a data-sharing policy. Thus, a meta-database system would largely depend on its partners' contributions and inputs. It also bears mentioning that most partners would probably feel the need for an incentive to contribute to the building of a meta-database. For this reason, the meta-database would require an elaborate management structure.

This paper presents two possible models for a meta-database at the EIS Unit: (1) the Directory Model, and (2) the Interactive Meta-database Platform Model. The directory would be compiled according to feedback received from an initial questionnaire survey on data availability and ongoing monitoring programmes, where hard copies of such questionnaires are submitted to potential meta-database partners. In this scenario, the DEA's meta-database manager would be responsible for entering the information and updating the meta-database. Access to the meta-database would be via the Internet, and the web page would include hyperlinks to partner institutions and other related information.

The interactive platform, on the other hand, would act as an interactive data-brokering service. To set up this kind of meta-database, a survey would need to be conducted among all potential EMIN stakeholders and partners. Data availability and existing monitoring programmes would be inventoried by the survey team through face-to-face interactions and hands-on descriptions of the available information at the various partner institutions. Based on the survey information, the meta-database manager would design a demand-driven information system which would be put into effect and used by all EMIN partners as well as other users. The meta-database partners, e.g. EMIN, are owners and active participants of the information system. The meta-database manager would function as a facilitator only.

During this Workshop, the suggestions for the meta-database survey tool should be discussed and developed, and recommendations made as regards the meta-database layout and the possible setting up of the proposed information system. EMIN partners would need to supply the first level of information into the meta-database to guide planning and the implementation of the actual meta-database survey. They would also need to sign up on the meta-database survey schedule for the survey team visits, which are planned for July to September 2001. Participants of this Workshop are also requested to identify essential meta-database partners and identify any gaps that are apparent in monitoring programmes that are essential to the NCEI.

After this Workshop, the meta-database survey would require the meta-database manager and support team to refine the survey tool and to schedule visits to meta-database partners to facilitate data descriptions for incorporating information into the meta-database. A systematic analysis of the shortcomings of NCEI-related monitoring programmes could be used as a recommendation for future coverage of environmental monitoring programmes in Namibia by the MET and other institutions. The meta-database manager would then develop a layout of the meta-database and mechanisms of information systems to be included in nationally and internationally compatible systems. The survey team would also conduct field visits to document methodologies of the NCEI-related monitoring programmes *in situ*.

An example of a possible EMIN meta-database template is provided in Box 7.

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<sup>2</sup> *Socially kept data* are such data and knowledge that remain with an individual, i.e. they have not yet been recorded in any form. *Institutionally kept data* would be data produced by researchers at an institution, but which are available to other users as well.

## **Chapter 2: Feedback from the Working Group sessions**

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### **Introduction**

The most essential part of the meeting at Midgard were the Working Group sessions. They built on the resource papers presented and constituted the combined efforts of stakeholders in Namibia's SoE reporting.

Over the two days of the Workshop, participants engaged in four Working Group sessions, each of which built on outcomes of the previous session in the series of four. The sessions were as outlined below.

#### **Session 1: Setting the scene for the definition of the NCEI**

This session aimed to revisit the scope of environmental reporting in Namibia, the environmental issues that need to be covered, the theoretical framework that would underlie SoE reporting as well as envisaged outputs from the SoE reporting process, and the criteria for selecting environmental indicators. Each of these four areas of concern was addressed by a Working Group.

#### **Session 2: Prioritisation of the environmental issues in Namibia through the Analytical Hierachy Process**

During this session, participants ranked the environmental issues of concern to Namibia – as identified by the Working Groups during Session 1 – in order of importance, by way of the Analytical Hierarchy Process (AHP, an objective decision-making method). Among the implications was that, where resources for SoE reporting are limited, it was important for the most critical environmental issues to be covered by the NCEI and monitored regularly. Often, decisions as to which issues needed to be covered were taken intuitively and based on the experience of a few individuals, rather than through more objective decision-making processes.

#### **Session 3: Scoring of indicators**

From the various SoE reports produced in Namibia between 1998 and 2001 as well as through other indicator-related work, a great number of indicators for environmental monitoring have been suggested. The need to select the most appropriate set of indicators that effectively and efficiently describe Namibia's SoE and identify detrimental changes was recognised. Thus, based on the environmental issues identified during Sessions 1 and 2, ten Working Groups were constituted. Each of these groups scored the most suitable indicators, tracking the issues of concern by applying the selection criteria identified during Session 1.

#### **Session 4: Brainstorming the ways ahead for EMIN**

During this session, four Working Groups discussed the practicalities of continuing with the NCEI selection and monitoring process as part of Namibia's SoE reporting. Issues that were addressed included making an inventory of ongoing monitoring programmes in Namibia; the operationalisation of collecting, updating and sharing NCEI-related data; and identifying crucial gaps in the monitoring process. One of the Working Groups refined the proposed survey tool that would allow for the establishment of a meta-database of stakeholders and NCEI-process data.

## **Session 1**

### Setting the scene for the definition of the NCEI

#### **Introduction**

When the production of the SoE reports was commissioned to various consultancy teams from 1998 to 2001, only few guidelines were provided as to which framework and school of thought would apply in their preparation. Although a Task Force oversaw the development of each sectoral report, the consultancy teams worked in relative isolation. The few guiding principles that were given included an agreed-upon basic set of selection criteria for identifying indicators.

As international as well as national experiences have broadened since the inception of the SoE Reporting Project in 1998, it is essential to revisit the conditions under which the indicator-development process is to be continued. For this reason, the four basic concepts listed below were to be discussed by four individual Working Groups:

- Definition of the scope of the NCEI
- Definition of the environmental issues the NCEI needs to cover
- Definition of the framework of the NCEI and discussion of the outputs of SoE reporting
- Definition of indicator-selection criteria

#### **Working Group 1: Definition of the scope of the NCEI**

##### ***Background***

When Namibia implemented the SoE Reporting Project, it was understood that environmental reporting would need to address sustainable development along the lines determined by UNCED in 1992, i.e. marrying purely ecological and conservation concerns with human and economic development aspects. However, when determining the scope of SoE reporting, exactly which of these aspects to include in the reporting system needs to be established. In an attempt to define the scope of such reporting, therefore, the Working Group discussed the following three scenarios:

- *Scenario 1: Ecological focus*  
Only ecological indicators are included in the NCEI, and natural resources form the principal focus of monitoring systems.
- *Scenario 2: Integrated ecological, economic and human scope*  
Indicators from all three spheres are to be included in SoE reporting. In particular, indicators that occur in more than one sphere are identified. Indicators included in the NCEI are to bear directly on the environment.
- *Scenario 3: Complementing interdisciplinary scope*  
Indicators are drawn from all possible spheres independently, and are applied as a composite set. No specific emphasis is given to identifying indicators that occur in more than one sphere. SoE reporting would, therefore, take a much broader approach to the environment, not necessarily making a direct link to an ecological scope.

##### **Outcomes**

The Working Group decided that under the Namibian circumstances, –

- the following terms would be defined as listed below:
  - environment* (see Box 8)
  - ecological* refers to natural resources, including vegetation and animal, soils, climate and water
  - economic* refers to direct links between the environment and economic performance, e.g. through farming systems, tourism, fisheries and conservation
  - social* refers to human interaction with the environment, e.g. through management systems, but also aspects of health and welfare derived from the environment
- the ideal indicators should reflect inter-sectoral linkages, and
- such ideal indicators should have a national focus as well as comply with international/global obligations.

### **Working Group 2: Definition of the environmental issues the NCEI needs to cover**

At the outset, Namibia's SoE Reporting Project adopted a sectoral approach rather than addressing environmental issues only. Since then, however, it has been discovered that SoE reporting needs to be issue-based: only then can it serve as a powerful tool for improving environmental management and informed decision-making in the interests of sustainable development.

#### ***Defining environmental issues***

The Working Group defined *environmental issues* as being –

- aspects of the human environment that pose a threat to the sustainable utilisation of environmental resources, e.g. population growth and pollution
- environmental resources that limit human progress, e.g. a limited water supply
- environmental resources, such as water and soil, that, by their (inappropriate) utilisation, lead to a decline in the reserves available to support life, and
- undesirable changes to the SoE or to natural resources, e.g. desertification.

#### ***Outcomes***

The Working Group brainstormed the main environmental issues in Namibia, including those related to terrestrial, freshwater and marine ecosystems. The following issues were listed as deserving immediate attention:

- Climate change
- The greenhouse effect
- Recipients of acid rain
- Ozone levels
- Water availability
- Water quality
- Depletion of natural resources
- Renewable and non-renewable resources
- Consumption patterns relating to the use of resources by humans and livestock
- Degradation of ecosystems

- Desertification
- Loss of productivity, e.g. of rangeland and other agricultural production systems
- Chemicals toxic to the environment
- Air quality
- Condition of the soil
- Loss of biodiversity
- The impact of social factors on the environment, e.g. policies that affect the utilisation of resources
- Population pressure
- Poverty, equity issues and access to resources
- Health (HIV/AIDS) and how it relates to the environment
- Waste generation, and its impact on the environment

A further suggestion was to include the environment policy in a set of indicators.

Ten main issues of environmental concern were formulated for Namibia from the above list (see Box 9).

### **Working Group 3: Definition of the framework of the NCEI and discussion of the outputs of SoE reporting**

This Working Group had two different aims. The first was to confirm whether the framework initially proposed for SoE reporting in Namibia, i.e. using the Pressure-State-Response Model, should still apply. In this quest, a number of internationally accepted frameworks were to be tabled and discussed.

The second aim was to brainstorm what specific outputs would be useful for SoE reporting. The Working Group defined the objectives of such products, who would use them, and why. It was accepted that the contents of such products would need to aim for the target audience.

#### ***Framework***

It was generally accepted that the Pressure-State-Response Model would still constitute the most powerful and useful framework for Namibia's NCEI. This simple framework states that human activities exert pressure on the environment by way of, for example, pollution, emissions and land-clearing, which can lead to changes in the SoE. Society then responds to prevent, reduce or mitigate undesirable environmental changes.

#### ***Outputs***

For the identification of useful outputs from SoE reporting, the Working Group first established the objective of such outputs, their target audience, and the type of output to be produced.

In respect of the objective of the outputs, and in order to be able to make recommendations on outputs that should be produced by the SoE Reporting Project, the Working Group stated that it was essential to provide information that would change the behaviour of decision-makers in favour of facilitating sustainable development.

The group then identified target audiences, such as policy-makers, who would benefit from the dissemination of SoE reporting-related information, specified the objectives for disseminating such information to the target audience, and suggested products that could address specific information needs (see Box 10). As regards the type of

output or form in which SoE reporting could be presented, the following were suggested:

1. Media reports
2. Brochures and/or regular one-page briefings, such as the DRFN's "Updates" for Parliament, containing summaries of environmental issues
3. Scientific reports and papers
4. Videos
5. Drama productions
6. Internet publications
7. Lecture series
8. Political briefing sessions
9. Newsletters
10. Mass meetings
11. Publishing an environmental atlas of Namibia as well as other SoE reports and research
12. Face-to-face interactions with stakeholders

#### **Working Group 4: Definition of indicator-selection criteria**

The sectoral SoE reports already produced in Namibia used the following selection criteria for identifying an environmental indicator:

- The **scientific relevance** of theory and assumptions defining the indicator and for monitoring the SoE
- The **utility** of the indicator for decision-makers
- The **availability** and **accessibility** of baseline data required to measure the indicator with ease
- The **accessibility** of historical data and/or time series with regard to the indicator
- The **sensitivity** and **accuracy** with which the indicator responded to change, and how well it could establish a clear link to causative factors
- The indicator's **threshold**, i.e. reflects a desirable or undesirable condition against which the indications given by an indicator can be measured

However, the SoE reporting review (see Appendix 1) has clearly identified that most of the suggested indicators from the SoE reports do not comply with the above selection criteria. The SoE reports also show there has a tendency to make data availability the key criterion for indicator selection. This tendency had many drawbacks: some extremely relevant and important indicators were not even considered, whereas inferior indicators were included only because data were available.

#### **Outputs**

The following eight criteria were identified as essential in the selection of environmental indicators (see Box 11). The indicator needs to –

1. be accurate, i.e. provide data that are reliable, verifiable and scientifically sound
2. be understandable, i.e. by the target audience, as well as be user-friendly
3. be relevant to the issue it measures
4. provide data that are accessible in terms of measurement by the indicator

5. be sensitive
6. have defined thresholds
7. be unique, and
8. be sustainable in its application.

#### *Scientific relevance*

The indicator needs to –

- measure something of relevance to an environmental issue
- be relevant for the intended user
- focus on the livelihood of the human population and the natural economy
- be informative, i.e. provide specific knowledge to aid decision-making
- differentiate between causes
- focus on aspects that aid decision-making processes in relation to the environment, and
- be compatible with indicators that are used in similar international and regional environmental monitoring processes.

#### *Data accessibility*

The following points were raised in respect of making environmental data available and accessible to users:

- Data should not only be available, they should be accessible as well.
- User formats should guarantee ease of access to and retrieval of data.
- The practicability of collecting data for a suggested indicator needs to be determined.
- Links should be established between the various data-collectors.
- Establishing a network could improve the quality of data-recording and storage by standardising a format that would be widely used.
- The data must be interpretable, i.e. the meta-data should be of unquestionable quality.
- Data are to be recorded with the lowest degree of complexity possible.

#### *Sensitivity*

Indicators have to be –

- sensitive to critical changes in the environment
- sensitive to the present state of the environment and trends over time and space, and
- able to detect changes after response actions have been taken to ameliorate the effects of environmentally damaging impacts.

#### *Thresholds*

- Establish whether the indicator requires a threshold
- Assess the indicator's suitability, based on whether a threshold has already been determined, is difficult to determine, or can be determined at all

#### *Uniqueness*

The indicator should be –

- independent, i.e. able to indicate change by itself, and
- universal rather than sectoral.

### *Sustainability*

The indicator should be –

- manageable
- able to be incorporated into existing environmental monitoring structures (through capacity-building and knowledge transfer)
- cost-effective, and
- affordable.

## **Session 2**

### **Setting environmental priorities<sup>3</sup>**

#### **Background and method**

The scope of the AHP exercise was to define, in a systematic manner, which environmental problems were Namibia's the most serious among those identified by the 50 experts who had constituted Working Group 2 in Session 1 of the Workshop. The AHP exercise aimed to ensure that these most serious problems would be covered by a sufficient number of indicators included in the NCEI.

Using AHP, Working Group 2's list of ten of the most crucial environmental issues in Namibia (see Box 9) were ranked according to their seriousness. Thus, individual group members compared pairs of issues, each time choosing the more important issue in a pair. A direct comparison of the ten most crucial environmental issues against each other produced altogether 45 pairs. In the first step of scoring, the more important issue in a pair was marked. Then the pair of issues was assigned a score between 1 and 9. A pair that had a score of 1 indicated that the two issues in the pair were of similar importance. A score between 2 and 9 indicated that the marked issue was the more important. The importance of this marked issue increased as the score increased.

AHP is a systematic and robust analytical tool that allows one to differentiate between, and weigh, options that are very close to or not very different from one another. This is particularly important when, as in the example of Namibia, some of the items to be compared in terms of their importance are ranked extremely closely. An additional advantage of this method of comparing pairs is that the human mind can easily handle two distinct problems and examine their differences, while the simultaneous treatment of more than two problems may cause difficulties – even for an experienced analyst.

The results were calculated based on the AHP analysis, which is frequently used in valuation studies (Saaty 1980). The statistical examination was based on an analysis of variance. The weights of different problems were calculated as described by Saaty (1988), although additional programming was necessary because the commercial AHP software ("Expert choice") was unable to cope with the task. Dr Olli Varis from the Technical University of Helsinki therefore designed a special programme for the calculations, using Microsoft Excel as a base.

#### **Results**

The average weight of importance accorded to the ten most crucial individual environmental issues is displayed in Box 12. The individual results from the 50 experts participating in Session 2 of the Workshop are presented in Appendix 4. In their opinion, the two most significant problems in Namibia were (1) the degradation of ecosystems (desertification) and (2) a decline in the availability of water. This is a logical result for an arid country. Three environmental problems, namely depletion of natural resources, loss of biodiversity and decline of water quality, formed the next cluster in the importance rankings. New emerging environmental problems, which are linked with the current industrial era, including pollution, waste generation, the greenhouse effect and depletion of the ozone layer, formed a third cluster of issues with a significantly lower relative level of importance. This third cluster was ranked as less important in Namibia only in relation to certain other long-standing Namibian problems, i.e. those concerning water availability, natural resources and biodiversity.

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<sup>3</sup> This report, written by Tapio Reinikainen, forms part of his current doctoral research.

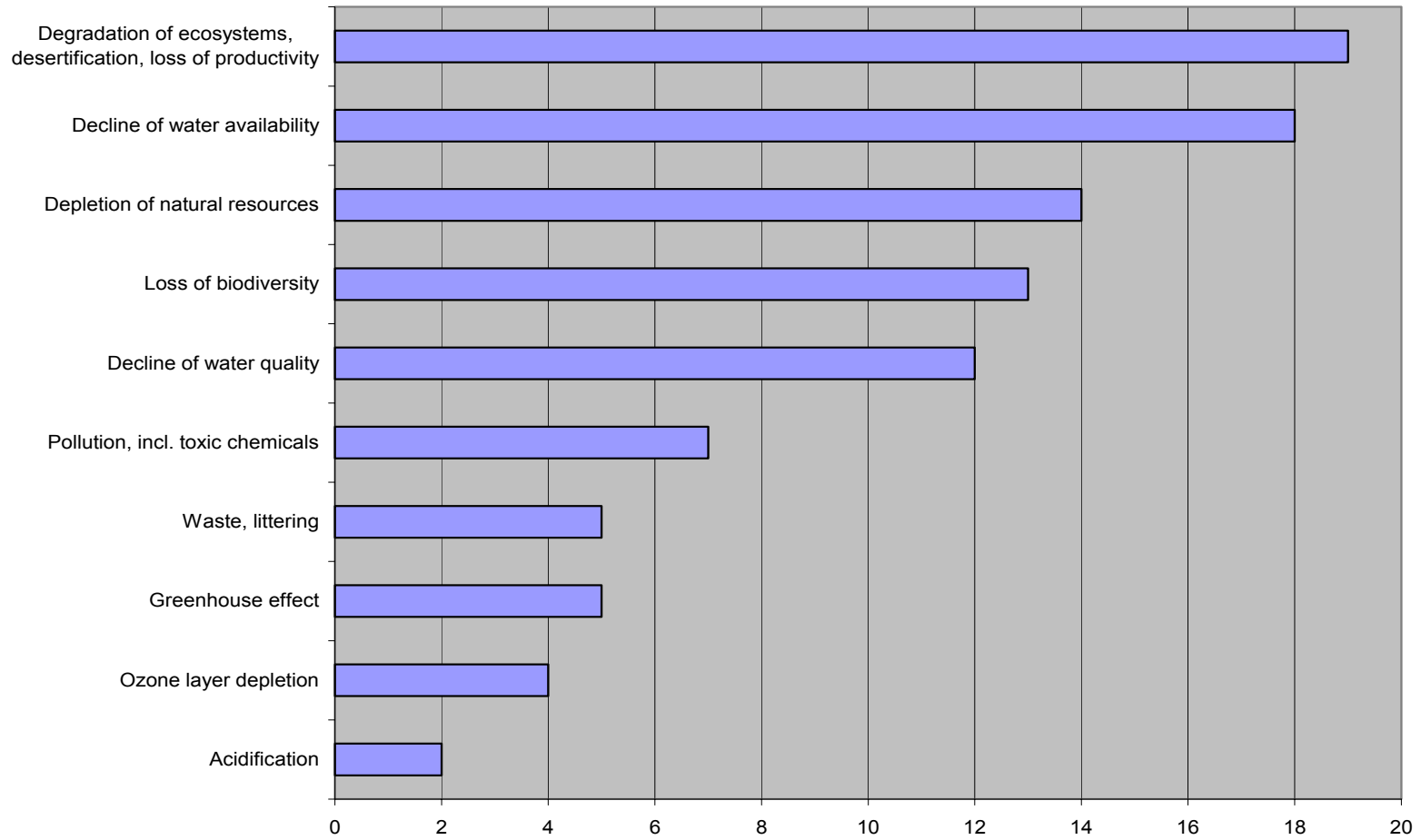
Also, acidification, although listed as an environmental problem in Session 1, was assessed to have very little significance in the Namibian context.

It is noteworthy that, in the overall analysis, the inconsistency ratios were quite high: a third of the participants in Session 2 showed inconsistency values in excess of 0.2. This might be due to several factors, such as the complexity and wide range of issues to be compared and a less than optimal logistical setting, as well as the fact that several people worked in groups rather than as individuals. However, the inconsistency level did not differ much from those recorded in a similar study done with Finnish experts in 1996 (Reinikainen 1996). Generally speaking, therefore, the results represent an average assessment and prioritisation of environmental issues by 50 Namibian environmental experts.

It is worth noting that priorities have tended to shift over time, and that emerging environmental problems such as the greenhouse effect might score quite low values – even though such problems present high environmental risks for Namibia.

The results from this AHP study will be used for cross-checking the coverage of the indicators in the NCEI. The results can also be used as a reference in different environmental policy-making situations.

### Expert priorities on environmental problems



## **Session 3**

### **Scoring of indicators**

#### **Introduction**

A great number of indicators have been suggested for SoE reporting in the relevant sectoral reports as well as in a few other related works. It is impossible and, in fact, unnecessary to monitor quite so many indicators, especially considering that national-level monitoring programmes are extremely resource-intensive. It is, therefore, the aim of this Workshop to identify and streamline the most effective and efficient indicators for incorporation into Namibia's NCEI. To take advantage of the preparatory work that was done through the sectoral SoE reports the identified indicators were to be checked for suitability in their application to the newly identified environmental issues. Potentially appropriate indicators were to be scored, applying the selection criteria defined in Session 1.

As resource material to Session 3, all key indicators suggested in the six sectoral SoE reports and other programmes (e.g. those of the Directorate of Forestry) were contained in a booklet distributed to all participants at the Workshop. These indicators amounted to 184 in total.

Each Workshop participant then chose to form part of one of the ten issue-based Working Groups constituted for Session 3, in which each person individually scored the potential indicators. Additional indicators which had not previously been identified could also be named and described for inclusion in the NCEI.

#### **Results**

A total of 39 Workshop participants handed in their results. A summary of these results is presented in Box 13, while the full table of scored indicators with the values is depicted in Appendix 2.

Most of the participants formed Working Groups constituting one to three members, while the Working Group addressing "Ecosystem degradation/desertification" had the highest membership, namely 15.

A total of 142 indicators (see Appendix 2) were used to describe the ten most crucial environmental issues, out of the collection of 184 in the booklet issued to Workshop participants. About 50% of these indicators were used to describe one specific environmental issue, while the other 50% were named for describing more than one environmental issue. Only one indicator that had not appeared in the existing lists was added. Seven indicators were used for between 4 and 5 issues alike, while all the others described less than 4 issues. The suitability of one indicator for various issues ranged widely, indicating that these selected indicators might be fairly unique to a specific issue. Thus, only 68 of the 142 scored indicators remain listed if only the 5 top scoring indicators per issue are included in Box 13.

#### **Discussion**

The fact that several of the Working Groups were made up of only one or two experts apiece makes the selection of indicators and scoring less robust. It might be necessary at a later stage to circulate the set of indicators to a larger group of experts for scoring.

The range of points scored by an individual indicator within one issue group was quite wide. This points to the fact that the score values given depend heavily on individual decision-making, even if the overall score is an average number. Some groups had few representatives, diluting the meaning of the average.

Only one indicator not previously listed was identified and added during the Working Group discussions. In this regard, participants mentioned that the tight time schedule for the exercise did not allow for both the scoring of the proposed indicators and creative thinking about new ones.

Some participants remarked that the scoring method was too elaborate and not clear enough, while others were unfamiliar with the ranking of 1–3–5 to describe the increased suitability of an indicator by way of an increased numerical value.

Clearly, this scoring exercise was only one of the many steps towards establishing an NCEI.

## Session 4: Part 1

### Review of scored indicators

Working Group 3 of the four constituted for Session 4 reviewed the shortlist of indicators (see Box 13) to give some more guidance to their future development. Their discussion was based on a draft analysis of Session 3, which they had reviewed.

Working Group 3's point of departure was that although the actual identification of indicators under each of the ten most pressing environmental issues in Namibia was valuable, the related scoring and final selection needed to be improved. Therefore, the Working Group assessed each of the short-listed indicators based on whether they were national (N) or local (L) indicators, and whether they had a direct (D) or indirect (I) bearing on the environmental issue in question. Additionally, where gaps existed in respect of the indicators describing each respective environmental issue, these were identified. Finally, recommendations were made to improve on the set of indicators. Where indicators have been crossed out in the tables, this indicates their presumed irrelevance.

#### 1. Availability of water

INDICATORS	N	L	D	I
Population pressure	◆	◆		◆
Quality of water in the Goreangab Dam		◆		◆
Cooperation with neighbouring riparian states under transnational initiatives	◆			◆
Draft White Paper on Water and the new Water Bill	◆			◆
Unsustainable irrigation	◆	◆	◆	

##### *Gaps identified*

- Few concrete and direct indicators
- Certain selected indicators would probably show no response if measured
- Lack of identifiable threshold values for a number of suggested indicators

##### *Bridging measures*

- Revisit selection criteria, the scoring exercise and the resulting importance rating
- Identify environmental (ecosystem) needs

#### 2. Water quality

INDICATORS	N	L	D	I
Pollution of groundwater	◆	◆	◆	
Ambient change of water quality			◆	
Goreangab Dam water quality			◆	
Amount of chlorine used per cubic metre of water supply			◆	◆
Growth rate of urban population	◆	◆		◆

*Gaps identified*

- Need for national indicators
- Need for national-level monitoring
- Need for more national-level analyses of water quality
- Need for ecosystem-level (environmental) analyses of water quality

*Bridging measures*

- Revisit indicators
- Specify water quality variables

**3. Depletion of natural resources**

INDICATORS	N	L	D	I
Monthly abstraction in strategic aquifers		♦		♦
Total woody biomass of national forest	♦	♦	♦	
Water consumption by resource type (by sector)	♦		♦	
Total biomass consumption	♦	♦	♦	
Total area of national forest, plantations and other wooded lands	♦	♦		♦

*Gaps identified*

- Need for productive indicators and/or measurement
- Not all environments are reflected in SoE reporting, e.g. marine resources are not yet listed

*Bridging measures*

- Review indicator set for obvious omissions, e.g. ensure that all major ecosystems are represented

**4. Toxic chemicals**

INDICATORS	N	L	D	I
National fuel consumption	♦			♦
Use of pesticides	♦	♦	♦	
Chemical fertiliser reports	♦	♦	♦	
Coastal oil pollution		♦	♦	
International conventions and/or policies implemented	♦			♦

*Gaps identified*

- No indicators showing direct chemical residues, e.g. by way of bio-accumulation
- No indicators to show whether or not remedies are enforced to prevent the dangers associated with toxic chemical waste

*Bridging measures*

- Implement the Stockholm Convention on Persistent Organic Pollutants (May 2001)

**5. The greenhouse effect (global warming)**

INDICATORS	N	L	D	I
Total area of national forest	◆			◆
Rainfall index	◆			◆
<del>Climate change</del>				
Proportion of Caprivi and Kavango burned	◆	◆		◆
<del>Number of rainfall-gauging stations</del>				

*Gaps identified*

- Direct indicators needed, e.g. for measuring changes in sea surface temperature
- Ambient temperature has not been included, although this might be an obvious indicator
- Carbon dioxide production, which is commonly used as an indicator for climate change, is not included in the Namibia's NCEI (This indicator may be less relevant as Namibia is not regarded as producing dangerous levels of these emissions.)

*Bridging measures*

- Obtain urgent input from experts in the field to review the list

**6. Ozone-layer depletion**

INDICATORS	N	L	D	I
<del>Ozone-layer depletion</del>				
Enforcement and control of illegal trade in CFCs				
Recycled materials				
Dependence on shared resources				
International conventions and/or policies implemented	◆			◆

*Gaps identified*

- The Working Group was unable to establish whether concrete/measurable indicators exist for this issue in Namibia

*Bridging measures*

- Revisit indicators (scoring system, criteria, etc.) to evaluate applicable ones
- Obtain urgent input from experts in the field to review the list
- Refer to the Ozone Office at the Ministry of Trade and Industry

**7. Change in biodiversity**

INDICATORS	N	L	D	I
Change in number and/or distribution of keystone and indicator species	◆	◆		◆

INDICATORS	N	L	D	I
Algae index		♦		♦
Change in land use	♦	♦		♦
% of protected forest	♦			♦
Benthic macro-invertebrates	♦			♦

*Gaps identified*

- No direct indicators relate to this environmental issue
- Few ecosystems seem to be covered by the suggested indicators

*Bridging measures*

- Review the indicator list critically
- Seek input from national and international experts

**8. Waste generation**

This was not assessed during Session 4.

**9. Acidification**

INDICATORS	N	L	D	I
Mean annual rainfall				
Number of rainfall gauging stations				
Rain pH		♦	♦	
National energy sources and consumption				

*Gaps identified*

- Most of the selected indicators seem to be irrelevant to the issue
- Amount of industrial emissions, e.g. as measured by the pH value, are not included but could be a useful indicator
- Soil and water analyses are entirely lacking

*Bridging measures*

- Revisit the suggested indicator list
- Seek expert advice

**10. Ecosystem degradation/desertification**

INDICATORS	N	L	D	I
Monitoring of changes in water quality		♦	♦	
Salinisation of irrigated land		♦	♦	
Area under forest management	♦	♦		♦
Siltation of dams	♦	♦		♦
Mean annual rainfall	♦	♦		♦

*Gaps identified*

- More indicators are needed for these broad environmental issues

*Bridging measures*

- This environmental issue as a whole requires further focussed discussion

**Discussion**

Working Group 3 identified that, even after a concerted effort to score useful indicators, the sets derived from Session 3 were still unsatisfactory. It is apparent that now the hands-on work of testing individual indicators and their data needs to proceed: only then will it become clear whether the theoretically prioritised indicators work in practice. Once a first attempt has been made to compile NCEI overviews, it will also possibly be easier to identify where shortcomings exist and where the indicators should be supplemented.

Working Group 3 acknowledged, however, that they did not have sufficient time during their discussions to fully review the descriptions of all listed indicators as contained in the SoE reports.

## **Session 4: Part 2**

### **Brainstorming the way forward for EMIN**

#### **Introduction**

Four Working Groups were constituted for this final session. They concentrated on defining the road ahead for EMIN, as well as providing input on the development of the EIS Unit's future work programme. The topics discussed by each Working Group were –

- making an inventory of ongoing monitoring programmes in Namibia
- operationalising the collecting, updating and sharing of NCEI data
- defining crucial gaps in environmental monitoring and exploring ways to bridge them, and
- refining the meta-database survey tool.

In order to effectively monitor the NCEI for SoE reporting, it is clearly essential to work in partnership with all stakeholders from the public, private, NGO and industrial sectors. The MET and the EIS Unit based within the MET understand their role as brokers of information amongst their partners, nationally and internationally. The establishment and maintenance of a comprehensive meta-database is seen as one of the most suitable tools to facilitate this flow of information: it would serve as a way to assess not only who the key players in the environmental monitoring field are, but also what type of monitoring programmes exist and what the status of the collected data is.

As with any multi-stakeholder undertaking, it is important to establish mechanisms for the efficient flow of information as well as sound institutional arrangements for the partnership to work. In Namibia, a number of such activities have already been undertaken; these ought to be strengthened and extended in support of the SoE Reporting Project. In this context, the EIS Unit sees itself as a service provider.

#### **Working Group 1: Making an inventory of ongoing monitoring programmes in Namibia**

This Working Group discussed how best to set up an inventory of existing environmental monitoring programmes in Namibia, building on the experiences of the existing Na-LTER network. The Working Group's recommendations entailed defining strategies for developing the inventory, and defining important aspects of a questionnaire that would form part of a related survey tool.

#### ***Strategy for developing the inventory***

- Conduct as wide a survey as possible
- By way of an e-mail circular, ask Workshop participants to list organisations already monitoring some of the suggested indicators
- Screen SoE reports
- Conduct an Internet search
- Consult previous surveys (e.g. those of Na-LTER and GTOS)
- EIS selects partners according to the need for indicators in their fields
- Include questions on other data-providers in the questionnaire
- First conduct a national survey, and then an international one

### ***Important aspects of conducting the survey***

- Make use of various media such as e-mail, the Internet, research papers, and personal interaction
- Provide the respondents with background information to encourage their participation
- List and explain all relevant environmental indicators to the survey respondents
- Compile support documentation, e.g. in the form of a brochure, and make it available to the survey participants
- Include information on the EIS objectives and mode of operation and/or plans in such a brochure
- Make a distinction between types of data-holders, e.g. public institutions, private bodies
- Explain that the survey enables the provision of advice or guidance to data-providers as regards data management
- Explain how participants can benefit from responding to the survey
- Outline how important it is to obtain the data
- Explain the benefits of sharing data (see Session 4, Working Group 2, who discussed this in detail)
- Explain the benefits of accessing other organisations' data
- Make a distinction between registered users and data-holders that do not wish to share their data
- Applicant users of EIS declare what data they have, and are provided with access to the information of others in return
- Explain that participation in the survey is a way of advertising one's work

### ***Important aspects of the questionnaire***

- Ask for institutional details
- Ask what NCEI data are available at the respondent's institute
- Ask what other data are relevant to the NCEI
- Ask how the respondent's data relate to specific indicators
- Ask the respondents to describe their data (the EIS should decide whether or not this is relevant)
- Ask whether the respondent would like to participate in the meta-database; if so, send him/her the full questionnaire; if not, ask why.
- Ask what the respondent would regard as an incentive to participate in the meta-database network
- Ask for the names of any organisations the respondent feels should be approached for information in regard to the survey

### **Working Group 2: Operationalising the collecting, updating and sharing of NCEI data**

In order to encourage all the relevant stakeholders in Namibia to collaborate in data-collection and data-sharing in support of SoE reporting, a number of issues have to be addressed. Data-collection is not only resource-intensive; there is also still a feeling that data are private or institutional property. Rather than acknowledging the advantages of data-sharing, individuals and institutions often feel threatened that data in their possession might be misused or that their data-collecting and data-processing efforts would not be acknowledged. In this regard, Working Group 2

made the following recommendations for operationalising the collection, updating and sharing of NCEI data:

**1. *Data-collection constraints***

- Identify suppliers of data for the meta-database
- Address the lack of commitment among existing data-providers
- Draw up memoranda of understanding or data-sharing agreements with data-providers
- Encourage EMIN to offer appropriate support

**2. *Lack of a common vision***

- Internalise Vision 2030 and identify strategic solutions
- Ensure EMIN members are partners in product development, e.g. as co-authors of the annual SoE report
- Coordinate activities

**3. *Inadequate data***

- Use a national programme to build up a comprehensive database
- Outsource the process of data-collection and the maintenance of monitoring projects
- Improve coordination among data-providers and build an awareness amongst them for the need to improve existing monitoring systems

**4. *Lack of data***

- Convince line ministries to collect data
- Obtain Cabinet support for line ministries to do so
- Build capacity to enable data-collection
- Seek development support where needed

**5. *Updating of data***

- Develop a system by means of which data can be updated
- Establish a time frame in accordance with which data is regularly updated
- Develop the market for the meta-database: only if the need for such an undertaking is understood can the meta-database be sustained

**6. *Sharing of data***

- Ensure that EMIN shares responsibility with the EIS Unit for disseminating, advertising and delivering products such as the annual SoE report, and for advertising and setting up access to the meta-database via the Internet

**Working Group 3: Defining crucial gaps in monitoring and exploring ways to bridge them**

Working Group 3 undertook to identify gaps in the monitoring systems, by assessing which NCEI-related indicators were currently being monitored and by whom. In preparation for this task, the shortlist of scored indicators from Session 3 was

reviewed. The results from this review were presented earlier as Part 1 of Session 4. The definition of gaps in monitoring will be addressed through the meta-database survey of the EIS Unit.

#### **Working Group 4: Refining the meta-database survey tool**

This Working Group used the draft survey tool (see Box 7) as a template to discuss what levels of information need to be incorporated in the meta-database survey. In addition, they made recommendations on improving data-flow procedures.

#### ***Levels of information to be incorporated into the meta-database***

1. Contact
2. Monitoring programmes implemented
3. Monitoring site
4. Indicator monitored
5. Monitoring method employed
6. Data description
  - Assess how much detail is required
  - State the monitoring frequency
  - State the type, format and quality of the data
7. Thresholds and benchmarks
8. Company or institutional policy on data-sharing
9. Information on whether use of the data is to be restricted or not

#### ***Recommendations on procedures***

- Provide a directory of key stakeholders
- Access demand for services and clarify the content of the meta-database
- Make NCEI analysis tools publicly available
- Especially for the NCEI, develop data standards and agree to mechanisms of data supply
- Through the meta-database, facilitate the acquisition of demand-driven data from suppliers of unprocessed data
- Provide data of good quality and high reliability, i.e. data that comply with set standards
- Document actual institutional data-collection methods in order to guarantee that collection times are reflected on the meta-database

#### ***Suggestions for Internet-based access***

- Assess the demand for data-sharing by way of Internet-user registration and the establishment of an online response system that allows web-site visitors to communicate directly with the meta-database manager
- Set up a keyword-based search engine
- Link up with Internet search engines such as Google or Yahoo! so that EMIN and relevant environmental information on Namibia can easily be found
- Link up with other Internet-based, environment-related projects and programmes
- Organise meta-database according to indicators or topics, not necessarily according to data-providers or other contacts
- Resolve the question of whether or not to recover costs from users of meta-database services

- The meta-database should refer to environment-related products such as the annual SoE report
- The information system should facilitate direct, net-based exchange between contacts

## Chapter 3: The road ahead

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### Conclusions

A great number of practical recommendations on the development of both the NCEI and EMIN were made throughout the Workshop. Only the main points will be synthesised here. However, all recommendations will be considered in the review and development of the work plan for the EIS Unit in its new project phase. At a later stage the full project documents, including the detailed work plan, will be circulated to all Workshop participants.

### Synthesis of main recommendations

1. The SoE reports produced between 1998 and 2001 form a good foundation from which an NCEI can be further developed. It is essential that these reports be made available in an appropriate format. At present, the full reports can be downloaded from the DEA's web page (<http://www.dea.met.gov.na>).
2. Even after a review of the large number of indicators suggested in SoE reports and other sources, the application of a defined set of selection criteria to score those indicators would be insufficient to delineate the NCEI. Thus, although the indicator selection process has been substantially advanced through this Workshop, much remains to be done.
3. It is also recommended that a thorough documentation of the Workshop proceedings be published and widely circulated for comment. In this way, national and international experts not present at the Midgard meeting will be able to provide inputs into the NCEI's future development.
4. A major issue in developing the NCEI and related outputs is the need to define threshold values that would indicate whether Namibia's SoE has changed, and whether such changes have reached critical levels.
5. Additionally, it is vital to develop relevant indicators that are appropriate to each spatial level. In the context of the SoE Reporting Project, many important environmental issues are measured at local or regional levels only, whereas national-scale measurements are as important. It is essential that national-level data are collected on a scale that allows sufficient detail for the detection and illustration of any patterns. Furthermore, environmental issues might require indicators that reflect regional variability.
6. The Workshop participants further agreed it was essential to produce annual reports on Namibia's SoE. In addition, the largely theoretical work done so far in the SoE Reporting Project needs to be put into practice. It is recommended that the first annual SoE report be produced by the end of 2001 or the beginning of 2002.
7. The updating of data in support of the NCEI is essential to produce current, meaningful outputs. Since the MET is not in a position to monitor all the proposed indicators itself, the monitoring work already being done by various public and private institutions on aspects of the NCEI should be continued. Furthermore, reliable and sustainable mechanisms have to be put into place to allow for continued data flow and updating of the NCEI.

8. The MET should review and adapt its ongoing monitoring programmes, as well as monitor indicators that relate directly to the NCEI. Although national-level monitoring is cost-intensive, the value of current and reliable data for informed decision-making is worth the effort.
9. The EIS Unit at the DEA has been identified as the key player in facilitating updates of NCEI-related data through establishing an interactive information system.
10. The EIS Unit, together with EMIN, would establish and manage a national environmental meta-database that would serve as a platform for sharing information on the environment in Namibia. An extensive set of recommendations on how to operationalise such a meta-database was drafted by Working Group 4 in Session 4 of the EMIN Workshop.
11. The SoE reporting process has to link up with other ongoing planning initiatives within the Namibian Government, such as Vision 2030 and the current NDP. Synchronised with the NDP planning process, a comprehensive SoE report that supports the NDP should be published every five years, addressing broader issues of sustainable development.

## Official closing address

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Good afternoon, Ladies and Gentlemen:

I believe and am convinced that this has been a very fruitful and productive Workshop. I am also confident that you have been able to do justice in further developing appropriate environmental indicators. We all know the worldwide importance of good environmental data. It is with reliable information that one is able to make informed decisions.

Ladies and Gentlemen:

I don't want to dilute what has been presented and discussed during this two-day Workshop. However, I would like to make a few remarks. I have to underline the point that the MET/DEA would like to make its contribution and show its commitment to the SoE reporting process and the Environmental Information Service (EIS) Unit. Again, the MET has made government positions available to this Unit. One can tell from the organisation and facilitation of the Workshop that the EIS Unit at the DEA is alive and, with people such as Louisa and Ester, is ready to start and bring the started process ahead.

It is important to develop appropriate environmental indicators as well as monitoring mechanisms to ensure that management is done based on good, quality information. I want to underline the extreme importance and relevance of scientifically valid and well-presented information to the decision-making process. It is our responsibility to facilitate and encourage public awareness and participation by making relevant environmental information widely available to any interested user.

Many environmental information products have already been generated and successfully made available to the public by our Ministry. These include the environmental profiles of the Caprivi and north-central Namibia as well as SoE sectoral reports. However, in future, it will not be sufficient to produce one-off descriptions of the environment. The draft Environmental Management Bill, for example, requires that our Ministry report on the state of the environment on a regular basis: annually. This is to keep good track of the status of the natural resource base here in Namibia, on which so many people depend for their daily livelihoods, and to allow for sound planning and decision-making. This ambitious undertaking can, however, only be achieved through defining the most powerful and descriptive indicators as well as standardised mechanisms for monitoring and updating the necessary indicator data annually. In short: we need to create an NCEI that meets all the requirements. I sincerely believe that you are much closer to meeting these goals after this productive Workshop than we were before.

We have heard much about the opportunity to link up the NPC's Vision 2030 Project – a project initiated by His Excellency Dr Sam Nujoma himself. We, as the MET, feel this to be a great opportunity, i.e. that indicators could be used in support and benchmarking this Vision. Again, I think that the EIS Unit could play a significant role in this regard.

It was mentioned that the MET itself might have to generate some data in support of SoE monitoring and reporting. In fact, the MET is carrying out several monitoring programmes such as regular game counts already. This could also be an opportunity for the MET to review its current monitoring programmes, based on the outcome of this Workshop, and in the future focus on the NCEI-related aspects.

Ladies and Gentlemen:

I believe you have laid down a strong foundation for the development of the EIS as well as for establishing an appropriate network to effectively share environmental data as stakeholders.

With these few remarks, I would like to extend my sincere appreciation and thanks for your active participation and your valuable contributions throughout the Workshop. I also need to thank the organising team of this Workshop. It is clear you put in much time and effort.

Once again, I thank you all, and wish you a pleasant and safe journey back home.

C Tangeni Erkana  
Permanent Secretary  
Ministry of Environment and Tourism

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## **Appendix 1: EMIN Workshop agenda**

### Environmental Monitoring and Indicators Network (EMIN)- Workshop

11 – 12 June 2001, Midgard

Ministry of Environment & Tourism, Department of Environmental Affairs

## **REVISED PRELIMINARY AGENDA**

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*Facilitator: Bertus Kruger*

### **DAY 1: NATIONAL CORE SET OF INDICATORS (NCEI)**

- |                      |   |
|----------------------|---|
| <b>8:00 – 9:30</b>   | <b>Arrival at Midgard, coffee, announcements</b>  |
| <b>9:30 – 9:45</b>   | <b>Official Opening of Workshop</b><br>(Honorable Deputy Minister Petrus Illonga)   |
| <b>9:45 – 10:05</b>  | <b>Introduction</b> <ul style="list-style-type: none"><li>• Organisational</li><li>• Purpose of the workshop</li><li>• The EIS Unit at MET</li></ul> (Louisa Nakanuku, MET & Bertus Kruger, DRFN) |
| <b>10:05 – 10:30</b> | <b>Environmental indicators – new tools for decision making</b><br>(Tapio Reinikainen, MET)   |
| 10:30- 10:40         | The role of environmental indicators in development co-operation<br>(Pekka Salminen- Advisor to Ministry of Foreign Affairs of Finland)   |
| <b>10:40- 10:50</b>  | <b>Representative of Vision 2030 (NPC)</b>  |
| <b>COFFEE BREAK</b>  |   |
| <b>11:00 – 11:30</b> | <b>SOER process review: 1998 - 2000</b><br>(Patrik Klintonberg, DRFN)   |
| <b>11:30 – 11:45</b> | <b>Workgroup procedures</b><br>(Bertus Kruger, DRFN)  |
| <b>11:45 – 13:00</b> | <b>Setting the scene for the definition of the Namibian Core set of Environmental Indicators (NCEI): Group-work facilitated by resource persons</b>   |

**WG 1:** Definition of the **scope** of the NCEI (Peter Tarr, SAIE)

**WG 2:** Definition of the **environmental issues** the NCEI need to cover (Chris Brown, NNF)

**WG 3:** Definition of the **framework & outputs** of the NCEI (Teo Nghitila, MET)

**WG 4:** Definition of **indicator selection criteria** (Patrik Klintonberg, DRFN)

LUNCH

**14:00 – 14:30**            **Results from the work groups**  
(Work group representatives)

**14:30 – 15:30**            Prioritisation of the **issues** (WG 2) through Analytic Hierachy Process

**15:30 – 15:45** **Introduction to the selection of indicators and formation of issue centered work groups**  
(Bertus Kruger, DRFN)

COFFEE BREAK

**16:00 – 18:00**            **Scoring of indicators**            - work groups

DINNER

## **DAY 2: ENVIRONMENTAL MONITORING & INDICATORS NETWORK (EMIN)**

BREAKFAST

- 9:00 – 9:10** Introduction to work program of day 2
- 9:10 – 9: 55** Recap of results of day 1
- 9:55 – 10:30** Environmental monitoring programs of Namibia. – what is there ?  
(John Mendelsohn, MET & Joh Henschel, DRFN)

COFFEE BREAK

- 11:00 – 11:30** Building the environmental information system, starting with a meta-database in Namibia  
(Louisa Nakanuku, MET & Mutjinde Katjiua, IECN)

**11:30– 13:00** Work groups – brainstorming ways ahead for EMIN:

- WG 1:** Making an **inventory** of ongoing monitoring programmes (Joh Henschel, DRFN)
- WG 2:** Operationalisation of **collection, updating and sharing of NCEI data** (John Mendelsohn, MET)
- WG 3:** Definition of crucial **gaps in monitoring** & exploring ways to bridge them (Phoebe Barnard, MET)
- WG 4:** Refining the **Metadabase survey tool** (Louisa Nakanuku, MET & Juliane Zeidler, IECN)

LUNCH

- 14:00- 15:00** Report back from the workgroups & rap-up on monitoring  
(Presentatives of the work groups)
- 15:00 – 15:30** Way ahead  
(Bertus Kruger)
- 15:30 – 16:09** Closing remarks  
(Permanent Secretary, Tangeni Erkana)

COFFEE

**Appendix 2: List of EMIN Workshop participants**

SURNAME	NAME	ORGANISATION	TEL	FAX	POSTAL ADDRESS	E-MAIL ADDRESS
Angombe	Simon	DOF	221 478	222 830	P/Bag 13346, Windhoek	<a href="mailto:angombe@forestry.met.gov.na">angombe@forestry.met.gov.na</a>
Barnard, Dr	Phoebe	DEA	249 015	240 339	P/Bag 13306, Windhoek	<a href="mailto:pb@dea.met.gov.na">pb@dea.met.gov.na</a>
Brown, Dr	Chris	Namibia Nature Foundation	248 345	248 344	P O Box 245, Windhoek	<a href="mailto:chrisbrown@nnf.org.na">chrisbrown@nnf.org.na</a>
Chakanga	Moses	DOF	221 478	222 830	P/Bag 13346, Windhoek	<a href="mailto:chakanga@forestry.met.gov.na">chakanga@forestry.met.gov.na</a>
De Klerk	JN	DEA	249 015	240 339	P/Bag 13306, Windhoek	<a href="mailto:ndk@dea.met.gov.na">ndk@dea.met.gov.na</a>
Du Pisani, Dr	Louis	MAWRD	208 7062	208 7768	P/Bag 13184, Windhoek	<a href="mailto:ldupisani@mweb.com.na">ldupisani@mweb.com.na</a>
Eiseb	Seth	National Museum	293 4302	228 636	P O Box 1203, Windhoek	<a href="mailto:seth@natmus.cul.na">seth@natmus.cul.na</a>
Els	Jacque	MAWRD	208 7034	208 7034	P/Bag 13184, Windhoek	<a href="mailto:elsj@mawrd.gov.na">elsj@mawrd.gov.na</a>
Forster	Birgit	OWR	(062) 560 232	(062) 560 232	P/Bag 90188, Klein Windhoek, Windhoek	<a href="mailto:okatumba@namibnet.com">okatumba@namibnet.com</a>
Forster	Harald	OWR	(062) 560 232	(062) 560 232	P/Bag 90188, Klein Windhoek, Windhoek	<a href="mailto:okatumba@namibnet.com">okatumba@namibnet.com</a>
Graz	Patrick	Polytechnic of Namibia	207 2462	207 2196	P/Bag 13388, Windhoek	<a href="mailto:pgraz@polytechnic.edu.na">pgraz@polytechnic.edu.na</a>
Haimbodi	Ndeu	DEA	249 015	240 339	P/Bag 13306, Windhoek	<a href="mailto:nh@dea.met.gov.na">nh@dea.met.gov.na</a>
Halweendo	Sirkka	MAWRD	208 7702	208 7767	P/Bag 13184, Windhoek	<a href="mailto:sirkka@yahoo.com">sirkka@yahoo.com</a>
Harmse	C	UNAM	206 4111	N/A	P/Bag 13301,	<a href="mailto:charmse@unam.na">charmse@unam.na</a>

SURNAME	NAME	ORGANISATION	TEL	FAX	POSTAL ADDRESS	E-MAIL ADDRESS
					Windhoek	
Henschel, Dr	Joh	DRFN	229 855	230 172	P O Box 20232, Windhoek	<a href="mailto:jhenschel@drfn.org.na">jhenschel@drfn.org.na</a>
Hipondoka	Martin	UNAM	206 3632	206 3806	P/Bag 13301, Windhoek	<a href="mailto:mhipondoka@unam.na">mhipondoka@unam.na</a>
Hochobeb	Ben	UNAM	206 3286 / 206 3052	N/A	P/Bag 13301, Windhoek	<a href="mailto:bhochobeb@unam.na">bhochobeb@unam.na</a>
Hoffmann	Trudy	Ministry of Health and Social Services	203 2824		P/Bag 13198, Windhoek	<a href="mailto:doccentre@mhss.gov.na">doccentre@mhss.gov.na</a>
Ilende	Titus	MFMR	(064) 410 1155	(064) 404 385	P O Box 912, Swakopmund	<a href="mailto:tiilende@mfmr.gov.na">tiilende@mfmr.gov.na</a>
Linana	Ester	DEA	249 015	240 339	P/Bag 13306, Windhoek	<a href="mailto:contact@dea.met.gov.na">contact@dea.met.gov.na</a>
Kaarakka, Dr	Vesa	DOF	221 478	222 830	P/Bag 13346, Windhoek	<a href="mailto:Kaaraka@iafricaonline.com.na">Kaaraka@iafricaonline.com.na</a>
Kalomo	Milka	UNAM	206 3657	206 3791	P/Bag 13301, Windhoek	<a href="mailto:mkalomo@unam.na">mkalomo@unam.na</a>
Karongee	Marks	Ministry of Lands, Resettlement and Rehabilitation	257 104	228 240	P/Bag 13343, Windhoek	N/A
Katjua	Mutjinde	IECN	206 3111	240 964	P O Box 25962, Windhoek	<a href="mailto:mutjinde@unam.na">mutjinde@unam.na</a>
Klinterberg	Patrik	DRFN	229 855	230 172	P O Box 20232, Windhoek	<a href="mailto:patrikk@drfn.org.na">patrikk@drfn.org.na</a>
Koski	Jaana	Oniipa Environment Project	(065) 248 207	(065) 240 472	N/A	<a href="mailto:jaana_koski@yahoo.com">jaana_koski@yahoo.com</a>
Kozonguizi	George	Windhoek Municipality/	290 2371	290 2114	P O Box 25962, Windhoek	<a href="mailto:gkk@windhoekcc.org.na">gkk@windhoekcc.org.na</a>

SURNAME	NAME	ORGANISATION	TEL	FAX	POSTAL ADDRESS	E-MAIL ADDRESS
		IECN				
Kruger	Bertus	DRFN	229 855	230 172	P O Box 20232, Windhoek	<a href="mailto:bertusk@drfn.org.na">bertusk@drfn.org.na</a>
Le Roux	Johan	Etosha Ecological Institute, Ministry of Environment and Tourism	(067) 229 854	(067) 229 853	P O Box 6, Okaukuejo	<a href="mailto:jlr@iafrica.com.na">jlr@iafrica.com.na</a>
Lubbe	LG	MAWRD	206 4028	206 4111	P/Bag 13301, Windhoek	<a href="mailto:llubbe@unam.na">llubbe@unam.na</a>
Marais, Dr	Eugene	National Museum	293 4354	228 636	P O Box 1203, Windhoek	<a href="mailto:eugene@natmus.cul.na">eugene@natmus.cul.na</a>
Mendelsohn, Dr	John	DEA	249 015	240 339	P/Bag 13306, Windhoek	<a href="mailto:mendelso@iafrica.com.na">mendelso@iafrica.com.na</a>
Mouton	David	MFMR	(064) 410 1120	N/A	P O Box 912, Swakopmund	<a href="mailto:dmouton@mfmr.gov.na">dmouton@mfmr.gov.na</a>
Mukumangeni	Saara	MAWRD	208 7111	208 7767	P/Bag 13184, Windhoek	<a href="mailto:saaramm@yahoo.com">saaramm@yahoo.com</a>
Mwanyangapo	Enias	Ministry of Mines and Energy	284 8111	N/A	P/Bag 13297, Windhoek	<a href="mailto:emwanyangapo@mme.gov.na">emwanyangapo@mme.gov.na</a>
Mwenya	Emmanuel	Gobabeb Training and Research Centre	(064) 694 199	(064) 694 197	P O Box 2554, Walvis Bay	<a href="mailto:Emmanuel@drfn.org.na">Emmanuel@drfn.org.na</a>
Nakanuku	Louisa	DEA	249 015	240 339	P/Bag 13306, Windhoek	<a href="mailto:ln@dea.met.gov.na">ln@dea.met.gov.na</a>
Nghileendele	Protasius	DEA	249 015	240 339	P/Bag 13306, Windhoek	<a href="mailto:pronghileendele@dea.met.gov.na">pronghileendele@dea.met.gov.na</a>
Nghitila	Teofilus	DEA	249 015	240 339	P/Bag 13306, Windhoek	<a href="mailto:nghitila@dea.met.gov.na">nghitila@dea.met.gov.na</a>

SURNAME	NAME	ORGANISATION	TEL	FAX	POSTAL ADDRESS	E-MAIL ADDRESS
Otsub	Michael	DOF	221 478	222 830	P/Bag 13346, Windhoek	<a href="mailto:motsub@yahoo.com">motsub@yahoo.com</a>
Paxton	Midori	United Nations Development Programme	204 6229	204 6207	P/Bag 13329, Windhoek	<a href="mailto:midori.paxton@undp.org">midori.paxton@undp.org</a>
Persendt	Frans	UNAM	206 3894	N/A	P/Bag 13301, Windhoek	<a href="mailto:persendt@unam.na">persendt@unam.na</a>
Raw	Tony	Namibian Ports Authority	(064) 208 2111	(064) 208 2323	P O Box 361, Walvis Bay	<a href="mailto:tony@namport.com.na">tony@namport.com.na</a>
Reinikainen	Tapio	DEA	249 015	240 339	P/Bag 13306, Windhoek	<a href="mailto:tapio@dea.met.gov.na">tapio@dea.met.gov.na</a>
Robertson	Mark	DRFN	229 855	230 172	P O Box 20232, Windhoek	<a href="mailto:markr@drfn.org.na">markr@drfn.org.na</a>
Salminen	Pekka	Department of International Development, Ministry of Foreign Affairs, Helsinki, Finland	(+358 9) 1341 6107	(+358 9) 1341 6100	P O Box 127, FIN- 00161, Helsinki, Finland	<a href="mailto:pekka.salminen@formin.fi">pekka.salminen@formin.fi</a>
13. Schachtschneider	K Klaudia	DWA	208 7156	N/A	P/Bag 13193, Windhoek	<a href="mailto:schachtschneiderk@mawrd.gov.na">schachtschneiderk@mawrd.gov.na</a>
Shikongo	Sem	DEA	249 015	240 339	P/Bag 13306, Windhoek	<a href="mailto:sts@dea.met.gov.na">sts@dea.met.gov.na</a>
Stagmann	Erwin	Namibia Breweries Ltd	081 127 9241	260 229	P O Box 206, Windhoek	<a href="mailto:erwin.stegmann@olfitra">erwin.stegmann@olfitra</a>
Tarr, Dr	Peter	Southern African Institute of Environmental Assessments	220 579	220 579	P O Box 6322, Ausspannplatz, Windhoek	<a href="mailto:saiea@africaonline.com.na">saiea@africaonline.com.na</a>

SURNAME	NAME	ORGANISATION	TEL	FAX	POSTAL ADDRESS	E-MAIL ADDRESS
Uugwanga	Petrus	Ministry of Trade and Industry	081 247 0287	N/A	P/Bag 13340, Windhoek	<a href="mailto:puugwanga@yahoo.com">puugwanga@yahoo.com</a>
Zeidler, Dr	Juliane	IECN	240 964	240 964	P O Box 86634, Eros, Windhoek	<a href="mailto:julianez@iafrica.com.na">julianez@iafrica.com.na</a>
Zimmermann	Ibo	Polytechnic of Namibia	207 2461	207 2143	P/Bag 13388, Windhoek	<a href="mailto:ibozim@polytechnic.edu.na">ibozim@polytechnic.edu.na</a>