

**GENERIC INTEGRATED
ENVIRONMENTAL MANAGEMENT FOR
BIOSPHERE RESERVES.**

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B.Sc. Hons.

Thesis submitted in Geography and Environmental Studies in the School
for Environmental Sciences and Development of the Potchefstroom
University for Christian Higher Education in partial fulfilment of the
requirements for the degree Magister Scientiae (Environmental
Management)

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POTCHEFSTROOM

2002

ABSTRACT

Generic Integrated Environmental Management for Biosphere Reserves

Biosphere reserves are protected terrestrial and coastal environments of international conservation importance. They are unique categories of protected areas combining both conservation and sustainable use of natural resources in a great variety of ecosystems, geographic conditions and socio-cultural settings. Sustainable management of a biosphere reserve should combine biological, social and financial aspects. This is a difficult challenge and implies an understanding of interactions within a complex biological and economic system combined with the successful negotiation of lasting compromises between a wide variety of stakeholders with diverse interests. Although the Seville Strategy, Agenda 21 and the Convention on Biological Diversity highlights priorities for the development of biosphere reserves (including implementation indicators), a huge gap exists regarding management guidelines and appropriate standards. An Environmental Management System framework will be an appropriate tool to bridge this gap.

The purpose of this study is to determine whether it is possible to apply the ISO 14001 principles to the Biosphere Reserve Concept to develop a generic Environmental Management System framework. This framework will combine the goals and objectives of the Seville Strategy, which affirms the nature and purpose of biosphere reserves, with the objectives of the specific biosphere reserve.

The goals and objectives from the Seville Strategy were evaluated against the elements of the ISO 14001 Environmental Management System, with the aid of a Leopold matrix, to determine which goals and objectives and ISO elements are most needed at national and local reserve level. Seven of the eleven objectives from the Seville Strategy are regarded as very important, three as important and one as less important on national and local reserve level. Nine of the seventeen ISO elements are regarded as very important, four as important and four as less important.

The very important and important objectives from the Seville Strategy have been incorporated into the very important and important ISO elements to develop a generic Environmental Management System Framework that can serve as a guideline

document for the compilation of an environmental management system for biosphere reserves.

OPSOMMING

Generiese Geïntegreerde Omgewingsbestuur vir Biosfeerreservate.

Biosfeerreservate kan beskryf word as bewaringsgebiede met internasionale status. Hulle vorm 'n unieke kategorie van bewaringsgebiede wat bewaring en volhoubare benutting van natuurlike hulpbronne asook die bewaring van 'n wye verskeidenheid ekosisteme, geografiese toestande en sosio-kulturele aspekte bevorder. Volhoubare bestuur van 'n biosfeerreservaat behoort biologiese, sosiale en finansiële aspekte in te sluit. Dit is 'n uiters moeilike uitdaging wat vereis dat interaksies binne 'n komplekse biologiese en ekonomiese sisteem gekombineer moet word met 'n suksesvolle onderhandelingsproses waardeur ooreenkomste tussen 'n wye verskeidenheid van rolspelers met uiteenlopende belange bereik moet word. Alhoewel die Seville Strategie, Agenda 21 en die Biodiversiteits Konvensie, prioriteite vir die ontwikkeling van biosfeerreservate (insluitend indikatore vir implementering) beklemtoon, bestaan daar 'n reuse gaping wat betref bestuursriglyne met toepaslike standaarde. 'n Omgewingsbestuurstelsel raamwerk behoort 'n gepaste instrument te wees om hierdie gaping te oorbrug.

Die doel van hierdie studie is om te bepaal of die beginsels van ISO 14001 toegepas kan word op die biosfeerreservaatkonsep om sodoende 'n generiese omgewingsbestuurstelsel te ontwikkel. Die doelwitte en doelstellings van die Seville Strategie, wat gedefinieer kan word as die doel en omvang van biosfeerreservate, kan sodoende gekombineer word met die doelstellings van 'n spesifieke biosfeerreservaat.

Die doelwitte en doelstellings van die Seville Strategie is geëvalueer met behulp van 'n Leopold matriks teenoor die elemente van die ISO 14001 omgewingsbestuurstelsel. Sodoende is die belangrikste doelwitte en doelstellings van die Seville Strategie bepaal, asook die belangrikste elemente van ISO 14001, wat nodig is vir die ontwikkeling van 'n toepaslike generiese omgewingsbestuurstelsel. Sewe van die elf doelstellings van die Seville Strategie word as baie belangrik geag, drie as belangrik en een as minder belangrik op nasionale- en reservaatvlak. Nege van die sewentien

ISO elemente word as baie belangrik geag, vier as belangrik en vier as minder belangrik.

The belangrikste doelstellings van die Seville Strategie is geïnkorporeer in die belangrikste elemente van ISO 14001 om 'n generiese raamwerk vir 'n omgewingsbestuurstelsel te ontwikkel. Hierdie raamwerk kan as 'n riglyn gebruik word vir die opstel van 'n omgewingsbestuurstelsel vir biosfeerreservate.

KEY PHRASES / SLEUTELTERME

- ⇒ Strategy and action plans for biosphere reserve
Strategiese en aksie planne vir biosfeerreservate
- ⇒ Environmental management systems in biosphere reserves
Omgewingsbestuurstelsels vir biosfeer reservate
- ⇒ Management systems in biosphere reserves
Bestuurstelsels vir biosfeerreservate
- ⇒ Environmental management techniques for biosphere reserves
Omgewingsbestuurstegnieke vir biosfeerreservate
- ⇒ Biosphere reserves in the world
Biosfeerreservate in die wêreld
- ⇒ UNESCO MaB programme
UNESCO MaB program
- ⇒ Legal procedures related to biosphere reserves
Wetlike aspekte ter sake vir biosfeerreservate
- ⇒ Auditing of biosphere reserves
Ouditering van biosfeerreservate
- ⇒ Socio-ecological management of biosphere reserves
Sosiale en ekologiese bestuur van biosfeer reservate
- ⇒ Biosphere reserves and sustainable development
Volhoubare ontwikkeling en biosfeerreservate

ABBREVIATIONS

BMC	– Biosphere Management Committee
CBD	– Convention on Biological Diversity
EIA	– Environmental Impact Assessment
EMS	– Environmental Management System
IDP	– Integrated Development Plans
ISO	– International Standards for Operation
MaB	– Man and Biosphere
NEMA	– National Environmental Management Act
SABS	– South African Bureau of Standards
SDI	– Strategic Development Initiatives
SEA	– Strategic Environmental Assessment
SHERCQ	– Safety, Health, Environmental, Regulatory Compliance and Quality
SIA	– Social Impact Assessment
UNESCO	– United Nations Educational, Scientific and Cultural Organisation

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CHAPTER 1

INTRODUCTION, AIMS AND OBJECTIVES OF STUDY

1.1 Introduction

Biosphere reserves are areas of terrestrial and coastal/marine ecosystems or a combination thereof, which are internationally recognised within the framework of UNESCO's programme on Man and the Biosphere (MaB). They are unique categories of protected areas combining both conservation and the sustainable use of natural resources. Biosphere reserves are nominated by national governments and each reserve must meet a minimal set of criteria and adhere to a minimal set of conditions before being admitted to the world network of biosphere reserves. The world network fosters exchange between biosphere reserves and facilitates co-operative activities. Each biosphere reserve is intended to fulfil three complementary functions (UNESCO, 1995:1):

- a conservation function to preserve genetic resources, species, ecosystems and landscapes;
- a development function to foster economic development that is ecologically and culturally sustainable; and
- a logistic support function to provide support for research, monitoring, training and education relating to local, national and global issues of conservation and sustainable development.

Biosphere reserves are organised in a core area, a buffer zone and transition or multiple use area. The core area needs to be legally established in terms of national or provincial legislation to ensure long-term protection for the landscape, ecosystem and species it contains. The limits of the buffer zone around the core must be clearly demarcated. Human activities in this area should not run counter to the conservation objectives of the core area. A transition area or multiple use area extends outwards from the buffer zone. It is here that local communities and other stakeholders must agree to work together to manage and develop the area's resources on a sustainable basis.

The following cases clearly show that biosphere reserves do offer a leading paradigm of stewardship that promotes sustainable land and water use and conservation in a great variety of ecosystems, geographic conditions and socio-cultural settings (Batisse, 1997: 13).

- Kenya's Amboseli Biosphere reserve, located at the foot of the spectacular Mount Kilimanjaro, was created in 1990 around a well-known nature reserve, which had long been a highly popular tourist destination. Elephants and many other large mammals were competing for water with the cattle owned by the Masai tribes. The creation of the Biosphere reserve spurred a new debate over how to appropriately zone the entire area and reconcile conflicts between conservation and development objectives. It resulted in bore holes being drilled in the transition area to provide water for the Masai, who are allowed to share in some of the profits generated by tourism. At the same time, tourism in the core area is better controlled and the wildlife has continuous access to water.

- The Maya Biosphere reserve in Guatemala protects the luxuriant tropical forest of the Peten region from irreversible logging. Established in 1990, it also provides the local Indian people with an arena where they are encouraged to create commercial markets for chicle sap, xate leaves and allspice seeds. Chicle sap is used to make chewing gum, xate leaves are exported for ornamental purposes and all-spice seeds are used as condiments. The combined use of non-timber forest products has now reached an economic "critical mass". Consequently, the forest actually pays for itself on the market.

- The Mont Ventoux Biosphere reserve in southern France, also established in 1990, features a landscape of surprising contrasts and important altitudinal differences. Because climate change could very well modify the contact line between temperate and Mediterranean ecosystems existing on this site, it offers an interesting potential for monitoring. The land is divided into a mix of public and private

properties and has a very long history of human habitation. Some 30 public authorities and representatives from local communities are now working together to ensure sustainable use and conservation of this unique and previously unprotected area and to develop communication and educational activities of value for the entire country.

Biosphere reserves are much more than protected areas. As such, they often need to incorporate a range of management regimes, institutional interests and jurisdictional responsibilities. The concept of a biosphere reserve is not a fixed agenda for a given area, but a basis from which to develop a workable management plan compatible with local customs and conservation interests (UNESCO, 2002: 186). Looking to the future, it seems likely that issues related to the multifunctional management of biosphere reserves will take on an increasing importance.

The Seville Strategy (UNESCO, 1995), reaffirms the nature and purpose of biosphere reserves and describes the criteria they must meet for formal designation. Each biosphere reserve should fulfil the three complementary functions namely, conservation, development and logistic support. Eleven goals were formulated to accomplish the four broad goals of the Seville Strategy (UNESCO, 1995a).

In the overview of the biosphere reserve concept and its implementation as prepared by the UNESCO-MAB Secretariat, results from a survey done among all biosphere reserves around the world proved that some of the main obstacles to implementation were budgetary problems, incompatibilities with government policies and management issues (UNESCO, 2002: 27).

Agenda 21 strives towards the integration of the natural environment and development concerns. More emphasis on this aspect will lead to the fulfilment of basic needs, improved living standards for all, better protected and managed ecosystems and a safe, more prosperous future. (South Africa, 1996: 2).

The aims of the Convention on Biological Diversity are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources (UNESCO, 2002: 156).

The ISO 14000 standards lay tools and systems out for the management of numerous environmental obligations and the conduct of product evaluations, without prescribing what goals an organisation must achieve. The ISO 14000 series aims to provide guidance for developing a comprehensive approach to be applicable to large, medium-size and small organisations in both developed and developing countries. The EMS can be customised to suit any organisation's needs (Cascio, 1996).

According to Batisse (1997: 13) proper management of a biosphere reserve is a difficult challenge that lies somewhere between science and art. It implies an understanding of interactions within a complex biological and economic system combined with the successful negotiation of lasting compromises between a wide variety of stakeholders with diverse interests. If this kind of management were simple, the road towards sustainable development would already be paved in many rural areas.

Although the Seville Strategy, Agenda 21 and the Convention on Biological Diversity highlights priorities for the development of Biosphere reserves (including implementation indicators), a huge gap exists regarding management guidelines and appropriate standards. This gap has definitely not yet been bridged in South Africa and no evidence could be found from any such system used in the management of biosphere reserves anywhere in the world.

One of the most crucial aspects of Biosphere reserves is that different land use options are incorporated into one initiative with common goals and objectives. The goals and objectives, although similar on macro level, differ for each zone and group of role players on micro level scale.

The co-ordination of the different role players to produce a strategy and action plan for all levels of the biosphere reserve is a challenge that still needs to be met. A biosphere reserve should be based on sound environmental policy and objectives, which include the crop and cattle farmers, industries and local communities that should be included in the concept.

The management of such a diverse area and different role players can be problematic and it is important to use internationally tried and tested procedures to ensure maximum benefit. All participants in the biosphere reserve should benefit from the concept, e.g. the crop farmers and industry markets can be extended if certified that their farming practices and production processes are environmentally sustainable.

Although a range of management systems and procedures are being used worldwide to manage biosphere reserves, they all originate from historically protected area management and are more preservation orientated than conservation through sustainable use orientated (Bothma, 2002: 650). The goals and objectives of the Seville Strategy are also loosely incorporated into the management plans.

The customisation and implementation of a range of environmental management techniques in a systematic manner such as the ISO 14001 Environmental Management System, can contribute to optimal outcomes for all interested and affected parties in and around a biosphere reserve.

The reason why a standardised Environmental Management System (EMS) is necessary according to Cascio (1996: 65-79) and Stapleton (1996: 3-4) can be summarised as follow:

- The international demand for environmental acceptability of products. Awareness has been increased world-wide during the last decade about the fact that the environmental cost of a product should be included into its price and the consumer should be made aware of all positive as well as negative aspects relating to the manufacturing or production of

the product. Some consumers refuse to purchase a product if there is not some kind of environmental certification attached to it. An EMS can assist with this certification process.

- To show awareness of the impact of activities on the environment.
The environmental certification process will certainly assist to raise awareness among the people in and around the biosphere reserve regarding environmentally acceptable production and manufacturing methods. All the activities of the biosphere reserve should be screened to determine which ones impact negatively on the environment in order to prevent or mitigate those impacts.
- To form the basis for environmental auditing.
The environmental certification of products will only be acceptable if an internationally recognised auditing process supports it. Continual improvement in environmental management within the borders of the biosphere reserve can only be achieved if regular external audits are done.
- To evaluate environmental performance.
Environmental performance can only improve if it is measured regularly against a predetermined set of environmental indicators. A set of recommended implementation indicators is also available to determine the implementation success of the goals and objectives of the Seville Strategy. Auditing will not only assist with this but will also ensure that environmental performance improves.
- To address emerging environmental issues.
A system is needed to identify and address emerging environmental issues on a continual basis. An EMS will ensure that this happens.
- To provide a framework for a logical management system.
Without a proper framework to manage such a diverse and vast area and its various sectors in a biosphere reserve, there is little hope that

the biosphere reserve management committee can achieve its objectives.

1.2. Aim and Objectives

The aim of this study is to demonstrate the need for an EMS in Biosphere Reserves, to establish the appropriateness of ISO 14001 in such a context and to illustrate its potential in sustainable management of such reserves.

The objectives of the study will be to find answers to the following important questions:

- **What types of Environmental Management Systems have been implemented in Biosphere reserves in other countries?**

Method: A literature study will be conducted.

- **Which goals and objectives from the Seville Strategy are the most important at national and local biosphere reserve level that need to be incorporated into the proposed Environmental Management System?**

Method: Evaluate all the goals and objectives from the Seville Strategy to determine which objectives are most needed at national and local reserve level. A matrix will be used to determine the most important objectives.

- **Which elements from the ISO 14001 system are most needed to ensure a smooth implementation of a practical Environmental Management System?**

Method: Evaluate all the elements of ISO 14001 Environmental Management System to determine which elements are most needed. A matrix will be used to determine the most important elements.

- **How will a generic integrated Environmental Management System framework be developed?**

Method: The prioritised objectives from the Seville Strategy will be incorporated into the prioritised elements from the ISO 14001 system to develop a generic Environmental Management System framework for biosphere reserves.

CHAPTER 2

HISTORY AND DEVELOPMENT OF BIOSPHERE RESERVES AND THE LEGISLATIVE FRAMEWORK IN SOUTH AFRICA

2.1 History of Biosphere reserves

One hundred and twenty-five years ago, the United States Congress established Yellowstone as the first national park in the United States. This example was eventually followed all over the world and today the United Nation's list of national parks and protected areas contains as many as 10 000 sites larger than 1 000 hectares (Batisse, 1997: 6). A noble idea that should command our deepest respect.

Conventional protected areas are (at least in theory) supposed to be kept free from human impacts. Therefore they have been established mainly in areas of low population density or in very specific sites such as mountainous or arid regions. As a result they do not adequately cover other regions that host a large portion of the world's biological diversity. The strict regulatory or legislative procedures governing conventional protected areas also do not typically allow for much managerial flexibility, setting up rigid structures that do not adjust easily to economic, social or ecological changes.

Where the local population has not been included in the decision-making process of establishing a protected area, that community can easily become hostile. Situations like these have arisen when governmental authorities failed to consider the impact of protected areas on the traditional activities of indigenous people and their livestock and did not offer them appropriate benefits or compensation. Experience in Africa and the former Soviet Union shows that when protected areas are imposed upon local populations in this way they collapse easily as a result of human encroachment, poaching or deforestation (Bequette, 1998: 38). There are numerous examples of such situations in South Africa like the Kruger National Park and Dukuduku Forest Reserve near St Lucia.

Out of the pioneering gathering of the United Nations' Educational, Scientific and Cultural Organisation's (UNESCO) first intergovernmental conference on the rational use and conservation of the resources of the biosphere in 1968, the Man and Biosphere Programme (MaB) was born (Batisse, 1997: 9 & UNESCO, 2002: 18-20). MaB was meant to be an interdisciplinary and problem orientated effort that would address, among others, three major objectives in particular. The first was to reinforce the extent and relevance of the conservation of biological diversity, including genetic resources, through a world system of protected areas. The second objective was to ensure the harmonious co-existence of rural populations and the ecosystems from which they derive their subsistence and income. The third was to provide a basis and applied researchers with a number of permanent field sites that could be used as a network of information exchange. Perhaps the single most original feature of this conference was to have firmly declared that the utilisation and conservation of our land and water resources should go hand in hand rather than in opposition, and that interdisciplinary approaches should be promoted to achieve this aim. The Biosphere Conference was therefore the first intergovernmental forum to discuss and promote what is now called "sustainable development" (UNESCO, 2002: 18).

Many of the first biosphere reserves were based on existing protected areas. They offered more or less important research facilities but they did not have the appropriate zoning pattern nor did they take the concerns of local people into account in any way.

As the number of reserves continued to grow, a new global context to the movement was emerging. The time was ripe to affirm the credibility of existing biosphere reserves, to formulate plans to develop their multifunctional role and to link them more closely together through an operational world network for research, monitoring, information exchange and training. These were the objectives of a second world conference on biosphere reserves held in Seville, Spain, in March 1995.

2.2 International Development and Framework for Biosphere reserves

2.2.1 The Seville Strategy

One major outcome was the unanimous adoption of a common platform for action, known as the Seville Strategy for Biosphere reserves, 1995 (Batisse, 1997: 10 & UNESCO, 2002: 24-27). The Seville Strategy reaffirms the nature and purpose of biosphere reserves. Every biosphere reserve should fulfil the following three complementary functions:

- the conservation function, which aims to preserve landscapes, ecosystems, species and genetic variations;
- the development function, which concentrates on fostering social, cultural and ecologically sustainable economic and human development to benefit local peoples; and
- the logistic support function, which facilitates research, monitoring, demonstration projects, education and training related to local, regional and global issues of conservation and sustainable development.

On the ground, each biosphere reserve should include three distinct territorial components, which may combine public land with private land. The first is a legally constituted core area or areas devoted to long-term protection. In the second component territory, a clearly identified buffer zone or zones, surrounding or contiguous to the core areas, only activities compatible with the conservation objectives should take place. The third territory, a flexible outer transition area, constitutes the region where sustainable resource management practises are promoted and developed and local communities cooperate with other concerned actors in managing the biosphere reserve, possibly deriving some benefits from it.

Establishing a biosphere reserve that implements these three functions, adhering to the zoning pattern, and properly managed, also entails

creating legal or institutional mechanisms to establish co-operative agreements between the various stakeholders. Because every site is specific and local conditions around the world are extremely diverse, the Seville Strategy can offer only general recommendations about this process. The Seville Strategy does not repeat the general principles of the Convention on Biological Diversity nor Agenda 21, but instead identifies the specific role of biosphere reserves in developing a new vision of the relationship between conservation and development.

Nonetheless, it enumerates no less than 90 tasks that should be performed at either the global, national, or individual site level and outlines a set of performance indicators that should allow progress toward the following four goals (UNESCO, 1996: 1-9):

- to conserve natural and cultural diversity;
- to use biosphere reserves as models of land management and approaches to sustainable development;
- to use biosphere reserves for research, monitoring, education and training; and
- to fully implement the concept of biosphere reserves throughout the world.

In addition to the Seville Strategy, a vision was also formulated for biosphere reserves in the 21st century. This can be summarised in the following statement: “Rather than forming islands in a world increasingly affected by severe human impacts, biosphere reserves can become theatres for reconciling people and nature, they can bring knowledge of the past to the needs of the future, they can demonstrate how to overcome the sectoral nature of our institutions. In this way, biosphere reserves will not only be a means for people who live and work within and around them to attain a balanced relationship with the natural world, but they will also contribute to the needs of society as a whole by showing a way to a more sustainable future.” (Batisse, 1997:13).

This vision for the 21st century addresses both the management of individual biosphere reserves and the scale of their influence. It upholds the basic principle of biosphere reserve management by obtaining the consent and active support of all stakeholders, particularly local people living in and around the biosphere reserve. It encompasses the indigenous peoples who have always lived on, and derived their living from the site, long settled farmers, recent immigrants in search of new land, large landowners and wealthy residents living in second homes, as well as a variety of urban communities. The cultural, social and economic issues that concern each of these groups will differ in complexity or acuteness. Ten key directions were identified to form the foundations of the Seville Strategy (UNESCO, 2002: 26). Direction number 8 has specific relevance to this study and states explicitly that management should be open, evolving and adaptive.

2.2.2 Agenda 21

Agenda 21, a global plan for sustainable development, (South Africa, 1996: 1-22) was not developed with specific reference to biosphere reserves but to integrate environmental and development concerns to ensure the fulfilment of basic needs, improved living standards for all and a safer, more prosperous future. This can only be achieved in a global partnership for sustainable development.

The following areas of concern are very relevant to the management of biosphere reserves and the forum that is created for the management of the biosphere reserve:

- International co-operation
Biosphere reserves are internationally recognised and international support is available for the development and management of the biosphere reserves.

- **Combating poverty**
This is one of the major goals for the development of biosphere reserves.

- **Changing consumption patterns**
The unsustainable patterns of production and consumption must be broken and the biosphere management forum is an ideal place to start.

- **Demographic dynamics and sustainability**
The formulation and implementation of integrated policies for environment and development programmes at local level can be obtained by incorporating the planning of the biosphere reserve in national, provincial and local planning initiatives for example the Integrated Development Plans at municipality level.

- **Integrating environment and development in decision making**
Decision-makers from provincial and local governments should form part of the management committee for the biosphere reserves.

- **Planning and management of land resources**
Provincial and Local Government should take into account environmental, social, and economic issues for the development of laws, regulations and economic incentives to encourage sustainable use and management of land resources. The biosphere reserve committee is the ideal working forum for these initiatives.

- **Fragile ecosystems: combating desertification and drought and promoting sustainable mountain development**
The biosphere reserve is the ideal place to strengthen the knowledge base and develop information and monitoring

systems, to develop and strengthen integrated development programmes for the eradication of poverty and to combat land degradation through intensified soil conservation and reforestation activities, water conservation, agro-forestry and small scale irrigation.

The provincial and local government should also strengthen the knowledge about ecology and sustainable development in mountain ecosystems, promote integrated catchment management by offering incentives to conserve resources and produce information on alternative livelihoods.

- **Promoting sustainable agriculture and rural development**
The transition zone is the area where this programme will thrive in the biosphere reserve. Proper farming techniques together with the latest trends in organic farming and specific plans to minimise the use of poisons will result in an acceptable product to be marketed under the flag of the biosphere reserve.
- **Conservation of biological diversity**
This should be promoted by preventing habitat destruction, over harvesting, pollution and the inappropriate introduction of exotic species. Research should also be promoted on the state of biodiversity and the development of strategies to conserve and sustain biological diversity.
- **Protection of quality and supply of fresh water**
The biosphere reserve should have a prominent seat on the Catchment Management Agency for the area.
- **Promoting education, public awareness and training**
The biosphere reserve should focus education towards sustainable development. Programmes should be developed for

schools and the indigenous people's experience and knowledge should also be used.

2.2.3 Convention on Biological Diversity (CBD)

The Convention on Biological Diversity entered in force in December 1993. The treaty is a landmark in terms of reconciling environment and development as it couples environmental objectives with the need for development in developing countries. The Convention is the first global comprehensive agreement to address all aspects of biological diversity (genetic resources, species and ecosystems). It recognises – for the first time – that the conservation of biological diversity is a common concern of humankind and an integral part of the development process (UNESCO, 2002; 156). Although biosphere reserves are not specifically addressed in the CBD, the objectives fit in perfectly with the goals of the Seville Strategy.

The three objectives of the Convention are:

- the conservation of biodiversity;
- the sustainable use of biological resources; and
- the fair and equitable sharing of benefits arising from the use of genetic resources.

As a party to this treaty, South Africa is obliged to ensure that the agreement is implemented in accordance with these objectives. The state is also required to develop national strategies, plans or programmes, or adapt existing ones, to address the provisions of the convention, and to integrate the conservation and sustainable use of biodiversity into sectoral and cross sectoral plans, programmes and policies. South Africa's response to this requirement is contained within the White Paper on the Conservation of Biological resources (South Africa, 1997) and the proposed National Biodiversity Act.

The ecosystem approach has been adopted by the Conference of Parties in May 2000 as a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. The ecosystem approach is intended to address both environmental and economic concerns, to increase the opportunity for state, tribal and local cooperation and to enhance involvement by other stakeholders and the public in decisions (IUCN, 1995: 6). This approach is seen as an integrated approach for other conservation approaches such as biosphere reserves, protected areas and species conservation programmes. The following principles that have been proposed are important to include in the management system for biosphere reserves (UNESCO, 2000: 4 & UNESCO, 2002: 156):

- The objectives of management of land, water and living resources are a matter of societal choice.
- Management should be decentralised to the lowest appropriate level.
- Ecosystem managers should consider the effects of their activities on adjacent and other ecosystems.
- Recognising potential gains from management, there is a need to understand the ecosystem in an economic context.
- The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.
- The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

2.3 The South African Context

Although the biosphere reserve concept is not a new concept, it was only introduced in South Africa in 1995 due to the country's isolation until 1994. Since 1995, the Kogelberg and West Coast Biosphere Reserves have been established in the Western Cape and the Waterberg and Kruger to Canyons

Biosphere Reserves in the Limpopo Province. Six other biosphere reserve initiatives are currently being developed (UNESCO, 2002: 109).

There are several acts in SA regulating the protection and controlled utilisation of the environment. The legislative framework in South Africa does not cater currently for the legal protection of biosphere reserves, but some principles from the Seville Strategy, Agenda 21, the Convention on Biological Diversity, the Constitution, and the White Paper on Environmental Management are contained in the following acts and can be used for the legal protection of an area. Since 1992, environmental issues started dominating both international and national debates with a specific focus on sustainable development. The following acts and policies are specifically applicable to the conservation of protected areas in South Africa:

2.3.1 The Constitution of South Africa (South Africa, 1994) and the White Paper on the Conservation of Biological Resources (South Africa, 1997).

According to Section 24 of the Bill of Rights of South Africa's Constitution, everyone has the right:

to an environment that is not harmful to their health or well-being; and

to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that:

- prevent pollution and ecological degradation;
- promote conservation; and
- **secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.**

The South African Government has three overriding priorities:

- eradication of poverty;
- sustainable development of its economy; and

- social development of its people.

These priorities provide the context within which consideration will be given to achieve the three objectives of the Convention on Biological Diversity. The following six goals were adopted to achieve these priorities and objectives:

- Conserve the diversity of landscapes, ecosystems, habitats, communities, populations, species and genes in SA.
- Use biological resources, which are sustainable and minimise adverse impacts on biological diversity.
- Ensure that benefits, derived from the use and development of South Africa's genetic resources, serve national interests.
- Expand the human capacity to conserve biodiversity, to manage its use, and to address factors threatening it.
- Create conditions and incentives that support the conservation and sustainable use of biodiversity.
- Promote the conservation and sustainable use of biodiversity at international level.

2.3.2 Environmental Conservation Act, Act 73 of 1989 (South Africa, 1989: 1491 - 1507)

This act contained various mechanisms or systems that were designed to ensure good environmental management. Due to a lack of regulations, the Department of Environmental Affairs and Tourism never had any "teeth" to manage the environment. NEMA has repealed most sections of this act because they were unconstitutional.

Sections 16 – 18 which provide for the protection of the natural environment are however still applicable. Section 16 empowers the former Administrator or now Premier, to declare an area as a Protected Natural Environment while section 18 allows the Minister to declare an area as a Special Nature Reserve. The aim of these sections is to protect important areas other than the National Parks.

Section 27 authorises the Minister to make regulations regarding limited development areas. This imposes restrictions on the nature and extent of development or activities in connection with development in such areas.

2.3.3 National Environmental Management Act (NEMA) (South Africa, 1998)

NEMA tries to establish an integrated environmental management framework in the country. The overarching objective of NEMA is to provide for co-operative governance by establishing principles for decision-making, institutions to promote this and procedures for co-ordinating environmental functions.

One of the most important principles contained in this act is that development must be socially, environmentally and economically sustainable. Sustainable development requires, amongst others, that landscapes and cultural heritage be protected.

2.3.4 Mountain Catchment Act, Act 63 of 1970 (South Africa, 1970)

This act provides for the conservation, use, management and control of land situated in mountain catchment areas.

2.3.5 National Forests Act, Act 84 of 1998 (South Africa, 1998b)

According to this act the Minister may declare an area as a specially protected area in one of the following categories:

- a forest nature reserve;
- a forest wilderness area; or
- any other type of protected area which is recognised in international law or practise.

Biosphere reserves can be classified under the last category.

2.3.6 Proposed Bill for the Limpopo Province (South Africa, 2002b)

The proposed Environmental Bill for the Limpopo Province provides for the recognition and registration of biosphere reserves. According to this section, the Member of the Executive Council responsible for Environmental Affairs in the Limpopo Province, can register a biosphere reserve in the Provincial Gazette if it complies with the international recognised objectives for biosphere reserves. The Member may also determine other provisions applicable to such an area.

This is a significant development regarding the legalisation of biosphere reserves and applicable provisions to assist in the management of these areas. An appropriate environmental management system framework can be incorporated in these provisions.

2.3.7 The proposed National Biodiversity Bill (South Africa, 2002)

The objective of this proposed act is to provide for:

- the conservation of biological diversity;
- the sustainable use of biological resources: and
- the regulation and access to biological resources and to knowledge, practises and innovations associated with such resources, and to ensure the fair and equitable sharing of environmental, economic and social benefits arising from their use.

Although still in the drafting stage, this act will provide for the declaration of a biosphere reserve and the management thereof. Various measures aimed at the conservation of ecosystems, landscapes

and habitats that are identified as being of national conservation priority are also included.

2.3.8 Protected Area Management in South Africa

Conservation of biological diversity has emerged as a priority shared by both conservationists and development organisations. Unfortunately, conservation sites or protected areas were originally established with little or no regard to the local people and have increasingly become islands, as lands around them have been converted to alternative and often incompatible land uses. In the light of increasing human pressure on these conservation areas, enforcement alone will not be able to preserve these areas. Conservation today requires a perspective that stretches well beyond park boundaries and involves national policies and programmes directed towards the local communities.

The new trend since 1994 in South Africa regarding protected area management can be summarised with goal number 2 from the Environmental Management Policy White Paper (1999: 51):

“To promote fair access to, and sustainable use of, natural and cultural resources, and environmentally sustainable life-styles. To integrate environmental impact management with all economic and development activities to achieve sustainable development. To satisfy basic needs and ensure environmental sustainability.”

One of the supporting objectives for this goal is to improve environmental performance by encouraging industry and other stakeholders to become more involved in agreements and partnerships that will improve the environment. Industry and other stakeholders also need to develop and adopt best practise standards that exceed minimum requirements.

2.4 Critical Review

After browsing through 357 articles on biosphere reserves, substantial reference to management of these reserves could only be found in the quoted articles and books. It became clear that the management of biosphere reserves is an extremely complicated issue because of the vast differences in the three spheres of the biosphere reserve and the involvement of so many land use options and affected people.

Although there are several frameworks available to address certain issues like sustainability or biological diversity, a system has not been developed or been used to ensure integration of all these factors in one system according to international acceptable standards.

Deputy Minister Peter Mokaba mentioned in his foreword to the Environmental Management Policy White Paper (1999) that this document marks a dramatic shift in policy. It shifts away from narrow conservation, or mere protection of the environment towards the sustainable development of the environment. We should move forward now into an era of sustainable development, nationally and internationally.

The table has been laid with regards to environmental policy and legislation in South Africa and we need to grasp the opportunity to ensure that a system for the environmental management of biosphere reserves is developed to satisfy the goals and objectives of the Seville Strategy, national and international policy as well as local policy and legislative requirements.

CHAPTER 3

PRIORITISING THE KEY OBJECTIVES FROM THE SEVILLE STRATEGY AND ISO 14001 ELEMENTS FOR INCLUSION IN THE EMS FRAMEWORK.

3.1 Introduction

The real challenge in the management of biosphere reserves as a concept without legal protection at this stage in SA is to combine all the relevant policies, strategies and legislation applicable to certain parts of the biosphere to an internationally accepted management system, and to ensure that the goals and objectives of the Seville Strategy are also met.

3.2 The Goals and Objectives of the Seville Strategy (UNESCO, 1995a: 1-9)

Besides the three main complementary functions of a biosphere reserve namely conservation, development and logistic support as described in 2.2.1, the Seville Strategy aims to reconcile conservation with development. It upholds the basic principle of biosphere reserve management by obtaining the consent and active support of all stakeholders, particularly local people living in and around the biosphere reserve.

Sound management of biosphere reserves depends on sharing a common vision and arriving at some kind of contractual agreement with all stakeholders to achieve the goals and objectives set by the Seville strategy and the individual biosphere reserve itself.

The recommendations to achieve the objectives of the four goals of the Seville Strategy are divided into three levels, namely international level, national level and individual reserve level. The recommendations at international level do not form part of this study. Some of the recommendations at national level are also applicable at provincial and local government level in South Africa and have been extracted as such. The following recommendations have been selected for each relevant objective because they are relevant to incorporate into an EMS to develop an internationally accepted management system.

3.2.1 Goal 1: Use biosphere reserves to conserve natural and cultural diversity

3.2.1.1 Objective 1.1: Improve cover of natural and cultural biodiversity

Although there are no recommendations at individual reserve level, it is recommended at national level that biosphere reserves should be strengthened or extended to attend to fragmented habitats, threatened ecosystems and fragile and vulnerable natural and cultural environments.

3.2.1.2 Objective 1.2: Integrate biosphere reserves into conservation planning

Although there are no recommendations at individual reserve level, the following are recommended at national level:

- Biosphere reserves should be integrated with national biodiversity strategies and action plans.
- Link biosphere reserves with each other and with other protected areas through green corridors.
- Use biosphere reserves for *in situ* conservation of genetic resources.

3.2.2 Goal 2: Use Biosphere Reserves as models of land management and approaches to sustainable development

3.2.2.1 Objective 2.1: Secure support and involvement of local people.

The following are recommended at individual reserve level:

- Survey the interests of the various stakeholders and fully involve them in planning and decision-making.
- Identify and address factors that lead to environmental degradation and unsustainable use of biological resources. The farming communities in some of Cuba's biosphere reserves assisted with the rehabilitation of swamps (Bequette, 1998:43)
- Evaluate the natural products and services of the biosphere reserve to promote environmentally sound and economically

sustainable income opportunities for local people. In Cuba communities earn money by selling woodcarvings and paintings of orchids as well as seedlings of ferns, medicinal plants and orchids from nurseries. (Bequette, 1998:43)

- Develop incentives for the conservation and sustainable use of natural resources by local populations. Develop alternative means of livelihood for local populations when existing activities are limited or prohibited within the biosphere reserve. In Senegal and Guinea micro projects like the raising of guinea fowl, fish farming, bee keeping and nurseries have been developed in villages on the edge of biosphere reserves. (Bequette, 1998a: 38). In Guatemala, instead of harvesting the forest, a market for non-timber forest products has been created like chicle sap from chicle trees that is used for chewing gum. (Batisse, 1997:14) In Cuba, wild pigs are hunted on a sustainable basis for meat; and tomato hot houses have been developed to improve production. (Bequette, 1998b: 39)
- Ensure that the benefits derived from the use of natural resources are shared by all stakeholders, by such means as sharing the entrance fees, sale of natural products or handicrafts, use of local construction techniques and labour and development of sustainable activities like agriculture, forestry, etc. In Kenya boreholes have been drilled in the transition area to provide water for the cattle of the local Masai communities. (Batisse, 1997:14)

3.2.2.2 Objective 2.2: Ensure better harmonisation and interaction between biosphere reserve zones.

The following are recommended at national and individual reserve level:

- Develop and establish institutional mechanisms to manage, coordinate and integrate the biosphere reserve programmes and activities.

- Develop means of identifying incompatibilities between the conservation and sustainable use functions of biosphere reserves and take measures to ensure that an appropriate balance between the functions is maintained.
- Establish a local consultative framework in which the reserve's economic and social stakeholders are represented, including the full range of interests (e.g. agriculture, mining, hunting, tourism, research).

3.2.2.3 Objective 2.3: Integrate biosphere reserves into regional planning.

The following are recommended at national and individual reserve level:

- Biosphere reserves should be included in regional development policies and regional land-use planning projects. Strategic Development Initiatives (SDI's), as well as the Integrated Development Plans (IDP's) by regional and local municipalities, are prime examples of regional and local land use plans.
- Encourage the major land-use sectors near the biosphere reserve to adopt practises favouring sustainable land use. In France, government and the private sector are working together to ensure sustainable use and conservation on the mix of state and private land. (Batisse, 1997:15)
- Biosphere reserves should organise forums and set up demonstration sites for the examination of socio-economic and environmental problems of the region and for the sustainable utilisation of biological and cultural resources.

3.2.3 Goal 3: Use biosphere reserves for research, monitoring, education and training

3.2.3.1 Objective 3.1: Improve knowledge of the interaction between humans and biosphere.

The following are recommended at national and individual reserve level:

- Integrate biosphere reserves with national and regional scientific research programmes and link them to national and regional policies on conservation and sustainable development.
- Use biosphere reserves for basic and applied research, particularly projects with a focus on local issues, interdisciplinary projects incorporating both the natural and the social sciences, and projects involving the rehabilitation of degraded ecosystems, the conservation of soil and water and the sustainable use of natural resources.
- Develop a functional system of data management for rational use of research and monitoring results in the management of the biosphere reserve.

3.2.3.2 Objective 3.2: Improve monitoring activities.

The following are recommended at individual reserve level:

- Use the biosphere reserve to compile inventories of flora and fauna, to collect ecological and socio-economic data, to make meteorological and hydrological observations and to study the effects of pollution as basis for sound site management.
- Use the biosphere reserve as an experimental area for the development and testing of methods and approaches for the evaluation and monitoring of biodiversity, sustainability and quality of life of its inhabitants.
- Use the reserve for developing indicators of sustainability in ecological, economic, social and institutional terms for the different productive activities carried out within the buffer zone and transitional area.
- Develop a functional system of data management for rational use of research and monitoring results in the management of the biosphere reserve.

3.2.3.3 Objective 3.3: Improve education, public awareness and involvement.

The following are recommended at national and individual reserve level:

- Include information on conservation and sustainable use, as practised in biosphere reserves, in school programmes, teaching manuals and media efforts.
- Encourage involvement of local communities, school children and other stakeholders in education and training programmes and in research and monitoring activities within biosphere reserves. In France, communication and educational activities are developed by biosphere reserves for the entire country. (Batisse, 1997:14)
- Produce visitor information about the biosphere reserve, its importance for conservation and sustainable use of natural and cultural resources. In Cuba people with access to biosphere reserves appreciate their value and respect their biodiversity (Bequette, 1998:44)
- Promote the development of ecology field educational centres within the biosphere reserve as facilities for contributing to the education of school children and other groups.

3.2.3.4 Objective 3.4: Improve training for specialists and managers.

The following are recommended at individual reserve level:

- Use the reserve for on-site training and for national, regional and local seminars.
- Encourage appropriate training and employment of local people and stakeholders to allow their full participation in inventory, monitoring and research programmes. In Mexico training programmes and information exchange have been implemented to accommodate traditional dry land farming and ranching. (Batisse, 1997:9)
- Encourage training programmes for local communities, decision-makers, local leaders, managers and agents working in production, technology transfer and community development programmes to encourage their full participation in the

planning, management and monitoring processes. In Cuba the management of the biosphere reserves is inseparable from the country's overall economic situation. Managers manage as best they can despite severe financial restrictions. (Bequette, 1998:43).

3.2.4 Goal 4: Implement the biosphere reserve concept.

3.2.4.1 Objective 4.1: Integrate the functions of biosphere reserves.

The following are recommended at national and individual reserve level:

- Encourage private-sector initiatives to establish and maintain environmentally and socially sustainable activities in appropriate zones of biosphere reserves and in surrounding areas in order to stimulate community development.
- Identify and map the different zones of the biosphere reserve and define their respective status.
- Prepare, implement and monitor an overall management plan or policy that includes all the zones of the biosphere reserve.
- Define and establish institutional mechanisms to manage, coordinate and integrate the reserve's programmes and activities.
- Ensure that the local community participates in planning and management.

3.2.4.2 Objective 4.2: Strengthen the World Biosphere Reserve network.

The following are recommended at individual reserve level:

- Give more visibility to the biosphere reserve by disseminating information materials, developing communication policies and highlighting their roles as members of the network.
- Mobilise private funds for the benefit of the biosphere reserve.
- Monitor, assess and follow up on the implementation of the Seville Strategy.

It is clear that there are many of the above-mentioned recommendations that overlap. These will be eliminated when the objectives of the Seville Strategy are incorporated into the generic EMS framework.

3.3 Aims of the ISO 14000 Series of Standards

The aims of the ISO 14000 series of standards according to SABS, 1996 is:

- to provide the ability to balance and integrate economic and environmental interests with business realities;
- to increase the effectiveness of environmental programmes and improve its performances;
- to ensure that all operational processes are effective; and
- to achieve the stated environmental objectives of the organisation.

3.4 Purpose of the ISO 14001 Standard

According to Annex A of the ISO 14001 Standard, this system should enable an organisation to:

- establish an environmental policy;
- identify the environmental aspects and determine the environmental impacts of significance;
- identify the relative legislative and regulatory requirements;
- identify priorities and set appropriate environmental objectives and targets;
- establish a structure and programmes to implement the policy and achieve objectives and targets;
- facilitate planning, control, monitoring, corrective action, auditing and to review all activities to ensure both that the policy is complied with and that the environmental management system remains appropriate; and
- be capable of adapting to changing circumstances.

3.5 Requirements of an Environmental Management System

The 14001 International Standard specifies requirements for an environmental management system to enable the organisation to formulate a policy and objectives, taking into account legislative requirements and information about significant environmental impacts (ISO 14001). It is important to note here that significant environmental impacts can be either positive or negative. The positive environmental impacts of the Biosphere reserve outweigh the negative impacts by far. This applies to the environmental impacts that the Biosphere Management Committee can control and over which it can be expected to have an influence. Specific environmental performance criteria is however, not stated.

The Biosphere Management Committee can be regarded as the Top Management Structure of the Biosphere reserve. The International Standard is applicable to any organisation (the Biosphere reserve in this case) that wishes to:

- implement, maintain and improve an environmental management system;
- assure itself of its conformance with its stated environmental policy;
- demonstrate such conformance to others;
- seek certification/ registration of its environmental management system by an external organisation; and
- make a self-determination and self-declaration of conformance with this International Standard.

The definition of **environment** according to the International Standard is crucial in this case and reads as follows:

“Surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans, and their interaction. NOTE – Surroundings in this context extend from within an organisation to the global system.”

3.6 The structure of the ISO 14001 International Standard (SABS, 1996: 1-10)

3.6.1 Environmental Policy

The environmental policy is the driver to implement and improve the organisation's environmental management system so that it can maintain and potentially improve its environmental performance to form the basis upon which the organisation sets its objectives and targets. The policy should be easily understood by internal and external interested parties and should be periodically reviewed to reflect changing conditions and information.

- a) Top management shall define the organisation's environmental policy and ensure that it is appropriate to the nature, scale and environmental impacts of its activities, products or services.
- b) The environmental policy shall include a commitment to continual improvement and prevention of pollution.
- c) The environmental policy shall include a commitment to comply with relevant environmental legislation and regulations and other requirements to which the organisation subscribes.
- d) The environmental policy shall provide the framework for setting and reviewing environmental objectives and targets.
- e) The environmental policy shall be documented, implemented, maintained and communicated to all employees.
- f) The environmental policy must be available to the public.

3.6.2 Planning

3.6.2.1 Environmental aspects

The organisation shall establish and maintain procedures to identify the environmental aspects of its activities, products or services, that it can control and over which it can be expected to have an influence. The organisation shall determine those that have or can

have significant positive or negative impacts on the environment and ensure that they are considered when environmental objectives are set.

An organisation with no existing EMS should initially establish its current position by means of an environmental review.

3.6.2.2 Legal and other requirements

The organisation shall establish and maintain a procedure to identify and have access to legal and other requirements that are applicable to the environmental aspects, its activities, products or services.

3.6.2.3 Objectives and targets

The organisation shall establish and maintain documented environmental objectives and targets at each relevant function and level that are consistent with the environmental policy.

When objectives are established and reviewed, the organisation shall consider the legal and other requirements, the significant environmental aspects, technological options as well as its financial, operational and business requirements and the views of interested and affected parties.

3.6.2.4 Environmental Management Programme

The organisation shall establish and maintain a programme for achieving its objectives and targets. It should include the designation of responsibility for achieving objectives and targets at each relevant function. The means and time frame by which they are to be achieved must also be specified.

3.6.3 Implementation and operation

3.6.3.1 Structure and responsibility

Roles, responsibility and authority shall be defined, documented and communicated in order to facilitate effective environmental management.

Management shall provide resources essential to the implementation and control of the environmental management system. Resources include human resources, financial resources as well as technology.

Top management shall appoint management representatives with defined roles, responsibilities and authority to ensure that the EMS requirements are established, implemented and maintained.

A management representative shall report annually on the performance of the EMS to top management for review and a basis for improvement of the EMS.

3.6.3.2 Training, awareness and competence

The organisation shall identify training needs. It shall require that all personnel whose work may create a significant impact on the environment have received appropriate training.

Procedures for awareness training should be established and maintained for employees or members at each relevant function. This training should include the following:

- The importance of conformance with the environmental policy and the requirements of the EMS.
- The identification of significant environmental impacts and the benefits of improved environmental performance.

- Their roles and responsibilities in achieving conformance with the environmental policy and the requirements of the EMS, including emergency preparedness and response requirements.
- The potential consequences if the specified operating procedures are not adhered to.

3.6.3.3 Communication

Procedures for internal communication between all members of the organisation shall be established.

Procedures should also be established to receive, document and respond to relevant communications from external interested and affected parties. The external communication processes for significant environmental aspects shall also be established.

3.6.3.4 EMS documentation

Information, in paper or electronic format, shall be available to describe the core elements of the EMS and its interaction processes and to provide direction to related documentation.

3.6.3.5 Document control

The organisation shall establish and maintain procedures for controlling all documents to ensure that:

- they can be easily located;
- they are periodically reviewed and revised as required;
- current versions of documents are available at locations where operations are performed;
- obsolete documents are removed from points of use; and
- any obsolete documents retained for legal knowledge preservation purposes are suitably identified and stored.

A document numbering system shall be established to ensure that documents can be traced and referred to correctly.

3.6.3.6 Operational control

The organisation shall identify those operations and activities associated with identified significant environmental aspects according to the environmental policy, objectives and targets. The operation and maintenance of those activities should be planned in such a manner that they are carried out under specified conditions by:

- Establishing and maintaining documented procedures to cover situations where their absence could lead to deviations from the environmental policy, objectives and targets.
- Stipulating operating criteria in the procedures.
- Establishing and maintaining procedures to identify significant environmental aspects of goods, actions and services used by members the Biosphere reserve and communicating relevant procedures and requirements to suppliers and contractors.

3.6.3.7 Emergency preparedness and response

Procedures shall be established by the organisation to identify the potential for accidents and emergency situations and to respond thereto in order to prevent and/or mitigate the environmental impacts associated with them.

The emergency preparedness and response procedures of the organisation shall be periodically reviewed and revised, especially after the occurrence of emergency situations. These procedures should also be tested wherever practically feasible.

3.6.4 Checking and corrective action

3.6.4.1 Monitoring and measurement

The organisation shall establish and maintain procedures to monitor and measure, on a regular basis, the key characteristics of its operations and activities that can have a significant impact on the environment. This must include conformance with the environmental objectives and targets.

The organisation shall establish and maintain procedures to evaluate periodical compliance with relevant environmental legislation and regulations.

3.6.4.2 Non-conformance and corrective and preventative action

The organisation shall establish and maintain procedures for defining responsibility and authority for handling and investigating non-conformance, taking action to mitigate any impacts caused and for initiating and completing corrective and preventative action.

Any corrective or preventative action taken to eliminate the causes of actual and potential non-conformances shall be appropriate to the magnitude of problems and commensurate with the environmental impact encountered.

3.6.4.3 Records

The organisation shall establish and maintain procedures for the identification, maintenance and disposition of environmental records. These shall include training records and the results of audits and reviews.

Environmental records shall be legible, identifiable, and traceable to the activity, product or service involved. Environmental records shall be stored and maintained in such a way that they are readily retrievable and protected against damage, deterioration or loss. Retention times should also be determined.

3.6.4.4 Environmental management system audit

The organisation shall establish and maintain programmes and procedures for periodic environmental management system audits to be carried out in order to:

- determine whether or not the environmental management system conforms to planned arrangements for environmental management and whether it has been properly implemented and maintained; and
- provide information on the results of audits to top management.

In order to be comprehensive, the audit procedures should cover the audit scope, frequency and methodologies as well as the responsibilities and requirements for conducting audits and reporting results.

3.6.5 Management review

In order to maintain continual improvement, top management shall at predetermined intervals review the environmental management system to ensure its continued suitability (fit for use), adequacy (does it deliver the expected results) and effectiveness (are we still on track).

The management review shall address the possible need for changes to the policy, objectives and other elements of the EMS.

3.7 Determining priority objectives from the Seville Strategy and priority elements from the ISO 14001 standard to combine in a proposed EMS framework.

3.7.1 Method

The principles of the Leopold matrix (Wathern, 1988: 13) have been used to develop the matrix in figure 1. All the objectives of the Seville Strategy have been listed on the X-axis and all the elements of ISO 14001 on the Y-axis. In each block the question has been asked how important the objective is with relation to the ISO element on national and reserve level. Importance on international level has been listed as not applicable because those are policy and strategy issues on national and international level and falls outside the scope of this study.

The scores used in each block were determined from values allocated as follows: Critical important – 3, moderate important – 2, less important – 1 and not applicable – NA. Critical important means that sustainability and long term existence of the biosphere reserve will be jeopardised if these aspects are not addressed. Moderate important means that management of the biosphere reserve will be elevated to an acceptable national and international standard. The less important category is all the ‘nice to have’ issues that can be disregarded without jeopardising the sustainability and long term existence of the biosphere reserve. The level of management will also not be compromised to such an extent that national or international standards are not met. Not applicable are objectives from the Seville Strategy with international relevance and ISO elements with no relevance to biosphere reserves.

The following questions guided the decision to determine the scores:

- How applicable and important is the specific element in relation to the objective with regards to the management of a conservation area? Knowledge and experience gained during 20 years of involvement with management aspects of

conservation areas in the Limpopo province were well used in this regard. Planning and management guidelines mentioned in Bothma (2002) were also used.

- How applicable and important is the specific element in relation to the objective with regards to principles 2, 3 and 4 of Section 2 of the National Environmental Management Act.
- How applicable and important is the specific element in relation to the objective with regards to the practical experience gained from involvement with the development of two biosphere reserves in the Limpopo Province?
- What is most important from a practical point of view for the functioning of an EMS according to lessons learned from the development of a SHERCQ Manual for Potch Metals in 1999 as part of a class practical?

The answer to each question was scored 3 if critical important, 2 if moderate important and 1 if less important. The average of the three scores was calculated, converted to a percentage and transferred to the matrix.

Objectives and elements with scores higher than 75% were considered as critical important on national and local level. Objectives and elements with scores between 50% and 75% were considered as moderate important while objectives and elements with scores lower than 50% were regarded as less important.

FIGURE 1. DETERMINING OF PRIORITIES BETWEEN SEVILLE STRATEGY AND ISO 14001

→	Seville	Goal 1		Goal 2			Goal 3				Goal 4		TOT
↓	ISO	O 1.1	O1.2	O 2.1	O 2.2	O 2.3	O 3.2	O 3.2	O 3.3	O 3.4	O 4.1	O 4.2	(%)
	Env. Policy												100
P L A N N I N G	Env. Aspects												97
	Legal requir.												76
	Object.+ Targets												100
	EMP												91
	Struct + Resp.												91
P L & O P E R A T I O N	Training Awaren												85
	Communica-tion												97
C H E C K I N G	EMS documt.												27
	Docmt. Control												9
	Operat. Control												55
	Emer-gency												64
E C O N O M I C	Mon & Measmt												42
	Noncon-forman.												48
	Records												61
	EMS Audit												100
	Mngmt review												61
	TOT (%)	45	51	76	86	61	76	96	86	88	75	37	

3 = Critical important 2 = Moderate important 1 = Less important NA = Not applicable

3.7.2 Results

The totals for the Seville Objectives varied between 37% and 96% with an average of 70.6%. Seven of the eleven objectives were regarded as critical important, three as moderate important and one as less important on national and local reserve level. This can be regarded as a true reflection of importance because all of the objectives are important but this method selected the most important ones at national

and local level that should determine the preferred focus of the biosphere reserve.

The totals for the ISO elements varied between 9% and 100% with an average of 70.8%. Nine of the seventeen elements were regarded as critical important, four as moderate important and four as less important. This does not mean that the less important ones will be totally neglected but the management committee can decide to what extent those elements will be incorporated into the EMS once the selected critical important and moderate important elements have been included.

CHAPTER 4

PROPOSED GENERIC ENVIRONMENTAL MANAGEMENT SYSTEM FRAMEWORK FOR BIOSPHERE RESERVES.

4.1 Proposed Generic Environmental Management System Framework for Biosphere Reserves.

The following generic framework is based on the critical important and moderate important elements of ISO 14001 as identified in chapter 3 and include all the critical important and moderate important objectives of the Seville Strategy as identified in chapter 3. The applicability of each element is described and examples are given wherever possible. This framework can serve as a guideline document for the compilation of an environmental management system for the biosphere reserve.

4.1.1 Environmental Policy

- a) The environmental policy should be regarded as the driver to implement and improve the biosphere reserve's environmental management system to maintain and improve environmental performance and forms the basis upon which the biosphere reserve sets its objectives and targets. The policy should be centred on the central vision of the biosphere reserve e.g. "To maximise this unique area's considerable potential for conservation of natural and cultural resources, sustainable development and social upliftment." (Waterberg Biosphere, 2001: 1) Special attention should be given to fragmented habitats, threatened ecosystems, and fragile and vulnerable environments, both natural and cultural. The future expansion of the biosphere reserve, as well as the preferred areas should be included. Also the reasons for inclusion should be indicated. Such a vision will entail the development of the biosphere reserve as a premier tourist destination and the building of a

conservation and sustainable-use ethic, which can be monitored.

- b) The policy should also ensure that benefits and opportunities derived from the biosphere reserve, like entrance fees, sale of natural products, development of sustainable activities, etc., are spread to the poorer members of the community while relevant applied research, education and skills training are facilitated. Traditional life styles and indigenous uses of the biological resources should be encouraged. Traditional knowledge should be used to identify and promote sustainable development in the buffer and transitional zones. Two of the three overriding priorities of the SA Government, namely eradication of poverty and social upliftment of its people, should also be included.
- c) The Biosphere Management Committee (BMC), should define the biosphere reserve's environmental policy and ensure that it is appropriate to the nature, scale and environmental impacts of its activities, products or services. The six goals of the national white paper on the conservation of biological diversity as described in 2.3.1 should also be included wherever possible. There should also be proper consultation with all members of the biosphere reserve during the drafting of this policy. The document must be easily understood by all members as well as interested and affected outside parties.
- d) The activities and services of the biosphere reserve in the **core area** can be described as the conservation of landscapes, ecosystems, species and genetic resources, eco-tourism, water conservation, archaeological and cultural conservation, and environmental education and research. In the **buffer zone** it is the same as in the core area but compatible activities such as game and cattle farming, as well as sustainable activities developed through traditional knowledge, are added. In the

transitional zone other land uses like crop farming, villages, small industries and even mining can be added as well.

The most important products of the biosphere reserve are high quality water, a well-conserved eco-system, unique eco-tourism and hunting destination for local and foreign tourists. It also includes high quality agricultural and mining products produced by environmentally sensitive agricultural and mining practices, socio-cultural development, education and training programmes, research opportunities as well as sustainable economic development.

- e) A commitment to continual improvement and prevention of pollution and environmental degradation should be included. Pollution aspects that need to be addressed are agricultural pesticides and fertilizers, by-products of industries, mining waste, solid household waste, sewage and visual, air and noise pollution. Factors that lead to environmental degradation and unsustainable use of biological resources should also be identified and addressed, e.g. over-grazing, incorrect burning practices, deforestation, spreading of exotic plants and poor agricultural practices.
- f) Include a commitment to comply with relevant environmental legislation and regulations. The legal register will form the basis here and will be addressed under legal requirements.
- g) The framework for setting and reviewing environmental objectives and targets is provided by the environmental policy. The framework should include environmental objectives and targets for all sectors (conservation, tourism, agriculture, settlements, mining & industry). The review of these targets at specific time intervals and by whom must also be outlined.

- h) The environmental policy should be properly documented, maintained and communicated to all members of the biosphere reserve. Proper documentation and distribution to all members are important.
- i) The implementation of the environmental policy should be the task of the BMC.
- j) The environmental policy should be made available to the public.

4.1.2 Planning

4.1.2.1 Environmental aspects

The BMC should establish and maintain procedures to identify the environmental aspects of its activities, products or services that it can control and over which it can be expected to have an influence, in order to determine those, which have or can have significant positive or negative impacts on the environment. Special attention should be given to fragmented habitats, threatened ecosystems, special landscapes and fragile and vulnerable natural and cultural environments. Basic and applied research projects, as well as the compilation of inventories for the fauna and flora, should be promoted in and around the biosphere reserve.

The process should consider emissions to air, releases to water, solid waste management, use of natural resources and other local environmental and community issues like the interactions between people and their environment e.g. rural areas, rivers and vegetation for grazing, building, fuel, medicinal use, etc. The various stakeholders should be involved in planning and decision-making regarding the management and use of the biosphere reserve. Regional development policies and regional land-use planning

projects like Strategic Development Initiatives (SDI's), as well as the Integrated Development Plans (IDP's) by regional and local municipalities should be considered as well.

Incentives should be developed for the conservation and sustainable use of natural resources. Alternative means of livelihood for local populations should be developed when existing activities are impacting negatively on the biosphere reserve. An example is the cattle drinking from natural springs and the accompanied degradation of the sensitive spring area. Drinking troughs should be provided in less sensitive areas. The major land use sectors near the biosphere reserve should be encouraged to adopt practices favouring sustainable land use.

Tools that can be used to achieve this are Strategic Environmental Assessments (SEA), Environmental Impact Assessments (EIA), Sociological Impact Assessments (SIA), Environmental Risk Assessments, Environmental Analysis, aerial photos (including infrared photos), satellite images and physical surveys.

4.1.2.2 Legal and other requirements

The BMC should establish and maintain a legal register that includes other requirements that are applicable to the environmental aspects of the biosphere's activities, products or services. All international conventions, treaties and agreements, national policies, laws and regulations, provincial policies, laws and regulations, as well as municipal bylaws and regulations applicable to the biosphere reserve, should be listed. Compliance with these legal requirements should be monitored according to a specific time frame. The biosphere reserve may also subscribe to agreements with public authorities and non-regulatory guidelines. Harmonisation between the different zones in the biosphere should also be addressed through proper institutional mechanisms.

Provision should be made for internal as well as external monitoring. Procedures to deal with non-compliance should be outlined clearly.

4.1.2.3 Objectives and targets

The BMC should develop environmental objectives and targets for each zone and sector within the biosphere reserve. These objectives and targets should be measurable wherever practicable and should be set together with the relevant sector to ensure that they will be committed to it. The BMC must ensure that all aspects related to significant positive or negative impacts are also considered. The objectives and targets should be consistent with the environmental policy, including the commitment to the prevention of pollution and, wherever appropriate, preventative measures should be taken into account. The development of indicators for sustainability in the ecological, economic and social fields should also be included.

The Seville Strategy recommends that the following objectives be included to develop the biosphere reserve to its fullest potential (only the very important objectives as identified according to figure 1 are listed):

- Secure the support and involvement of local people. Local people are all people in the biosphere reserve as well as adjoining neighbours.
- Ensure better harmony and interaction between zones. There is a vast difference between the conservation-orientated members of the core area and the settlements or industries in the transitional zone.
- Integrate the biosphere reserve into regional planning processes like regional Strategic Development Initiatives and Integrated Development Plans of municipalities. Batisse, 1996, feels that biosphere reserves offer a

remarkable tool for balancing and planning land-use at the regional level, provided it can be implemented properly.

- Improve knowledge of the interaction between humans and biosphere reserves. The advantages and disadvantages of the biosphere reserve should be made known to all affected people.
- Improve monitoring activities on fauna and flora, socio-economic activities, hydrology and sources of pollution.
- Improve education, public awareness and involvement of, especially, the local communities.
- Improve training for specialists and managers.
- Integrate the functions of the biosphere reserve. Ensure that there is an institutional mechanism in place to manage the biosphere according to a policy and management plan.

Examples of objectives for the biosphere reserve are:

- Participate actively in the MaB programme of UNESCO.
- Generate interest and active participation in environmental conservation and management amongst its members.
- Conserve and enhance the scenic environment, indigenous fauna and flora and the cultural history of the area.
- Implement strategies for the sustainable utilisation of the natural and cultural resources of the area.
- Improve the quality of life of the people within the area through the creation of job opportunities and the execution of education and training programmes.
- Enhance the tourism potential and tourism information network of the area.
- Maintain the Biosphere Reserve Centre office that will provide a local scientific and technical support service to the biosphere reserve members relating to all environmental and tourism issues.
- Ensure compliance with all National and Provincial Legislation and policies relating to environmental issues.

- Co-ordinate all activities within the biosphere reserve and act as a communication pivot between stakeholder groups.

These objectives can be achieved by establishing sub-committees to deal with the main themes such as policy and planning, resource management, development, environmental awareness and training, tourism and marketing and administration and finance.

4.1.2.4 Environmental Management Programme

The BMC should establish and maintain a programme for achieving its objectives and targets. It should include the designation of responsibility for achieving objectives and targets for each zone and sector of the biosphere reserve. The means and time frame by which they are to be achieved must also be specified. The management programme should address the following:

- Who: BMC members responsible and biosphere reserve members involved in the implementation of the various objectives and targets.
- What: Tasks, which must be executed to ensure the achievement of the objectives and targets.
- When: The time frame or schedule for each task.
- How: Methods that must be used for the execution of each task.
- Monitoring: Report back to BMC.

A table should be established to address the following aspects for each task:

- Responsibility: The BMC member(s) who should actually complete the task or activity and who is/are responsible for action and/or implementation.

- **Accountability:** The committee member(s) who will be accountable for the implementation. This is an optional aspect for the biosphere reserve!
- **Consult:** Person(s) who must be consulted prior to a final decision or action.
- **Inform:** Person(s) who need(s) to be informed after a decision or action is taken.

4.1.3 Implementation and operation

4.1.3.1 Structure and responsibility

The successful implementation of an environmental management system will depend on the commitment of all members of the biosphere reserve. Roles and responsibilities of members of the BMC as well as members of the biosphere reserve should be clearly defined, documented and communicated to all in order to facilitate effective environmental management.

The BMC should facilitate the availability of human resources, specialised skills, technology and financial resources essential to the implementation and control of the environmental management system.

A nominated member of the BMC should report annually on the performance of the EMS to the Biosphere Reserve Committee for review and a basis for improvement of the EMS.

4.1.3.2 Training, awareness and competence

The identification of training and awareness needs is a key role of the BMC. It must also determine the level of experience, competence and training necessary to ensure the capability of members and their employees. This includes those performing

specialised environmental management functions, for example, burning of fire belts, veld and game monitoring as well as patrolling. Training programmes should also be developed for politicians, decision-makers and local leaders.

The BMC should ensure that all members, whose activities may have a significant impact upon the environment, receive appropriate competence training. Members performing these activities will be competent on the basis of appropriate education, training and experience. An example is the application of pesticides to crops or the spraying and poisoning of pests and invader species. This should also be extended to contractors doing work in the biosphere reserve that should prove that their employees have the required training.

Procedures should be established and maintained for awareness training for BMC members and biosphere reserve members. This training should include the following:

- The importance of conformance with the environmental policy and the requirements of the EMS.
- The identification of significant environmental impacts and the benefits of improved environmental performance.
- Their roles and responsibilities in achieving conformance with the environmental policy and the requirements of the EMS, including emergency alertness and response requirements. Emergency incidents like floods, droughts, veld fires, pest and disease outbreaks, accidents of vehicles transporting dangerous chemicals and the escape of dangerous animals from enclosures should be considered.
- The potential consequences if the specified operating procedures are not adhered to.

Procedures should be established to encourage the awareness training of local communities, school children and other stakeholders.

The development and maintenance of ecological field education centres within the biosphere reserve should also be promoted.

4.1.3.3 Communication

Procedures for internal communication between all members of the biosphere reserve should be established by the BMC. Various options like a newsletter and annual meetings can be considered. This will be crucial to convey all the information and required actions from the BMC to all members.

Procedures should also be established to receive, document and respond to relevant communication from external interested and affected parties. These procedures should also address necessary communications with public authorities regarding emergency planning and other relevant issues. The external communication processes for significant environmental aspects should also be established. The possible extension of the biosphere reserve should also be communicated to adjoining landowners. Press releases, an internet website, radio talks on local radio stations as well as an annual report are options which should be considered.

4.1.3.4 Operational control

The purpose is the translation of policy, objectives and targets into actions. The committee should identify those operations and activities associated with identified significant environmental aspects according to the environmental policy, objectives and targets. These operations and activities should include normal and abnormal activities and operations, accidents and functions that are

controlled by law. Industry, mining and agriculture are the most likely sectors to be affected. The operation and maintenance of those activities should be planned in such a manner that they are carried out under specified conditions by:

- Establishing and maintaining documented procedures to cover situations where their absence could lead to deviations from the environmental policy, objectives and targets.
- Stipulating operating criteria in the procedures.
- Establishing and maintaining procedures related to the identifiable significant environmental aspects of goods, actions and services used by members of the biosphere reserve and communicating relevant procedures and requirements to suppliers and contractors.

Private sector initiatives should be stimulated and encouraged to establish and maintain environmentally and socially sustainable projects, with participation of the local community, in appropriate zones of the reserve and in surrounding areas.

4.1.3.5 Emergency alertness and response

Procedures should be established by the BMC to identify possible emergency situations and respond rapidly to them in order to prevent and/or mitigate the environmental impacts associated with them. Emergency situations include veld fires, floods, droughts, pollution incidents, outbreak of diseases like foot and mouth and the escape of dangerous animals from confined areas. A communication strategy as well as a register of competent people, organisations and equipment needs to be in place.

The emergency alertness and response procedures of the BMC and members of the biosphere reserve should be periodically reviewed

and revised, especially after the occurrence of emergency situations.

4.1.4 Checking and corrective action

4.1.4.1 Records

The BMC should establish and maintain procedures for the identification, maintenance and disposition of environmental records. These may include the following:

- legal register;
- permits;
- complaint records;
- training records;
- incident reports;
- information on emergency alertness and response;
- information on significant environmental aspects;
- monitoring data;
- audit results; and
- management reviews.

Proper account should be taken of confidential business information.

The BMC should ensure that records are numbered, stored and maintained in such a way that they are readily retrievable and protected against damage, deterioration or loss. Retention times should be determined, as well as the person(s) responsible for key actions and methods for the management of records.

4.1.4.2 Environmental management system audit

The BMC should establish and maintain programmes and procedures for periodic environmental management system audits to be carried out in order to:

- determine whether or not the environmental management system conforms to planned arrangements for environmental management and has been properly implemented and maintained; and
- provide information on the results of audits to the committee.

In order to be comprehensive, the audit procedures should cover the audit scope, frequency and methodologies, as well as the responsibilities and requirements for conducting audits and reporting results.

Audits may be performed by personnel from within the biosphere reserve and/or by external persons selected by the committee. In either case, the persons must be in a position to do so impartially and objectively.

4.1.5 Management review

In order to maintain continual improvement, the BMC should, at predetermined intervals, review the environmental management system to ensure its continued suitability (fit for use), adequacy (does it deliver the expected results) and effectiveness (are we still on track). An annual review is strongly recommended.

The management review will address the possible need for changes to policy, objectives and other elements of the EMS. The scope, review areas, as well as review criteria, should be identified by the BMC. The review should include:

- results from audits;
- the extent to which objectives and targets have been met;
- the continuing suitability of the EMS in relation to changing conditions and information;
- concerns amongst relevant interested parties; and
- the commitment to continual improvement.

Observations, conclusions and recommendations should be documented for necessary action.

CHAPTER 5

CONCLUSION

One of the main issues today is to ensure that biosphere reserves are fulfilling their functions properly. This means that they should be encouraged to fulfil these functions, and those that do not should not be maintained in the world network of biosphere reserves. Currently 50 % of biosphere reserves do not fulfil all the required criteria adequately (Batisse, 1997: 11). A future requirement from UNESCO is that each biosphere reserve must be reviewed periodically for 10 years after being designated, to identify and overcome shortcomings in the reserve. If the reserve does not meet the required criteria, and continues to do so, it may be dropped from the world biosphere reserve network. This means that the evaluation of the biosphere reserve is an absolute necessity to remain part of the world biosphere reserve network.

The proposed National Biodiversity Bill (South Africa, 2002) requires that biosphere reserves must be managed in accordance with norms and standards as may be prescribed. These norms and standards include performance indicators for the monitoring of biodiversity management and conservation, eco-tourism, commercial and community activities in the reserve. The proposed generic framework can be seen as a national and international standard to provide a framework for the environmental management of biosphere reserves.

This study proves that the ISO 14001 standard can be applied successfully to include the goals and objectives of the Seville Strategy and provide a generic standardised environmental management system framework for biosphere reserves.

The implementation of this environmental management system will ensure that, among other issues, in compliance with UNESCO's criteria for biosphere reserves, reserves will be addressed and monitored on an annual basis. This criteria has been incorporated into the generic environmental management system framework and will be addressed accordingly. The environmental management system framework will ensure that co-operation with all members of the biosphere reserve, as well as the neighbouring community, will be addressed to ensure sustainable utilisation and

development of the natural resources. The environmental management system will also ensure that the full scope of environmental management is addressed and that the biosphere management committee will steer the biosphere reserve to achieve its vision and mission statements. It will also demonstrate to what extent its policy statements, objectives and expectations have been met.

One real aspect is that the environmental management system framework will create a practical implementation system to ensure that ideas and plans are put into action through the development of action plans, the assignment of responsibilities and a monitoring system to check progress on an annual basis. It also provides the opportunity for each biosphere reserve to develop its own detailed criteria and guidelines for implementation.

It was stated by Batisse, (1997: 13), that the proper management of a biosphere reserve lies somewhere between science and art. The implementation of the environmental management system framework for biosphere reserves can ensure that biosphere reserves become theatres for reconciling people and nature and it can demonstrate how to overcome the island nature and approach of the different sectors involved. If properly applied, biosphere reserves will become a means for people who live and work in and around them, to contribute towards the needs of the environment and the society as a whole, by presenting a way to a more sustainable future.

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