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## Biosphere Reserves

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### 1. Introduction

Protected areas are essential for biodiversity conservation. They are the cornerstones of virtually all national and international conservation strategies, set aside to maintain functioning natural ecosystems, to act as refuges for species and to maintain ecological processes that cannot survive in most intensely managed landscapes and seascapes. Protected areas act as benchmarks against which we understand human interactions with the natural world. Today they are often the only hope we have of stopping many threatened or endemic species from becoming extinct (Dudley, 2008).

Most protected areas exist in natural or near-natural ecosystems, or are being restored to such a state, although there are exceptions. Many contain major features of earth history and earth processes while others document the subtle interplay between human activity and nature in cultural landscapes. Larger and more natural protected areas also provide space for evolution and future ecological adaptation and restoration, both increasingly important under conditions of rapid climate change.

The term “protected area” is therefore shorthand for a sometimes bewildering array of land and water designations, of which some of the best known are *national park*, *nature reserve*, *wilderness area*, *wildlife management area* and *landscape protected area* but can also include such approaches as *community conserved areas*. More importantly, the term embraces a wide range of different management approaches, from highly protected sites where few if any people are allowed to enter, through parks where the emphasis is on conservation but visitors are welcome, to much less restrictive approaches where conservation is integrated into the traditional (and sometimes not so traditional) human lifestyles or even takes place alongside limited sustainable resource extraction. Some protected areas ban activities like food collecting, hunting or extraction of natural resources while for others it is an accepted and even a necessary part of management. The approaches taken in terrestrial, inland water and marine protected areas may also differ significantly and these differences are spelled out later in the guidelines (Dudley, 2008). Today roughly a tenth of the world’s land surface is under some form of protected area. Over the last 40 years the global protected area estate has increased from an area the size of the United Kingdom to an area the size of South America. However, significant challenges remain. Many protected areas are not yet fully implemented or managed. Protected areas continue to be established, and received a boost in 2004 when the Convention on Biological Diversity (CBD) agreed an ambitious *Programme of Work on Protected Areas*, based on the key outcomes from the Vth IUCN World Parks

Congress,<sup>1</sup> which aims to complete ecologically-representative protected area systems around the world and has almost a hundred time limited targets.

The IUCN protected area management categories are a global framework, recognized by the Convention on Biological Diversity, for categorizing the variety of protected area management types. Squeezing the almost infinite array of approaches into six categories can never be more than an approximation. But the depth of interest and the passion of the debate surrounding the revision of these categories show that for many conservationists, and others, they represent a critical overarching framework that helps to shape the management and the priorities of protected areas around the world. The first effort to clarify terminology was made in 1933, at the International Conference for the Protection of Fauna and Flora, in London. This set out four protected area categories: *national park*; *strict nature reserve*; *fauna and flora reserve*; and *reserve with prohibition for hunting and collecting*. In 1942, the Western Hemisphere Convention on Nature Protection and Wildlife Preservation also incorporated four types: *national park*; *national reserve*; *nature monument*; and *strict wilderness reserve* (Holdgate 1999). In 1978, Ten categories were proposed, defined mainly by management objective, all of which were considered important, with no category inherently more valuable than another: *scientific reserve*, *national park*, *natural monument/national landmark*, *nature conservation reserve*, *protected landscape*, *resource reserve*, *anthropological reserve*, *multiple-use management area*, *biosphere reserve* and *world heritage site (natural)*. In 1994, IUCN and the World Conservation Monitoring Centre are definition new protected area categories: *strict protection/strict nature reserve and wilderness area*, *ecosystem conservation and protection*, *conservation of natural features*, *conservation through active management*, *landscape/seascape conservation and recreation*, *sustainable use of natural resources*. This is the most important changes in the definitions that the biosphere reserves and world heritage sites. These categories are not discrete management categories but international designations generally overlain on other categories.

The concept of biosphere reserves as originated by a task force of UNESCO's Man and the Biosphere (MAB) Programme in 1974, The biosphere reserve network was launched in 1976 and, as of June 2011, has grown to include 580 reserves in 114 countries. The network is a key component in MAB's objective of achieving a sustainable balance between the sometimes-conflicting goals of conserving biological diversity, promoting economic development, and maintaining associated cultural values. Biosphere reserves are sites where this objective is tested, refined, demonstrated and implemented. In this chapter, which is one of the most important protected areas in the approach to the information given in relation to the biosphere reserve.

## 2. Protected areas and management categories

The original intent of the IUCN Protected Area Management Categories system was to create a common understanding of protected areas, both within and between countries. This is set out in the introduction to the Guidelines by the then Chair of CNPPA (Commission on National Parks and Protected Areas, now known as the World Commission on Protected Areas), P.H.C. (Bing) Lucas who wrote: "*These guidelines have a special significance as they are intended for everyone involved in protected areas, providing a common language by which managers, planners, researchers, politicians and citizens groups in all*

*countries can exchange information and views"* (The International Union For Conservation of Nature [IUCN], 1994).

Though its Commission on National Parks and Protected Areas (CNPPA), IUCN has given international guidance on the categorisation of protected areas for nearly a quarter of a century. The purposes of this advice have been (The International Union For Conservation of Nature [IUCN], 1994):

- to alert governments to the importance to the importance of protected areas;
- to encourage governments to develop systems of protected areas with management aims tailored to national and local circumstances
- to reduce the confusion which has arisen from the adoption of many different terms to describe different kinds of protected areas;
- to provide international standards to help global and regional accounting and comparisons between countries;
- to provide a framework for the collection, handling and dissemination of data about protected areas; and
- generally to improve communication and understanding between all those engaged in conservation.

As a first step, the General Assembly of IUCN defined the term "national park" in 1969. Much pioneer work was done by Dr Ray Dasmann from which emerged a preliminary categories system published by IUCN in 1973. In 1978, IUCN published the CNPPA report on Categories, Objectives and Criteria for Protected Areas, which was prepared by the CNPPA Committee on Criteria and Nomenclature chaired by Dr Kenton Miller. This proposed these ten categories. Ten categories were proposed, defined mainly by management objective, all of which were considered important, with no category inherently more valuable than another (Dudley, 2008):

Group A: Categories for which CNNPA will take special responsibility

- i. Scientific Reserve/Strict Nature Reserve
- ii. National Park
- iii. Natural Monument/Natural Landmark
- iv. Nature Conservation Reserve/Managed Nature Reserve/Wildlife Sanctuary
- v. Protected Landscape

Group B: Other categories of importance to IUCN, but not exclusively in the scope of CNNPA

- vi. Resource Reserve
- vii. Natural Biotic Area/Anthropological Reserve
- viii. Multiple Use Management Area/Managed Resource Area

Group C: Categories that are part of international programmes.

- ix. **Biosphere reserve**
- x. World Heritage Site (natural)

This system of categories has been widely used. It has been incorporated in some national legislation, used in dialogue between the world's protected area managers, and has formed the organisational structure of the UN List of National Parks and Protected Areas.

Nonetheless, experience has shown that the 1978 categories system is in need of review and updating. The differences between certain categories are not always clear, and the treatment of marine conservation needs strengthening. Categories IX and X are not discrete management categories but international designations generally overlain on other categories. Some of the criteria have been found to be in need of rather more flexible interpretation to meet the varying conditions around the world. Finally, the language used to describe some of the concept underlying the categorisation needs updating, reflecting new understanding of the, natural environment, and of human interactions with it, which have emerged over recent years (The International Union For Conservation of Nature [IUCN], 1994).

In 1984 CNNPA established a task force to update the categories. This reported in 1990, advising that a new system be built around the 1978 categories I-V, whilst abandoning categories VI-X (Eidsvik, 1990). CNPPA referred this to the 1992 World Parks Congress in Caracas, Venezuela. A three-day workshop there proposed maintaining a category that would be close to what had previously been category VIII for protected areas where sustainable use of natural resources was an objective. The Congress supported this and in January 1994, the IUCN General Assembly meeting in Buenos Aires approved the new system. Guidelines were published by IUCN and the World Conservation Monitoring Centre later that year. These set out a definition of a “protected area” – *An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means* – and six categories (Dudley, 2008):

Areas managed mainly for:

- i. Strict protection [1a] Strict nature reserve and [1b] Wilderness area
- ii. Ecosystem conservation and protection (i.e., National Park)
- iii. Conservation of natural features (i.e. Natural Monuments)
- iv. Conservation through active management (i.e. Habitat/species management area)
- v. Landscape/seascape conservation and recreation (i.e. Protected landscape/seascape)
- vi. Sustainable use of natural resources (i.e. Managed resource protected areas)

The 1994 guidelines (Guidelines for Protected Area Management Categories) are based on key principles: the basis of categorization is by primary management objective; assignment to a category is not a commentary on management effectiveness; the categories system is international; national names for protected areas may vary; all categories are important; and a gradation of human intervention is implied (Dudley, 2008).

## 2.1 Biosphere reserve

Biosphere reserves are designed to deal with one of the most important questions the World faces today: How can we reconcile conservation of biodiversity and biological resources with their sustainable use? An effective Biosphere reserve involves natural and social scientists; conservation and development groups; management authorities and local communities, all working together on this complex issue.

The concept of biosphere reserves as originated by a Task Force of UNESCO's Man and the Biosphere (MAB) Programme in 1974, The biosphere reserve network was launched in 1976



and, as of June 2011, had grown to include 580 reserves in 114 countries. The network is a key component in MAB’s objective of achieving a sustainable balance between the sometimes-conflicting goals of conserving biological diversity, promoting economic development, and maintaining associated cultural values. Biosphere reserves are sites where this objective is tested, refined, demonstrated and implemented (United Nations Educational, Scientific and Cultural Organization [UNESCO], 1996). Landmarks in the history of the Man and Biosphere Programme are given below Table 1 (Pocono Environmental Education Center and The Center for Russian Nature Conservation/Tides Center, 2001)

<b>1970: UNESCO General Conference. Delegates support the formation of the Man and Biosphere program,</b> intended to ensure harmonious coexistence between rural populations and the environment from which they derive their subsistence.
<b>1971: First meeting of the MAB International Coordinating Committee.</b> The official birthday of the MAB program sees the establishment of 13 (later 14) research programs aimed at evaluating human impact on various natural systems.
<b>1972: UN Conference on Human Environment, Stockholm.</b> Recommendations are made for establishing a global network of protected areas to conserve representative examples of ecosystems around the world.
<b>1976: UNESCO meeting on the designation of Biosphere Reserves.</b> A total of 59 biosphere reserves are established in eight countries.
<b>1983: First International Biosphere Reserve Conference, Minsk.</b> Delegates develop a detailed action plan for biosphere reserves, including proposals for research, monitoring, training, education, and local participation.
<b>1992: Earth Summit, Rio de Janeiro.</b> The Convention on Biological Diversity (CBD) introduced the “ecosystem approach” promoting holistic analysis of environmental as well as social and economic problems. The Agenda 21 Action Plan advocates conserving local environments and involving the local population in conservation and development.
<b>1995: UNESCO Seville Conference.</b> The “Seville Strategy” is adopted, emphasizing the importance of sustainable development in biosphere reserve creation and management. The Statuary Framework is drawn up regarding the nomination, approval, networking, periodic revision, and withdrawal of biosphere reserves by UNESCO.
<b>2000: Seville +5 Meeting, Pamplona.</b> Delegates review the implementation of the Seville Strategy over the past five years on the international level.
<b>2008: Madrid Action Plan for Biosphere Reserves (2008-2013)</b> <i>Madrid Action Plan</i> was agreed at the 3rd World Congress of Biosphere Reserves which was held in Madrid in February 2008. It builds on the Seville Strategy and aims to capitalize on the strategic advantages of the Seville instruments and raise biosphere reserves to be the principal internationally-designated areas dedicated to sustainable development in the 21st century

Table 1. History of Biosphere Reserve Program

In 1983, UNESCO and UNEP jointly convened the First International Biosphere Reserve Congress in Minsk (Belarus), in cooperation with FAO and IUCN. The Congress’s activities

gave rise in 1984 to an 'Action Plan for Biosphere Reserves.' which was formally endorsed by the UNESCO General Conference and by the Governing Council of UNEP. While much of this Action Plan remains valid today, the context in which biosphere reserves operate has changed considerably as was shown by the UNCED process and, in particular, the Convention on Biological Diversity. The Convention was signed at the 'Earth Summit' in Rio de Janeiro in June 1992, entered into force in December 1993 and has now been ratified by more than 100 countries. The major objectives of the Convention are: conservation of biological diversity; sustainable use of its components; and fair and equitable sharing of benefits arising from the utilization of genetic resources. Biosphere reserves promote this integrated approach and are thus well placed to contribute to the implementation of the Convention (UNESCO, 1996).

In the decade since the Minsk Congress, thinking about protected areas as a whole and about the biosphere reserves has been developing along parallel lines. Most importantly, the link between conservation of biodiversity and the development needs of local communities – a central component of the biosphere reserve approach – is now recognized as a key feature of the successful management of most national parks, nature reserves and other protected areas. At the Fourth World Congress on National Parks and Protected Areas, held in Caracas, Venezuela, in February 1992, the world's protected-area planners and managers adopted many of the ideas (community involvement, the links between conservation and development, the importance of international collaboration) that are essential aspects of biosphere reserves. The Congress also approved a resolution in support of biosphere reserves.

There have also been important innovations in the management of biosphere reserves themselves. New methodologies for involving stakeholders in decision-making processes and resolving conflicts have been developed, and increased attention has been given to the need to use regional approaches. New kinds of biosphere reserves, such as cluster and transboundary reserves, have been devised, and many biosphere reserves have evolved considerably, from a primary focus on conservation to a greater integration of conservation and development through increasing cooperation among stakeholders. And new international networks, fuelled by technological advances, including more powerful computers and the Internet, have greatly facilitated communication and cooperation between biosphere reserves in different countries (UNESCO, 1996).

In this context, the Executive Board of UNESCO decided in 1991 to establish an Advisory Committee for Biosphere Reserves. This Advisory Committee considered that it was time to evaluate the effectiveness of the 1984 Action Plan, to analyze its implementation, and to develop a strategy for biosphere reserves as we move into the 21st century. To this end, and in accordance with Resolution 27/C/2.3 of the General Conference, UNESCO organized the International Conference on Biosphere Reserves at the invitation of the Spanish authorities in Seville (Spain) from 20 to 25 March 1995. This Conference was attended by some 400 experts from 102 countries and 15 international and regional organizations. The Conference was organized to enable an evaluation of the experience in implementing the 1984 Action Plan, a reflection on the role for biosphere reserves in the context of the 21st century (which gave rise to the vision statement) and the elaboration of a draft Statutory Framework for the World Network. The Conference drew up the Seville Strategy, which is presented below. The International Coordinating Council of the Man and the Biosphere (MAB) Programme,

meeting for its 13th session (12-16 June 1995) gave its strong support to the Seville Strategy (UNESCO, 1996).

In sum, biosphere reserves should preserve and generate natural and cultural values through management that is scientifically correct, culturally creative and operationally sustainable. The World Network of Biosphere Reserves, as implemented through the Seville Strategy, is thus an integrating tool which can help to create greater solidarity among peoples and nations of the world.

In addition, goals and objectives for biosphere reserves as shortly defined in the Seville Strategy. These objectives were defined in the context of broad goals and recommendations at three organizational levels: international, national and individual reserves. The objectives for individual reserves are described in Table 2 (UNESCO, 2010).

GOALS	OBJECTIVES
Utilize Biosphere Reserves as models of land management and of approaches to sustainable development	Secure the support and involvement of local people
	Ensure better harmonization and interaction among the different biosphere reserve zones
	Integrate biosphere reserves into regional planning
Use Biosphere Reserves for research, monitoring, education and training	Improve knowledge of the interactions between humans and the biosphere
	Improve monitoring activities
	Improve education, public awareness and involvement
Implement the Biosphere Reserve Concept	Improve training for specialists and managers
	Integrate the functions of biosphere reserves
	Strengthen the World Network of Biosphere Reserves

Table 2. Goals and objectives for biosphere reserves as defined in the Seville Strategy

The decisions made at conference in Seville in detail the goals and objectives are given below (UNESCO, 1996).

**GOAL 1. Use Biosphere Reserves to Conserve Natural and Cultural Diversity**

Objective 1.1. Improve the coverage of natural and cultural biodiversity by means of the World Network of Biosphere Reserves.

Objective 1.2. Integrate biosphere reserves into conservation planning.

**GOAL 2. Utilize Biosphere Reserves as Models of Land Management and of Approaches to Sustainable Development**

Objective 2.1. Secure the support and involvement of local people



Objective 2.2. Ensure better harmonization and interaction among the different biosphere reserve zones.

Objective 2.3. Integrate biosphere reserves into regional planning.

### **GOAL 3. Use Biosphere Reserves for Research, Monitoring, Education and Training**

Objective 3.1. Improve knowledge of the interactions between humans and the biosphere.

Objective 3.2. Improve monitoring activities.

Objective 3.3. Improve education, public awareness and involvement.

Objective 3.4. Improve training for specialists and managers.

### **GOAL 4. Implement the Biosphere Reserve Concept**

Objective 4.1. Integrate the functions of biosphere reserves.

Objective 4.2. Strengthen the World Network of Biosphere Reserves.

The Statutory Framework sets out the rules for governing the functioning of the World Network, giving a formal definition, a set of functions and criteria, and a designation procedure. In particular, it sets out a periodic review of biosphere reserves designated over eleven years ago to bring them up to the revised standards and criteria. At the request of the MAB ICC, a “Seville +5” international meeting of experts was organized in October 2000 in Pamplona, Spain. Aimed at taking stock of the first five years of implementation of the Seville Strategy, the meeting highlighted the following points (Pocono Environmental Education Center and The Center for Russian Nature Conservation/Tides Center, 2001):

#### **Use biosphere reserves to implement the Convention on Biological Diversity**

The biosphere reserve concept encapsulates the three major concerns of the Convention on Biological Diversity (conservation of biological diversity, sustainable use and sharing of benefits at the local, national and international levels). Moreover, this Convention has now adopted the “Ecosystem Approach” which is close to the principles of biosphere reserves.

#### **Develop biosphere reserves in a wide variety of environmental, economic, and cultural situations**

Since 1995, an increasing number of biosphere reserves worldwide founded in coastal marine areas. Biosphere reserves have been established in previously un-represented regions noted for their exceptional biodiversity, and are also increasingly being established near or around important urban centers.

#### **Explore and demonstrate approaches to sustainable development on a regional scale**

Since 1995, the new biosphere reserve nominations demonstrate a clear rise in the size and complexity of decision making in biosphere reserves. In some cases, these recent biosphere reserves correspond to entire “bioregions” spanning several administrative areas. As a result, interest in creating transboundary biosphere reserves has grown. The Seville +5 meeting produced specific recommendations for transboundary biosphere reserves.

#### **Bring together all interested groups in a partnership approach**

In this process of creating larger sites, the biosphere reserve often consists of multiple units, with several core areas and buffer zones within a large transition area. The coordination

mechanisms of such sites are often innovative, consisting of a consortium or a committee on which all stakeholders are represented, usually with a rotating chair. New funding mechanisms are also being tried.

### **Strengthen regional networks as components of the World Network of Biosphere Reserves**

Computer technology increases the ease of informal communications and access to information and has enhanced cooperation in regional groupings. Various sub-networks include ArabMAB, AfriMAB, IberoMAB (19 countries of Latin America plus Portugal and Spain), EABRN (East Asian Biosphere Reserves Network) and EuroMAB (including North America). A new MAB network for South and Central Asia was recently formed.

Madrid Action Plan is one of the latest studies on Biosphere Reserves. *The Madrid Action Plan* was agreed at the 3rd World Congress of Biosphere Reserves which was held in Madrid in February 2008. It builds on the Seville Strategy and aims to capitalize on the strategic advantages of the Seville instruments and raise biosphere reserves to be the principal internationally-designated areas dedicated to sustainable development in the 21st century. The biosphere reserve (BR) concept has proved its value beyond protected areas and is increasingly embraced by scientists, planners, policy makers and local communities to bring a variety of knowledge, scientific investigations and experiences to link biodiversity conservation and socio-economic development for human well-being. Thus the focus is on developing models for global, national and local sustainability, and for biosphere reserves to serve as learning sites for policy professionals, decision-makers, research and scientific communities, management practitioners and stakeholder communities to work together to translate global principles of sustainable development into locally relevant praxis. Individual biosphere reserves remain under the jurisdiction of the States where they are situated, which take the measures they deem necessary to improve the functioning of the individual sites (UNESCO, 2008).

#### **2.1.1 The Biosphere Reserve concept**

Biosphere reserves are areas of terrestrial and coastal/marine ecosystems or a combination thereof which are internationally recognized within the framework of UNESCO's Programme on Man and The Biosphere (MAB) (Statutory Framework of the World Network of Biosphere reserves). Reserves are nominated by national governments; each reserve must meet a minimal set of criteria and adhere to a minimal set of conditions before being admitted to the Network (UNESCO, 1996).

Biosphere reserves are 'living laboratories for sustainable development' and represent learning centers for environmental and human adaptability. Biosphere reserves are the only sites under the UN systems that specifically call for conservation and sustainable development to proceed along mutually supportive paths. Such mutuality requires cultural sensitivity, scientific expertise, and consensus-driven policy and decision-making (UNESCO, 2010).

Biosphere Reserves are special entities (sites) for both the people and the nature and are living examples of how human beings and nature can co-exist while respecting each other's

needs. These reserves contain genetic elements evolved over millions of years that hold the key to future adaptations and survival. The high degree of diversity and endemism and associated traditional farming systems and knowledge held by the people in these reserves are the product of centuries of human innovation and experimentation. These sites have Global importance, having tremendous potential for future economic development, especially as a result of emerging new trends in Biotechnology (Government of India Ministry of Environment and Forests, 2007).

Biosphere reserves are areas that are recognized by the UNESCO's program on MAB. One of the primary objectives of MAB is to achieve a sustainable balance between the goals of conserving biological diversity, promoting economic development, and maintaining associated cultural values.

### **Characteristics of Biosphere Reserves**

The characteristic features of Biosphere reserves are (Government of India Ministry of Environment and Forests, 2007):

1. Each Biosphere Reserves are protected areas of land and/or coastal environments wherein people are an integral component of the system. Together, they constitute a worldwide network linked by International understanding for exchange of scientific information.
2. The network of BRs includes significant examples of biomes throughout the world.
3. Each BR includes one or more of the following categories
  - i. BRs are representative examples of natural biomes.
  - ii. BRs conserve unique communities of biodiversity or areas with unusual natural features of exceptional interest. It is recognized that these representative areas may also contain unique features of landscapes, ecosystems and genetic variations e.g. one population of a globally rare species; their representativeness and uniqueness may both be characteristics of an area.
  - iii. BRs have examples of harmonious landscapes resulting from traditional patterns of land-use.
  - iv. BRs have examples of modified or degraded ecosystems capable of being restored to more natural conditions.
  - v. BRs generally have a non-manipulative core area, in combination with areas in which baseline measurements, experimental and manipulative research, education and training is carried out. Where these areas are not contiguous, they can be associated in a cluster.

Biosphere reserves are areas of terrestrial and coastal/marine ecosystems. Reserves are nominated by national governments; each reserve must meet a minimal set of criteria and adhere to a minimal set of conditions before being admitted to the World Network. Each biosphere reserve is intended to fulfill three complementary functions: 1) a conservation function, to preserve genetic resources, species, ecosystems and landscapes; 2) a development function, to foster sustainable economic and human development; and, 3) a logistic support function, to support demonstration projects, environmental education and training, and research and monitoring related to local, national and global issues of conservation and sustainable development (UNESCO, 2010) (Figure1).



Fig. 1. Biosphere reserves functions

The main principal tasks of biosphere reserves are as detailed below (The Federal Ministry for The Environment, 2007):

*Conservation of natural systems and biodiversity;*

- Preservation and restoration of natural and near-natural ecosystems
- Development and preservation of diverse cultural landscapes
- Sustainable use of the natural resources of water, soil and air
- Safeguarding genetic resources and the diversity of ecosystems

*Economic sustainability;*

- Use of environmentally sound Technologies
- Establishment of regional value chains
- Production and marketing of sustainability produced products.
- Environmentally and socially compatible tourism.
- Ecologically adapted and site-appropriate land use, with due regard for a regions distinctive characteristics

*Education for sustainable development, research and monitoring:*

- Development of the skills to shape a sustainable future
- Public relations work, practice-based information and education
- Promotion of sustainable lifestyles
- Long-term ecosystem research and environmental monitoring
- Advancement of interdisciplinary research in ecological, social and economic disciplines

### Structure and design of Biosphere Reserves

In order to undertake complementary activities of biodiversity conservation and development of sustainable management aspects, Biosphere Reserves are demarcated into three inter-related zones. These are natural or core zone manipulation or buffer zone and a transition zone outside the buffer zone (Anonymous, 2007) (Figure 2).

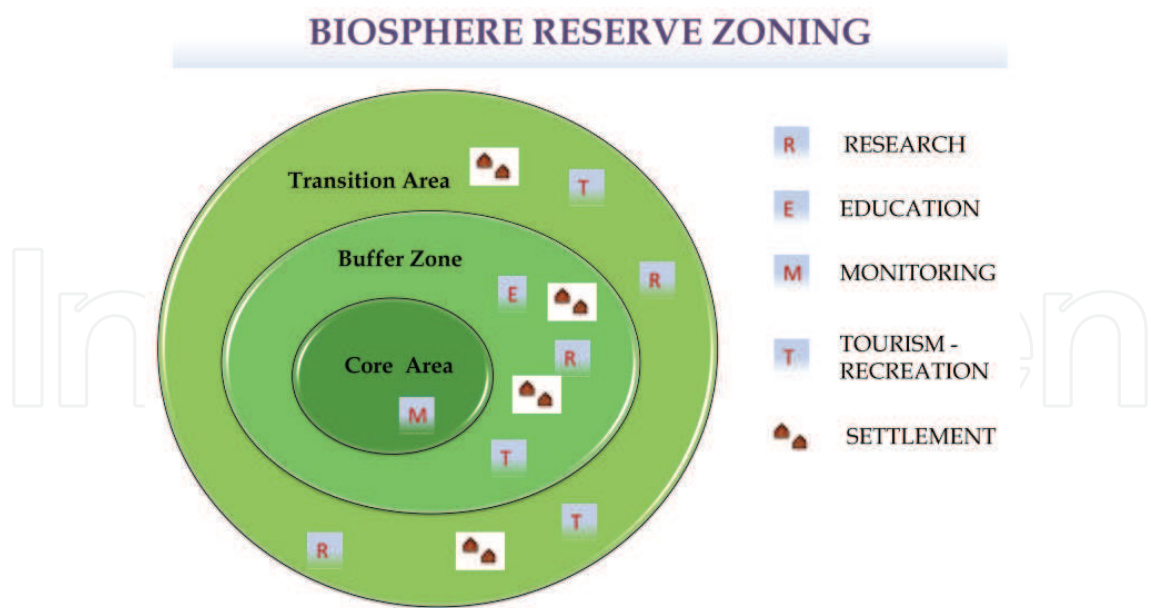


Fig. 2. Biosphere reserves zoning system

**The Core Zone**

The core zone is kept absolutely undisturbed. It must contain suitable habitat for numerous plant and animal species, including higher order predators and may contain centres of endemism. Core areas often conserve the wild relatives of economic species and also represent important genetic reservoirs. The core zones also contain places of exceptional scientific interest. A core zone secures legal protection and management and research activities that do not affect natural processes and wildlife are allowed. Strict nature reserves and wilderness portions of the area are designated as core areas of BR. The core zone is to be kept free from all human pressures external to the system.

**The Buffer Zone**

In the Buffer Zone, which adjoins or surrounds core zone, uses and activities are managed in ways that protect the core zone. These uses and activities include restoration, demonstration sites for enhancing value addition to the resources, limited recreation, tourism, fishing and grazing, which are permitted to reduce its effect on core zone. Research and educational activities are to be encouraged. Human activities, if natural within BR, are likely to be permitted to continue if these do not adversely affect the ecological diversity.

**The Transition Zone**

The Transition Zone is the outermost part of a Biosphere Reserve. This is usually not delimited one and is a zone of cooperation where conservation, knowledge and management skills are applied and uses are managed in harmony with the purpose of the Biosphere Reserve. This includes settlements, crop lands, managed forests and area for intensive recreation, and other economic uses characteristic of the region. In Buffer Zone and the Transition Zones, manipulative macro-management practices are used. Experimental research areas are used for understanding the patterns and processes in the ecosystem. Modified or degraded landscapes are included as rehabilitation areas to restore the ecology in a way that it returns to sustainable productivity.



Although originally envisioned as a series of concentric rings, the three zones have been implemented in many different ways in order to meet local needs and conditions. In fact, one of the greatest strengths of the biosphere reserve concept has been the flexibility and creativity with which it has been carried out in various situations. Some countries have enacted legislation specifically to establish biosphere reserves. In many others, the core areas and buffer zones are designated (in whole or in part) as protected areas under national law. A large number of biosphere reserves simultaneously belong to other national systems of protected areas (such as national parks or nature reserves) and/or other international networks (such as World Heritage or Ramsar sites). Ownership arrangements may vary, too. The core areas of biosphere reserves are mostly public land, but can also be privately owned, or belong to non-governmental organizations. In many cases, the buffer zone is in private or community ownership and this is generally the case for the transition area. The Seville Strategy for Biosphere Reserves reflects this wide range of circumstances (UNESCO, 2010).

At first glance, much of the biosphere reserves and other protected status may not be seen a difference. At first glance, much of the biosphere reserves and other protected status may not be seen a difference. But the nature of the biosphere reserves and other protected areas management objectives and the expected functions of these areas are quite different from each other. In fact, within the biosphere reserves and the IUCN classification independent of each other in fields such as nature conservation areas must be thinking. In some cases fields are independent of each other as in the examples are designed mostly with the biosphere reserve approach Occasionally, there also exist examples in nature conservation areas are being adapted to the existing nature conservation area, covering a wider area as a biosphere reserve is determined. The differences between the biosphere reserves and other conservation areas are given in Table 3 (Bioret, 2001).

The coordinator of the Biosphere Reserve is not the direct manager of the territory concerned: he/she merely coordinates or facilitates. One of the main problems encountered in Biosphere Reserves is the need for visibility of the management structure and adequate recognition of the coordinator. The role of the Biosphere Reserve coordinator is to moderate and communicate the different aspirations and needs of each partner around a 'common territory project' (a project which balances consideration of the environment, economy and equity of a specific area) with which all stakeholders can identify themselves (resource users, professional groups, local populations, government agencies, elected officials, scientists etc.). Hence a Biosphere Reserve coordinator must ensure (Bioret, 2001):

- Identification of the main conservation and development issues and potentialities, both at the scale of the territory concerned and at the scale of the wider biogeographically region. Certain conservation or development priorities and even sustainable development experiments may be envisaged.
- Identification of the main management issues concerning human interaction with nature using the ecosystem approach. Different types of interaction can be highlighted including
  - negative interactions: divergence of interests;
  - neutral interactions and;
  - positive interactions: convergence of interests.
  - resolving conflicts throughout mediation processes.

- Setting up working groups devoted to the common concerns of the main groups of actors.
- Organization of thematic workshops and training sessions.
- Promotion of results of successful experiments.
- Carrying out the periodic review of the Biosphere Reserve using a multidisciplinary approach.

Protected Areas	Biosphere Reserves
One type of land <i>a single category of land, usually relatively small in size and managed for a single purpose (e.g. nature conservation)</i>	A mosaic of different types of land <i>several categories of land, generally managed for different purposes (conservation, development, etc)</i>
One type of objective and function <i>conservation</i>	Overlapping of different types of objectives and functions <i>conservation, development, logistical support</i>
One main category of interests <ul style="list-style-type: none"><li>– <i>natural</i></li><li>– <i>landscape</i></li><li>– <i>cultural</i></li><li>– <i>historical</i></li></ul>	Multitude of interests <i>often conflicting: farming, forestry, fisheries, tourism, science, local and national government</i>
One manager <i>well identified, directly in charge of the management of the territory</i>	Several managers <i>working more or less independently without consultation</i>
Simple zonation	Complex zonation <i>three zones, transition area without demarcated outer limit</i>
Protection through regulation	Various means of protection <i>Regulation limited to the core areas, existence of management agreements or contracts</i>
Management plan <i>single planning scenario applied to a well-defined land area</i>	Guide to Biosphere Reserve coordination <i>harmonization of different planning scenarios for different areas in line with Biosphere Reserve concept; emphasis on local Participation</i>
Single ecosystem approach <i>populations, ecosystem functioning</i>	Landscape approach <i>complex of ecosystems</i>
Manager	Coordinator

Table 3. TitleThe differences between the biosphere reserves and other protected areas (Bioret, 2001)

This approach can be realized by setting up a management guide for the Biosphere Reserve Territory. Here, a GIS can prove to be a relevant and efficient tool for the Biosphere Reserve Coordinator, since it can be used to set up, structure and continuously update a database for the Biosphere Reserve, and provide an excellent basis for decision-making by facilitating the elaboration of various zoning scenarios. The maps produced using a GIS can also help in discussions and consultations with the local communities and the various stakeholders (Bioret, 2001).

### 2.1.2 Ecotourism and Biosphere Reserves

The concept of ecotourism and the concept of Biosphere Reserves go together in many ways. Some people feel that although tourism is and should be an important activity in Biosphere Reserves, especially in the core areas, the only responsible tourism in these areas is ecologically conscious and sustainable tourism, thus "ecotourism". Others have pointed out, however, that there are some distinctive and possibly difficult aspects to ecotourism in Biosphere Reserves that must be considered if ecotourism is to contribute positively to all functions of a Biosphere Reserve -in the core area, the buffer zones, and the transition or cooperation zone, and if the Biosphere Reserve is to contribute in a strong and positive way to the ecotourism experience. For it is that positive experience, which requires a high level of knowledge and preparation from both leaders and participants, that will give the ecotourists the emotional and inspirational stimulus that Biosphere Reserves can provide, and develop increased understanding and perspective so that they will take henceforth an active personal responsibility toward the natural environment. If it can achieve this understanding and commitment, ecotourism can help Biosphere Reserves fulfill their responsibilities to demonstrate a balanced relationship between humans and Nature (Canada MAB Committee, 2002).

A decade ago, a perceptive report of the Canadian Environmental Advisory Council called "Ecotourism in Canada" (Scace, et.al., 1992) drew attention to characteristics of ecotourism in protected and managed areas that had been identified by Prof. James Butler (Butler, 1990). Although the situations and institutions are always evolving, the characteristics of ecotourism in protected and environmentally managed areas listed by Butler are pertinent today (Canada MAB Committee, 2002):

- Ecotourism must promote positive environmental ethics - fostering environmentally conscious behavior in its participants;
- Ecotourism does not degrade the natural resource or interfere with natural environmental processes;
- Ecotourism concentrates on intrinsic rather than extrinsic values. Facilities and services never become attractions in their own right;
- Ecotourism is biocentric rather than homocentric in philosophy. Ecotourists enter the environment accepting it on its terms, not expecting it to be modified for their convenience;
- Ecotourism must benefit the wildlife and natural environment. The environment and ecological functions remain essentially undisturbed by the tourism;
- Ecotourism provides a first-hand experience with the natural environment. movies and zoological parks do not constitute an ecotourism experience;
- Ecotourism has an "expectation of gratification" that is measured in terms of education and/or appreciation rather than in thrill-seeking or physical achievement;
- Ecotourism has a high knowledge-based and experience-based dimension.

Biosphere reserve planning work to be done to be successful eco-tourism activities are given below (Roots, 2002).

#### General comments

1. To be successful within Biosphere Reserves, the ecotourism activities and tourist experience should be compatible with all the characteristics of ecotourism in protected

and managed areas as outlined by Butler (previously referred to) and in addition should also help the tourist to understand, take part in, and contribute to the three main functions of a Biosphere Reserve:

- a. Conservation of:
    - Ecosystems
    - Ecological functions
    - Landscape, hydrology/coastal features, and habitats
    - Historical and local cultural attributes
  - b. Improvement of Social, economic and cultural development and sustainability;
  - c. Provision of sites and opportunities for research, monitoring, education, communication and international contact and Exchange (the logistic function)
2. Ecotourism in Biosphere Reserves must incorporate visits to and explanations to visitors of the role of the Core Areas, Buffer Zones, and Transition or Co-operation zones in a way that shows to the visitors that these, together, demonstrate balance between human activities and Nature.
  3. Biosphere Reserves, in general, can support the preamble to the Declaration on Ecotourism and help to implement the spirit of all the main clauses. But the priority for Biosphere Reserves is Nature and the future, not immediate commercial business.
  4. In turn, ecotourism, properly informed and conducted, can support the functions of Biosphere Reserves.

#### **Characteristics of Biosphere Reserves that is important to ecotourism**

There are some important characteristics of Biosphere Reserves that should be kept in mind as they relate to tourism in general and to ecotourism (Roots, 2002):

1. Biosphere Reserves are, above all, selected places where relatively undisturbed Nature and active economic and social development, with all its cultural overtones, exist side by side in the same ecological setting. It is the study and knowledge of interaction and inter-dependence of these, and the lessons learned from that study, that characterize a Biosphere Reserve and its role as an exemplary of sustainable development.

*Tourists must be able to visualize and understand this interaction, and learn from it. Tour operators must understand and support this purpose. Otherwise, the tourist visit will not be "ecotourism" in a Biosphere Reserve.*

2. Biosphere Reserves are not government structures or entities. They typically include land of which some parts are owned and managed by governments, and other parts owned by industry, private citizens and institutions, all of whom have voluntarily co-operated for a common purpose of ecological protection, sustained social and economic development, and learning about long-term management of living resources and ecological productivity. No ownership or legal rights are in any way changed by the creation of a Biosphere Reserve.

*Therefore Biosphere Reserves, as complete entities, are not subject to special regulations. They are subject to and must be governed by all the regulations that apply to their component parts. Tourists must be helped to understand that Biosphere Reserves are not special protected "parks", but places where ecological responsibility is exercised through ordinary land rights and regulations.*

3. Biosphere Reserves are fundamentally places of research and monitoring in both the natural and social sciences. This means that all activities, including all aspects of tourism itself, can and should be scientifically studied and monitored; and the effects of such activities on the biosphere, natural resources, local and regional economy, cultural integrity and expression should also be studied and monitored.

*Biosphere Reserves may offer an unique opportunity to observe and measure the impacts of different numbers or groupings, timing, movements, etc., of tourists. Thus they can provide assessment or models of the "tourist carrying capacity" of landscapes and ecosystems. Such studies require investment, data-gathering and persons knowledgeable in the theoretical and applied social and behavioral sciences to be associated with the ecotourism activity. The network of Biosphere Reserves, within a country or internationally, can facilitate comparative studies.*

4. Biosphere Reserves are areas that will be managed, studied, and monitored over a long period of time - at least over several decades. They are throughout much of the world prime places to observe and record long-term environmental and ecological change, including the effects of regional and global changes due to natural causes as well as to changing human activities and technologies.

*Ecotourism in Biosphere Reserves can be an excellent way of educating people about global change or changes in the local Nature and the environment over time. At the same time extreme care must be taken to ensure that tourism activities do not disrupt the irreplaceable role of Biosphere Reserves as long-term ecological benchmarks and monitors.*

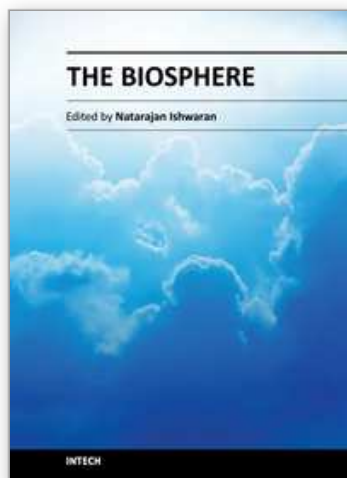
### 3. Conclusion

Biosphere reserves are part of an international program implemented by the United Nations Educational, Scientific and Cultural Organization since 1970 for conservation of biological diversity and sustainable land management using a participatory approach. The main goal of this program is effectiveness of the participatory approach for sustainable resources management. Conservation of biological diversity, training, monitoring, information sharing, and experience exchanging at a global level are fundamental elements of this program (Özyavuz et al. 2006; Özyavuz and Yazgan, 2010). According to the Madrid Declaration (UNESCO, 2008), the biosphere reserves, to be considered learning sites of sustainable development, should be territories where the relationship between conservation of biodiversity and local cultural and socioeconomic development has been reconciled. In other words, biosphere reserves are expected to be territories where all the four above mentioned functions are being permanently fulfilled. Empirical evidence gained by our field survey suggests that association of the biosphere reserve with the administration of protected area, either the protected landscape area or the national park, does not seem to be an ideal institutional model for the biosphere reserve existence. At least, such a model is hardly to guarantee fulfilling of the fourth function of the biosphere reserve - promotion of sustainable development (Kusova et al., 2008). Though the biosphere-reserve approach, established for the protection and sustainability of biodiversity and natural resources, is a new concept for our country, there are many protected areas which could incorporate into the international network system.



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## **The Biosphere**

Edited by Dr. Natarajan Ishwaran

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In this book entitled "The Biosphere", researchers from all regions of the world report on their findings to explore the origins, evolution, ecosystems and resource utilization patterns of the biosphere. Some describe the complexities and challenges that humanity faces in its efforts to experiment and establish a new partnership with nature in places designated as biosphere reserves by UNESCO under its Man and the Biosphere (MAB) Programme. At the dawn of the 21st century humanity is ever more aware and conscious of the adverse consequences that it has brought upon global climate change and biodiversity loss. We are at a critical moment of reflection and action to work out a new compact with the biosphere that sustains our own wellbeing and that of our planetary companions. This book is a modest attempt to enrich and enable that special moment and its march ahead in human history.

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