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SOME CRUCIAL ASPECTS OF THE CONCEPT OF BIOSPHERE RESERVES IN THE MEDITERRANEAN REGION

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U N E S C O

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Some Crucial Aspects of the Concept of Biosphere Reserves in the Mediterranean Region

1.0 INTRODUCTION

The last decade has seen the birth of several initiatives concerned with the protection of natural or semi-natural environment of areas judged to be of international importance. This concern is in marked contrast to the earlier pattern in nature conservation in which the selection of national parks or other protected areas was made strictly on the basis of a framework describing the national resources and where any international element was generally accidental, depending on the coincidence of areas on either side of a frontier.

Since 1970 the situation has considerably changed in that a number of international legal instruments have been adopted for internationally co-ordinating efforts in the field of natural heritage conservation and the launching of international programmes for enhancing conservation and management of natural resources. Thus in 1970 the Man and the Biosphere Programme (MAB) was officially launched at the 16th Session of the General Conference of Unesco and the broad outlines of the programme were established in 1971 at the first session of the MAB International Co-ordinating Council which proposed 13 project areas for co-operative research, among them MAB Project 8 entitled "Conservation of Natural Areas and of the Genetic Material they contain". A 14th project on environmental protection was added at the 18th Session of the Unesco General Conference in 1974.

In 1971 the Convention on Wetlands of International Importance Especially as Waterfowl Habitat was adopted by the International Conference on the Conservation of Wetlands and Waterfowl at Ramsar, Iran, for which Unesco accepted to be the depositary and IUCN to provide the Secretariat for the management of the Convention.

In 1972, the same year that the United Nations Conference on the Human Environment was held in Stockholm, during which the United Nations Environmental Programme was established, the Convention Concerning the Protection of the World Cultural and Natural Heritage was adopted by the Unesco General Conference at its 17th Session. For this Convention, Unesco is not only the depositary but also provides the Secretariat. The two above-mentioned legal instruments and the Inter-Governmental MAB Programme are three major areas in which Unesco helps to implement the world conservation strategy which was launched early this year by the members of the Ecosystems Conservation Group (UNEP, FAO, Unesco, IUCN) and the World Wildlife Fund.

The following is a brief outline of crucial aspects of the concept of Biosphere Reserves which has been developed under the MAB Programme with particular focus on the Mediterranean Region.

2.0 SOME CRUCIAL ASPECTS OF THE CONCEPT OF BIOSPHERE RESERVES IN THE MEDITERRANEAN REGION

2.1 Practical aspects of implementation of MAB Project 8

The Biosphere Reserve concept was introduced in 1971 by Unesco's MAB Programme. Biosphere Reserves form an international network of protected areas in which an integrated concept of conservation is being developed, combining the preservation of ecological and genetic diversity with research, environmental monitoring, education and training.

Biosphere Reserves are selected as representative examples of the world's major ecosystems. Generally speaking, they are made up of a strictly protected central or core zone surrounded by a larger buffer zone where both experimental and manipulative research as well as traditional land use are carried out.

Particular emphasis is given to co-operation and participation of the local population, thus ensuring a stronger social acceptance of conservation activities. Biosphere Reserves provide a framework for international cooperation in research on comparable ecosystems and in finding practical solutions to similar environmental problems.

Experience since the establishment of the first Bisophere Reserves in 1976[1] has shown that pragmatism is necessary in implementing MAB Project 8 on a national and regional level.

Although a variety of approaches are being taken, the following major elements form a regular part of the Biosphere Reserve concept. These are somewhat different in emphasis to other national conservation programmes, but complement these programmes:

(1) Emphasis upon use of natural areas in research, including the kind which provides an improved scientific base for conservation.

(2) Emphasis upon conservation of ecosystems, rather than upon conservation of individual species.

(3) Emphasis upon providing sites for long-term, continuous research and monitoring.

(4) Choice of sites for representativeness, rather than for uniqueness.

(5) Provision of an international framework for co-operation among nations in conservation and research, this framework being Unesco's Intergovernmental MAB Programme.[2]

Fortunately the Biosphere Reserve concept has considerable flexibility and can readily be adapted to meet the specific needs of different regions of the world. For example, in selecting areas for designation as Biosphere Reserves, some countries have emphasized the conservation aspects of MAB Project 8, while others have emphasized research. Furthermore, the largest and best potential sites for conservation purposes are often remote from scientific institutions and separated from their research sites. To accommodate this, the concept has been developed of a Biosphere Reserve cluster, composed of a central conservation reserve (the core), associated where available with a contiguous buffer zone and with nearby experimental reserves, each of which may provide for the needs of manipulative research. Such a cluster of separate reserves with different conservation and research objectives can be as successful in fulfiling the goals of a Biosphere Reserve as one in which all the zones are contiguous.

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1 As of August 1980, 177 Biosphere Reserves were established in 46 countries encompassing more than 120 million ha of terrestrial or coastal-marine ecosystems.

2 As of August 1980, 95 countries have established MAB National Committees. More than 1,000 field projects of integrated ecological research involving co-operation work of more than 10,000 scientists are under implementation. In addition, more than 300 research projects in Biosphere Reserves provide base-line data for natural resources conservation and management.

In several countries of the Mediterranean region, most important natural ecosystems have been converted to agriculture or have become degraded, so that remnants available for preservation are not large and may have lost some of their fauna and flora. Therefore, in some Biosphere Reserves, restoration is a major task, based on integrated ecological studies and supported by continuous observations to monitor recovery.

2.2 Previous MAB meetings in the Mediterranean region

The Biosphere Reserve network for Mediterranean countries began at the regional meeting on integrated ecological research and conservation activities in the countries of the Northern Mediterranean at Potenza, Italy, October 1975 (MAB Report Series No. 36). The seven countries (France, Greece, Italy, Portugal, Spain, Turkey, Yugoslavia) represented at Potenza proposed a number of sites for inclusion in the future network of Biosphere Reserves in the Mediterranean.

At the MAB Mediterranean Scientific Conference, which was held at Montpellier, France, between 27 September and 2 October 1976, recommendations were made for further development of MAB Project 8 in the Mediterranean region. However, major progress in the development of a conceptual basis and a plan for the establishment of a Biosphere Reserve network for the Mediterranean region was made at a MAB Workshop held in Side, Turkey from 6 to 11 June 1977 (MAB Report Series No. 45).

2.3 Adapting the Biosphere Reserve concept to the particular conditions of the Mediterranean region

There is a special need to adapt the Biosphere Reserve concept in the Mediterranean region, to take into account the present ecological, socio-economic and socio-cultural conditions. A crossroads of cultures and civilizations, a highway for communication and the exchange of ideas, materials, human energies and natural and cultural resources, this region has changed profoundly over the millenia. Settlements, cultivated fields, maquis, garrigue and pasture have replaced the original natural condition, when forests of evergreen and deciduous trees covered plains and mountain slopes. The natural state is still in retreat, before the force of human intervention; and much of the land has become seriously degraded.

In these circumstances nature conservation is particularly difficult. Yet it is in just such places, in the frontier areas of nature and the impoverishment of man's livelihood, that it is perhaps most necessary.

The numerous difficulties arising from this situation also require the solution of several scientific, technical and socio-economic problems peculiar to the Mediterranean region. The establishment of Biosphere Reserves is proposed as one of the possible measures to combine conservation, land restoration and environmental education.

In adapting the Biosphere Reserve concept to specific conditions and needs of the region, the following are important:

- to represent the ecological diversity of this very varied region;
- to represent transitional zones between this and neighbouring regions and ecotones within the region;

- to take into account the specific problems in the conservation of wetlands, coastal marine and island ecosystems in the Mediterranean;
- to take account of socio-economic development;
- to include semi-natural and artificial ecosystems;
- to consider degraded landscapes and the possibility of their restoration;
- to preserve the cultural heritage within Biosphere Reserves.

2.3.1 Representing the diversity of the region

The Mediterranean climate is very varied, especially in precipitation and temperature. This is reflected by its outstanding floristic and phytosociological heterogeneity notably in comparison with cold and temperate regions. The diversity of climate, coupled with geological and geomorphological history, and particularly the presence of many islands and broken mountain masses, have made the region a very important centre for the evolution and survival of species. There is consequently great variation in the composition of communities round the Mediterranean basin; the species show many different and specialized morphological and ecological adaptations; and there are many isolated concentrations of endemic species.

Mediterranean ecosystems have proved to be most unstable in the face of human disturbance, and they become very vulnerable to the intense periodic droughts and torrential rain which are characteristic of the climate. This has led to widespread soil erosion and degradation of the vegetation.

Emphasis in the choice of Biosphere Reserves should be on a full range of sites representative of the major ecosystems. This will lead to a rather different selection from those preferred as national parks. Unique sites should only be chosen as Biosphere Reserves if research has been carried out or is planned which would provide valuable comparisons with other broadly similar areas elsewhere.

Biosphere Reserves should include as much internal variation of habitat as possible to render them more effective and durable conservation units. They should include, for example, differences in altitude, rainfall, drainage and soils. They should also contain different intensities of human activity. Attention should be directed at studying the dynamics of natural and of man-induced processes.

2.3.2 Representing transitional zones and ecotones

Because the Mediterranean region is so internally diverse and is bounded by so many different biogeographic regions, it is important that these interfaces should be represented in Biosphere Reserves as well as typical examples of ecosystems at the centre of their distribution. Two types of interfaces can be recognized: transitions between the Mediterranean region and adjacent biogeographic realms or provinces; and ecotones within the region itself as for example between land and sea.

From the biogeographical point of view, the principal transitions between the Mediterranean and adjoining regions are the following:[1]

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1 For more details see MAB Report Series No. 45, which includes a tentative map and terrestrial ecosystems classification for the Mediterranean region.

- North Mediterranean - Atlantic.
- North Mediterranean - Central European.
- North and East Mediterranean - South-Eastern Black Sea.
- East Mediterranean - Irano-Turanian.
- South Mediterranean - Saharo-Arabian.
- West Mediterranean - Macaronesian.

It is at the great interregional interfaces that most interactions, transitions and conflicts occur; and, generally the most active, rapid processes of change and the most serious imbalances. Since the entire MAB Programme concerns itself with world-wide ecological problems, it is deeply interested in these interfaces.

When man's intervention at these critical points becomes heedless, this may result in very dangerous and sometimes disastrous consequences. There is, accordingly, a growing need for them to be subjected to intensive, systematic, scientific control, taking into account not only physical and biophysical, but also cultural, ethnological and sociological variables.

Particularly serious problems arise in the East-Mediterranean-Irano-Turanian and South-Mediterranean-Saharo-Arabian transition zones, where the classic Mediterranean problems of degradation intermesh with the general problems of desertification. The relationship between MAB Project 8 and Projects 3 and 4 takes on a special significance in these zones.

2.3.3 Problems of conservation of wetland systems

For many centuries the area of wetlands has been diminished by drainage for agriculture (a notable example is the Pontine marshes in Italy). At present, the remaining areas are seriously threatened, for further agriculture, for aquaculture, for urban and industrial growth, and for tourism, each of them competing for space and bringing danger of increased pollution. The threats are greatest and most immediate for coastal wetlands but extend to all.

In spite of this about 1 million hectares of natural or semi-natural wetlands still remain in the region, with important concentrations in some countries. An estimated 71 per cent of the population of European palaearctic waterfowl spends the winter in these wetlands, amounting to several million birds.

Because of the scarcity of the remaining wetlands, their importance as genetic reservoirs and the urgency of the threat, international action is necessary to safeguard them. They should be considered as key areas in any programme to select Biosphere Reserves in the region. Biosphere Reserves, for their part, can play a vital role in maintaining a continuum of Mediterranean wetland ecosystems which could be of great importance to the future needs of man in the region, especially as a source of protein.

The discontinuous but interdependent nature of wetland ecosystems makes them particularly well suited to the cluster approach for setting up Biosphere Reserves. Wetland ecosystems have great recuperative capacity and can be restored much more rapidly than those on land; they lend themselves very well, therefore, to studies in management. There is a great need within the region for such studies, which are all the more urgent because of the contribution which these wetlands could make to the declining resources of protein for the people of the region.

2.3.4 Problems of conservation of coastal zones

Reference has already been made to the ecotone between the sea and land. This zone has exceptional ecological characteristics related to the dynamic processes taking place there. It is characterized by a high biological productivity and is the centre of intense human activity. This applies also to marine islands and the seas immediately surrounding them.

Because of the serious problems affecting these critical habitats and the very great length of coastline in the Mediterranean region, special attention should be given to establishing a representative series of Biosphere Reserves in the coastal zone. This could build upon, and supplement, the efforts that have been made in recent years to establish marine parks and reserves in the region which have been the subject of a number of international meetings and conferences. Biosphere Reserves should, however, place more emphasis on the changing effects of human activities on the coast, notably increased urbanization, tourism, fishing pressure and pollution.

2.3.5 Problems of conservation of island ecosystems

There is also the need to establish a number of Biosphere Reserves for conservation of the great natural heritage found in Mediterranean islands. Such reserves could also fulfil important research and monitoring functions as in many cases islands offer unique possibilities for the study of effects of human impacts. Such research would be carried out under MAB Project 7, 'Ecology and rational use of island ecosystems', which would benefit from permanent research sites within a future network of Mediterranean island Biosphere Reserves. These would offer an exceptional opportunity to study under relatively controlled conditions the entire spectrum of ecological, economic and social factors that influence man's relationship with his environment.

Three research themes could be considered in the first place:

- the management of their natural resources by island populations;
- the effect on islands of external influences, especially tourism;
- the effect of alien plants and animals on island ecosystems.

In addition, and most important, the establishment of Biosphere Reserves on selected Mediterranean islands could help to preserve the great wealth of local endemic plant and animal species to the benefit of present and future generations.

2.3.6 Socio-economic development

The problems of socio-economic development should be carefully considered in relation to the establishment of Biosphere Reserves, their development, and their use for research and public education. This is particularly important in the Mediterranean region where a number of Biosphere Reserves include human settlements or are continually affected by human populations living outside the reserve but drawing upon its natural resources for survival. Therefore, the economics of human communities should be considered an important component of a framework that is conceived to integrate and harmonize the economies of man and nature.

Nevertheless, consideration for the economy of existing human communities should not jeopardize the ecological viability of the Biosphere Reserves. The criteria for ecological viability of each Biosphere Reserve should be stated in its basic administrative policies which should conform to the natural characteristics of the site.

Within such Biosphere Reserves the justifiable needs of the local population should be provided for by appropriate socio-economic development. In these cases the local population should be encouraged to participate actively in the formulation of Biosphere Reserve management objectives and in decisions. The possibility of subventions, subsidies, leases and easements should be considered and used if necessary for the proper fulfilment of the functions of the Biosphere Reserve.

Lasting success depends upon the co-operation and comprehension of local human communities, especially in the developing countries of the Mediterranean basin. This understanding is largely related to the educational and cultural level of the society involved. Consequently, public relations gain paramount significance. In order to encourage the understanding and co-operation of the local population, special programmes should be set up to provide them with information about the Biosphere Reserve and the significance and importance of its functions. When providing socio-economic subsidies enough provision should be made for public education and for public relations in order to make local people more conscious of their environment and willing to co-operate in its protection.

If the objectives of Biosphere Reserves are to encompass the actual human problems found in the Mediterranean, agro-ecosystems, silvicultural systems, or even urban and industrialized systems should be included in some instances. In the Mediterranean the problems of areas under continuous use increase in importance; when human activities are continuous and without change, man assumes a role comparable to that of natural factors. In such instances, then, we pass from the problems of nature conservation to problems of the conservation of sustained usable productivity, which means working in harmony with basic natural processes. When, on the contrary, human activities and uses are disorderly and cause degradation either of productivity or of the landscape in general, efforts should be made to restore the overall quality of the environment.

A particular problem in this context is how to maintain indefinitely these traditional systems in which man has established a certain equilibrium, for example, between vegetation, livestock and simple techniques of cultivation. The perpetuation of such systems may be very important for the preservation of genetic stocks such as those of the primitive cereals.

2.3.7 Semi-natural and artificial ecosystems

The semi-natural and artificial ecosystems created by the action of man have their own characteristic flora and fauna, and play an important part in the economy of local communities. The preservation of samples of these modified ecosystems is therefore important for genetic conservation and the study of them is vital for understanding the interactions between man and the land. They should therefore be considered as essential, integral parts of any Biosphere Reserve.

The various zones of a Biosphere Reserve should cover the whole range from natural to man-modified ecosystems, including traditional and modern land use practices. These would provide sites for the comparative ecological and socio-economic studies that are urgently needed for regional planning in the Mediterranean.

Four levels of intensity of human influence should be analysed and compared:

- no influence (core areas);
- some influence (core and buffer zones);
- traditional land use (buffer and peripheral zones);
- intensive management (peripheral zone).

In areas where no unmodified ecosystems remain, the core might be formed of modified areas which would then be allowed to develop by natural succession.

The last would allow a comparison to be made between major development schemes outside Biosphere Reserves and the less intensive management and natural situations within.

As it may not be possible to find all of these kinds of land in contact with one another, it may prove more practical to include them all in a Biosphere Reserve cluster.

2.3.8 Degraded landscapes and the possibilities of restoration

Man has been active for at least four millenia in the Mediterranean region. Ecosystems have been degraded and even destroyed by successive civilizations who found in them materials essential for their survival or sometimes considered them as obstacles to development.

Since degraded and impoverished areas are so prevalent, some should be incorporated within Biosphere Reserves as restoration zones. Research should be conducted on these degraded landscapes to establish the scientific basis for restoration. Certain areas should be kept in a degraded state as demonstrations, and as controls against which the improvement of the remainder may be assessed.

In some Mediterranean countries there may already be legislation to protect degraded or destroyed vegetation to restore it to a desired state. In this case Biosphere Reserves may cover this kind of area as well.

Such extensive degradation and destruction of the landscape illustrate the severity of the impact of local inhabitants on the natural resources readily available to them from their immediate environment. If this population is still living in the area, the adverse effects are likely to continue unless active restoration is undertaken. In these circumstances the land capability of the area should be assessed in order to bring it as rapidly as possible under productive, sustainable use as, for example, vineyards, olive or pistachio orchards, or plantations of irrigated crops, supported by proper catchment protection. This is likely to produce more rapid benefits than the process of natural recovery. As indicated in the preceding section, all these alternatives should be studied.

2.3.9 The preservation of the cultural heritage within Biosphere Reserves

Many parts of the Mediterranean region contain an invaluable wealth of cultural heritage, especially from Greek and Roman times. Because of the importance of this heritage and the need to integrate it both aesthetically and culturally with the natural heritage, Biosphere Reserves should, wherever appropriate, include sites of archaeological and historical interest. Special measures may be required to preserve the integrity of the natural and the authenticity of the cultural features. These may include protection, landscape management, regulation of tourists and the education of people living in and around the site.

Development of awareness of the moral obligation to respect and safeguard those natural and cultural properties most representative of a natural environment or of the genius and history of the peoples of the world has made great progress since the Convention concerning the Protection of the World Cultural and Natural Heritage was adopted by the General Conference of Unesco in 1972. The Convention is not intended to provide for the protection of all properties of great interest anywhere, but only for a selected list of the most outstanding of those from an international viewpoint. Some of the Mediterranean Biosphere Reserves may become World Heritage sites in the future due to their outstanding universal value.

3.0 GAPS IN THE NETWORK OF MEDITERRANEAN BIOSPHERE RESERVES

By April 1980, the following sites had been recognized by Unesco as Biosphere Reserves in the Mediterranean region.

France	:	the Camargue national reserve the national forest of Fango (Corsica)
Italy	:	Collemeluccio - Montedimezzo Circeo national park Miramare marine park
Spain	:	Ordesa - Vinamala reserve Grazalema reserve Montseny natural park
Tunisia	:	Djebel Bou-hedma national park Djebel Chambi national park Ichkeul national park Zembra and Zembretta Islands national park
Yugoslavia	:	Tara river basin Velebit mountain

All these 14 Biosphere Reserves have been formally designated for the Mediterranean region and have been approved by the MAB Bureau which considers that they have the potential for the full development of Biosphere Reserve functions.

Although these Biosphere Reserves cover many of the major ecosystems, in particular the forests, there are important gaps. The following are not or are poorly represented:[1]

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[1] Gaps in the Mediterranean Biosphere Reserve network have been identified with the help of a preliminary working classification system for the Mediterranean region proposed by Quézel in 1977 and described in MAB Report Series no. 45.

(1) Thermo-Mediterranean

Argania spinosa
Acacia gummifera
Pistacia atlantica
Tetraclinis articulata
Pinus halepensis
Juniperus (littoralis formation)
Quercus suber

(2) Eu-Mediterranean

The ecosystems of deciduous oaks (*Quercus pubescens, Q. aegilops, Q. faginea)*

(3) Supra-Mediterranean

Juniperus thurifera
Quercus pubescens
Quercus infectoria
Abies alba (Mediterranean)

(4) Mountain-Mediterranean

Cedrus atlantica
Abies marocana
Abies numidica
Abies cilicica
Pinus nigra ssp. *laricio*
Pinus silvestris

It should also be noted that there is an urgent need to establish additional coastal, marine and island Biosphere Reserves within the region.

4.0 CONCLUSION

In conclusion, it is suggested that the Athens Intergovernmental Meeting might wish to recommend the further implementation of MAB Project 8 since the Biosphere Reserve concept provides an international framework to combine conservation, research and environmental education in a region which is characterised by the heterogeneity and vulnerability of its ecosystems.

In selecting areas for designation as Biosphere Reserves, it might be recommended that emphasis should be placed on the following aspects:

- representation of the ecological diversity, taking account of transitional zones with other regions and ecotones within the region. A particular effort should be made to fill the 'gaps' in the Mediterranean Biosphere Reserve network;

- consideration of socio-economic parameters, taking account of the sometimes conflicting interests of economic development and the conservation of natural and semi-natural ecosystems. Biosphere Reserves can serve as pioneer areas for restoration of degraded landscapes and for the maintenance of traditional agro-pastoral systems in which man has established a certain equilibrium with the natural environment. This applies to both terrestrial and coastal marine ecosystems.