Towards a New Ecoregional Vision for the Management of Protected Areas in the Mediterranean Region

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A Mediterranean Vision of Protected Areas within the Context of the IUCN

The regionalization process undertaken by the World Commission on Protected Areas (WCPA), which was set in motion in the mid nineteen - eighties, did institute sixteen regions on the basis of certain geopolitical criteria, for the purpose of adapting the Commission's programmes and activities to regional characteristics and for that of achieving a better fulfilment of the global goals of the International Union for the Conservation of Nature (IUCN). Within the said regionalization process, the Mediterranean Basin, one single ecological region, was divided up between the European region and the Northern Africa / Middle Eastern region (Figure 1).

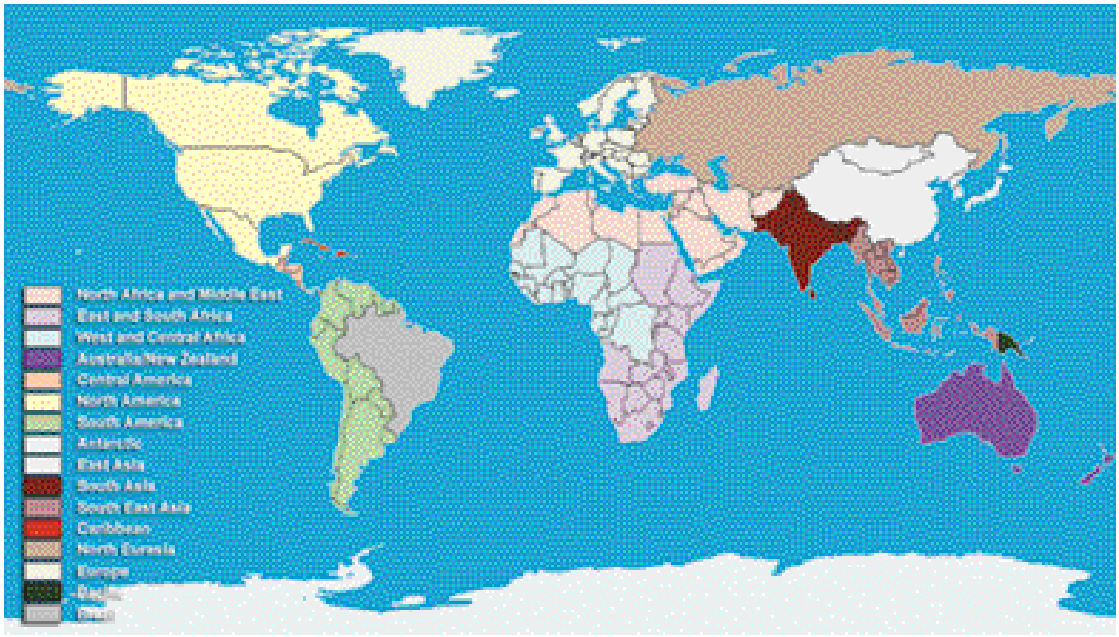

Figure 1. Terrestrial regions of the World Commission on Protected Areas (IUCN), as established on the basis of geopolitical criteria.

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However, the regionalization policy as put into effect by the IUCN has not proved to be efficacious in reaching the objectives first intended when it was inaugurated; the need having, therefore, emerged to define new and more consistent criteria, that may allow the development of models of protected areas according to regional differences in terms of ecological meaning. In this regard, the status of ecological regions (ecoregions), defined by the coincidence in space of patterns and relationships between climate, vegetation, ground and geomorphology (Bailey, 1996), was put forward during the IUCN General Assembly, held in 1994 in Buenos Aires, as the most relevant approach to deal, in a differentiated manner within the framework of the WCAP, with the achievement of conservation goals as well as with the settlement of conflicts within the scope of the protected areas.

The organization of the WCAP into new working units set up on the basis of ecoregional criteria, begins in the Assembly held in Buenos Aires, when the Mediterranean Basin was granted the status of ecological region and the proposal was put forward for establishing a cooperation centre and a specific - action framework agreement for the creation of ecological and cooperation networks within the context of the ecoregion. This new working region of the IUCN, the only one thus far having been defined according to ecoregional criteria, was supporting and promoting the implementation of other, already existing, initiatives in the scope of the Mediterranean Basin, such as the United Nations Action Plan for the Protection of the Mediterranean (1975), the Barcelona Convention (1976), the Mediterranean Commission on Sustainable Development, the Protocol of the Barcelona Convention concerning the Specially Protected Areas and the Biological Diversity in the Mediterranean, or the MedWet initiative by the European Commission (1993) for the implementation of the Ramsar Convention in the wetlands of the Mediterranean region, among others.

Seven years later, in October 2001, the Mediterranean project, launched and initially led by the Ministry of Environment of the Andalusian Regional Government, did culminate with the establishment of the IUCN Mediterranean Cooperation Centre (CCM), based in Malaga, and with the definition of a IUCN Mediterranean Action Programme, which, in turn, does complement other action programmes which are regional in scope, such as the medium and short - term Environmental Priority Action Programme for the Mediterranean Sea (SMAP) of the European Union, which stems from the development of its European - Mediterranean policy; the Regional Action Programme to fight desertification and drought under the terms of Annex IV to the United Nations Convention to fight against desertification and drought; or the WWF and Greenpeace programmes for the Mediterranean, among others.

Within the framework of the IUCN Mediterranean programme, the Protected Areas Programme is being put forward in the region for the purpose of achieving the integration

of the Mediterranean protected areas into the decision - making processes for the sustainable development at all levels. Bearing in mind the environmental and social reality prevailing in the Mediterranean region -including the importance of cultural landscapes-, the development of an ecoregional position within which the most appropriate models be defined, then to be put into effect in our protected areas, and within which a common conceptual framework be established, is one of the main challenges and opportunities both facing and provided by the ecological region (Rosabal, 2003). In this regard, and as one of the CCM priorities the need stands out to make progress in the definition of a Mediterranean vision for the management of the ecoregion's protected areas. The origin of such a need is no other than the reality of the Mediterranean protected areas, resulting from the action of the passing of time on territories devoted for centuries to the satisfaction of the needs of the peoples who settled the region, and which has nothing much to do with the vast natural areas to be found in other ecological regions, scarcely populated and relatively little modified by man. The development of an identical thought, as it has been the case up to very recent times, has entailed the reaching of an inappropriate understanding of the problems, the differences and the similarities between the former and the latter. To redress this situation the taking is needed of an ecosystemic approach in the work of the WCAP as well as the formulation of a strategy or a plan that make it possible to strengthen the protected heritage in the Mediterranean, by dealing with the marine and the continental protected areas, both north and south, from an ecoregional point of view (Rosabal, 2003).

Under the Vth World Park Congress horizon (Durban, 2003), the CCM has started a regional process whose aim is the definition of the Mediterranean contribution to the development of new ideas and concepts, which can rule and set the agenda for the protected areas over the coming decade in terms of finances, social and environmental issues. As a part of this process, through several sectorial meetings in which experts and Mediterranean members of the IUCN have taken part, the issues of governance, landscape linkages and training - priority items in the agenda of the coming World Park Congress (WPC) - have been analysed, for the purpose of establishing a consistent Mediterranean position on each of these topics which would make it possible to carry out an efficient management of our natural and cultural heritage (Box 1).

Box 1 **The Mediterranean process towards the Vth WPC (Durban, 2003)**

March 2002. Rosas (Spain). The ecoregion's priorities are defined in connection with the subject matters around which the Fifth WPC will be structured. The issues which are defined with a view to concentrating efforts are as follows: *Linkages in the Landscape/Seascape* (WS I - WPC); *New Ways of Working Together* (WS III - WPC); *Developing the Capacity to Manage* (WS IV - WPC) and *Building a Comprehensive Protected Area System* (WS VII - WPC).

September 2002. Malaga (Spain). *Environmental Connectivity. Protected Areas within the Mediterranean Context*. The purpose of this meeting was focused on the assessment of aspects which limit and boost ecological connectivity in the Mediterranean landscape; on the identification of relevant study cases to the subject matter and the suggestion of guidelines and further actions to be taken.

December 2002. Castelldefels (Spain). *Governability in Protected Areas: The Role of Entities in the Mediterranean Context*. The general purpose of the meeting was that of identifying, by taking as a starting point the identification and analysis of governability models currently in force in the protected areas of the Mediterranean region, the steps that ought to be taken and the needs concerning the development of new management models in keeping with the eco-region's uniqueness.

January 2003. Montpellier (France). *New Skills Needed for the XXIst Century: Which training needs for natural areas management?*. In the context of this meeting it was defined the priority lines and the Mediterranean synergies required for the management of protected areas in a territorial context.

March 2003. Murcia (Spain). *Mediterranean Conference: Protected Areas within the Mediterranean Context. Towards a Rational Use of the Protected Areas*, organised for the purpose of launching an initiative for the development of an action plan aimed at the Mediterranean region's protected areas. In the course of this conference the set of subjects which were deemed to be a priority in the meeting held in Rosas (March 2002) were discussed again, both in a sectorial and in an integrated manner. One hundred and twenty representatives from twenty - two Mediterranean countries did take part in the Conference.

The Mediterranean Conference held in Murcia under the motto *Protected Areas within the Mediterranean Context. Towards a Rational Use of the Protected Areas* in March 2003 - in which the aforesaid issues were dealt with from both a sectorial and an integrated approach - has entailed a major advancement not only in the definition of a Mediterranean position concerning protected areas to be put forward in Durban, but also in the definition of the foundations for the establishment of a long - term programme aiming at the conservation and the sustainable use of the ecoregion's protected heritage.

In this context, and with regard to the subject matter of *Linkages in the Landscape/Seascape*, this document has been prepared, which has been structured into two parts. On the one hand, a Mediterranean vision is explained and encouraged on how to achieve linkages and functional connections among protected areas, and between them and the surrounding territory; and, on the other hand, the Mediterranean experience of the Andalusian Network of Natural Protected Areas (RENPA) is shown, as an illustrative example of the establishment of a conservation system based on the ecological and administrative integration of protected areas into the territorial context.

Ultimately, the purpose of this publication is that of providing an answer to the need to work with our own perspective for the conservation of nature in the Mediterranean region and, in this regard, to highlight the characteristics which should define a future action plan concerning protected areas from an ecoregional point of view.

The Mediterranean Ecoregion. One Case of Joint Evolution Involving Natural and Cultural Forces

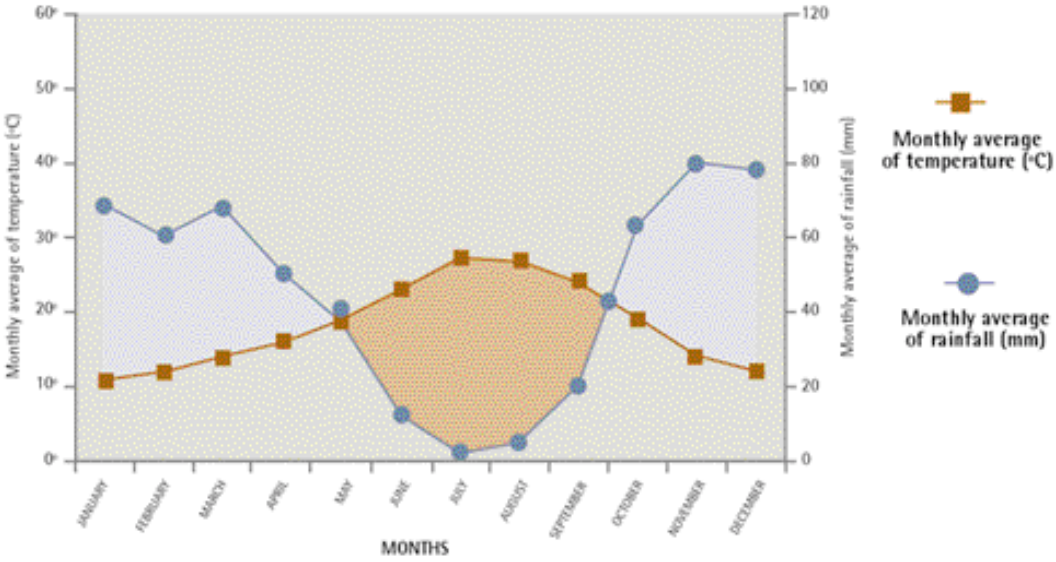
When we talk about nature in the Mediterranean region we cannot lose sight of the fact that the said nature, as we know it today, is the result of the existence of links between man and cosmos dating back to times before the Neolithic. It is in this ecoregion where the most ancient civilizations have flourished, the land having been put to agricultural and stockbreeding uses several millennia before Christ, as shown by the pollen records through which it is possible to ascertain that cultivation of vines, olive trees and chestnut trees in the Mediterranean Basin dates from the pre - Neolithic times (Grove and Rackham, 2001). Its nature is that of a littoral civilization, which exports and imports by sea the knowledge of primitive agriculture, the domestication of animals and the making of pottery (Fernández -Armesto, 2002). The turning of forest land into fruit - growing land (González Bernáldez, 1992a), by means of the selection of certain woody species due to the interest of their fruits and to other useful properties, did modify the composition of the Flora, the structure and the landscape (Blanco *et al*., 1997; García Antón *et al*., 2003).

The result of this secular relationship between man and nature is such that there is practically no Mediterranean ecosystem not having been modified by man, and that a large part of the original forests had already undergone transformation seven thousand years ago (Makhzoumi and Pungetti, 1999).

In addition to the inner sea from which the region takes its name, the climate is the unifying element of this territory and of its culture. A climate having mild features, but one which at the same time is set apart by its irregularity and its strong contrasts, and which beats the life rhythms, and rules the relationships in the natural world and in the man - made one, and also the ones existing between the former and the latter.

The coincidence during the summer of high temperatures and the lack of rainfall, a combination that creates an important hydrological shortfall, together with the pronounced climatic contrasts throughout the region and the unpredictable nature of precipitations, which does determine their wide variability over time, are the main

elements which characterise the Mediterranean climate. Its wide spatial diversity, brought about by small - scale meteorological phenomena and by the huge geomorphological complexity found in the ecoregion, makes possible the existence of a large variety of life forms adapted to different local conditions. On the other hand, the high time variability which characterizes it, a hardly predictable one both with regard to the types of changes and to the intensity and time range of same, is one of the main factors controlling the ecological working of land ecosystems in the ecoregion, the period of availability of water being one of the main limiting requirements (Rodó and Comín, 2001). In fact, the availability of water makes up the essential element in the shaping of the Mediterranean landscape, one of whose most peculiar features is the relative scarcity and the huge irregularity of the natural supply of the said resource. This fact is translated into long periods of drought interrupted by episodes of torrential precipitation which, acting as it does on land whose vegetation cover is not dense, gives rise to periodic flooding and to major erosion phenomena. The scarcity of water is a structural feature of the hydrological cycle of the Mediterranean ecoregion, which, in the main, takes place in the subsoil, whereas the majority of the surface watercourses are of reduced dimensions and limited development, and their beds remain dry for a large part of the year. Such an irregular availability of water, both from one year to the next and within the same year, has determined the great importance gained by subterranean waters in the ecoregion, having played, throughout the Basin's history, the role of axes along which the natural diversity, and the population and the territory's settlement process have been structured (Llamas, 1989). Mediterranean aquifers are characterised by having a low natural replenishment rate. The non - saturated area usually has a large thickness and the discharge areas are of small dimensions but have a high ecological value, for they reduce the interannual variability of the availability of water (González Bernáldez, 1992b).



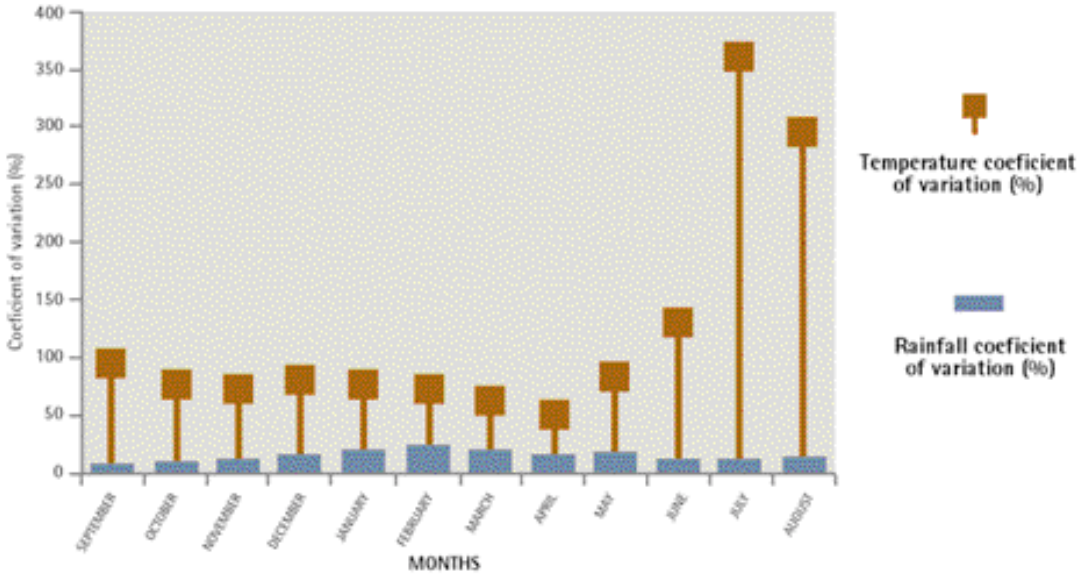


Figure 2. The main characteristics of the Mediterranean climate are, on the one hand, the coincidence of the warmest and the driest period and, on the other hand, the unpredictable character of rainfalls (Source: meteorological station of Sevilla –Tablada for the period 1960-2001; Coleto, in preparation).

The Mediterranean secular use of water has conditioned to a great extent the shaping of the ecoregion's cultural landscape; specially so, since the introduction by the Arabs of a deep knowledge of hydraulics, which made possible to convey water to fields already ploughed up, thus creating new intensive - farming crops, as well as to bring into cultivation marginal and rough lands (Fernández-Armesto, 2002).

The precipitation regime also has had a clear impact on the physical features of the region. The torrential nature of rainfall, which increases erosion and gives rise to catastrophic consequences for settlements, crops, etc., has determined to a great extent the adaptation of man to the environment, as exemplified by the cultivation, by terracing, of the steep Mediterranean mountain ranges, and as proved by the management of Mediterranean geomorphology for farming purposes, an activity dating back to the Bonze Age (Grove and Rackham, 2001).

In the same way, fire represents one of the most frequent disturbation agents in the Mediterranean. It constitutes one of the main determining factors in the diversity patterns of the Mediterranean flora and vegetation as well as a key process in the structural and functional convergence of the different vegetation communities in the ecoregion. As a matter of fact, the capability to regenerate itself following fires is one of the main characteristics of the Mediterranean vegetation (Lavorel, 1999; Ojeda Copete, 2001).

Fire as a disturbation agent in the Basin is linked with the intrinsic characteristics of the Mediterranean climate (Millán *et al*., 1998), where the high summer temperatures and the scarce precipitations reduce the moisture of the plants and, accordingly, increase flammability (Martín and Lara, 1989). Secularly, the Mediterranean man has imitated the natural disturbance caused by fire for the purpose of adapting and improving the ground's natural suitability for grazing, and even though Le Houérou (1974) suggests that the existence of naturally originated fires could have been part of the history of evolution in the Mediterranean Basin before the appearance of man, the increase in their frequency over the last 6.000 years would, in all probability, be associated with human activity since the Neolithic (Le Houérou, 1981).

As a rule, Mediterranean ecosystems find their stability by adjusting their organization and working to the magnitude, the intensity, the range and the frequency of natural perturbations (fire, drought, flooding) within an unpredictability gradient of interannual fluctuations. Mediterranean organisms as well as the human being have developed adaptative syndromes that enable them to live in these unnatural environments, characterized by their high degree of dynamism throughout time and space. The different strategies that have been developed are controlled not by the ranges of the key environmental factors, but by the fluctuation regime; basically by the climatic regime and by its effect on the hydrological regime.

There is no doubt that the diversity nowadays characterizing the Mediterranean landscape is closely linked with the uniqueness of its climate and with the unpredictability of natural disturbances, but it is also due to the replication by man of certain natural disturbances. In his attempt to adapt to a highly changing and hardly predictable environment, the Mediterranean man has found it necessary to diversify both the resources and their exploitation, and to adapt his lifestyle - based upon uncertainty - to dynamic and highly flexible models, bringing the systems under control by means of the imitation of natural guidelines. Transhumance, terracing, crop rotation systems involving cereals, leguminous and oleaginous plants, which characterize extensive unirrigated farming in the region, are, among others, secular practices basically adapted to the climatic peculiarities of the ecoregion. On the other hand, controlled fires and pasturing have made it possible over the centuries to mould and to open the Mediterranean natural systems.

As a matter of fact, this bi-directional man - nature relationship has conditioned the use of resources and the shaping of the Mediterranean territory, in addition to having made possible and having maintained the existence of relevant ecosystems, many of which are nowadays deemed to be of international importance. This is

exemplified by the coastal saltworks, whose development was, in the main, due to the Romans. Encircling the Mediterranean there are cities whose inhabitants, throughout History, have devoted themselves, almost to the exclusion of anything else, to the extraction of salt, to its marketing, and to the production of salted meat and fish and other derivatives, transmitting and maintaining a cultural identity within the Mediterranean arc (Sala Aniorte, 2000). Today, these saltworks, many of which remain in operation, are one of the main resources enabling the conservation of a large number of species of aquatic birds (Heath and Evans, 2000), and being part of the main ecological and marshy networks in the ecoregion. The agricultural, forestal and pastoral systems, in which the exploitation, direct as well as indirect, of agriculture, cattle - raising and that of forests for timber are combined by adapting the exploitation in time and in space to the environmental determining factors (impossibility of permanent and profitable farming cultivation, low productivity, stony ground, steep slopes, etc.), and integrated into other adjacent systems, such as farming cultivation (which provide food for the cattle when there is a shortage of grazing), the scrubland and the forestland, have modelled a territory characterized by its ecological stability, its diversity, its landscape, its history and its culture (San Miguel Ayanz, 1993). These semi - natural landscapes nowadays make up a large part of the protected natural areas in the region, and, by way of example, in the case of countries such as Spain, 80% of the area covered by Special Environmental Protection Zones belongs to extensive or semi - extensive farming areas (Beaufoy *et al.*, 1995) and to national parks such as Cabañeros National Park, which are a living example of the value of traditional agricultural, forestal and pastoral systems in the conservation of nature (de Miguel and Gómez Sal, 2002). Likewise, several authors have recently revealed the role played by cattle raising in the Mediterranean region, not as a factor that degrades vegetation, but as a useful tool for its management and as a boost to the diversity of vegetation (Zamora *et al.*, 2001).

The secular linkage between nature and culture in the Mediterranean region has given rise to a concern, equally millennia - old, for the protection of natural resources. Traditionally, in the Arab world game reserves were established (known as *Ashhur Al Hurum*) in which a close season was in force during certain months throughout the year. The creation and protection of such game reserves dates back to 1240 when they were established in Lake Ichkeul (Tunis), which has been managed as such well into the twentieth century, and today has been integrated into the namesake national park (Rosabal, 2003). The *Hemas* systems, consisting in protected areas managed for the purpose of avoiding overgrazing, were introduced to the South of the Mediterranean Basin even before Islamic times (Saud, 2000). Greeks and Romans alike established forest systems and other areas the aim of

whose management was the protection of the wild fauna (Fernández-Armesto, 2002). In this regard, it is possible to say that the Mediterranean region has a millennia - old experience in the creation and management of natural protected areas (Rosabal, 2003).

The combination of climatic and geological conditions with cultural and historical factors has brought about, in the region, a heterogeneous territory, whose cultural characteristics prevail over the natural ones, in which the landscape mosaic resulting from the centuries - old diversification of the uses of the land has played an important role in achieving the wealth of animal and vegetal species that characterize the Mediterranean Basin. The resulting high environmental diversity, local as well as regional, has enabled these areas to feature a high biological diversity, and has made it possible for the Mediterranean to be considered to be one of the planet's twenty hotspots of biodiversity (Myers *et al.*, 2000), a fact that has a lot to do with the centuries - old human practices, which have wisely integrated - throughout the region and over time - different uses and exploitation methods adapted to the ecological realities of the territory (Pineda and Montalvo, 1995).

The semi - natural (managed) ecosystems can contain a high biodiversity consisting of species with a greater capability to face the future's uncertainties than that of the rare, relict or exceptional species. It is also known that ecological succession is accompanied by a biological diversity curve whose highest point is not usually reached in conditions of maximum maturity, but in a previous situation with a certain degree of exploitation (Figure 3) (Pineda and Montalvo, 1995). The mosaic - like structure of the landscape, in which ecologically mature tesserae do coexist with agricultural tesserae and with a diverse weft of corridors, can maintain high biodiversity values deriving, on the one hand, from the huge diversity of habitats shown by these mosaics, and, on the other hand, from the energetical tensions appearing between systems having different degrees of ecological maturity (De Miguel *et al*., 1994). This knowledge can particularly be applied to the management and the planning of Mediterranean landscapes (Makhzoumi and Pungetti, 1999), in which the long joint - evolution process of nature and culture is responsible for managed landscapes, which are compatible with high values of biological diversity (Múgica *et al.*, 2002). Nowadays, the ecoregion is home to 10% of the vascular plant species catalogued up to the present time and to 2.8% of the planet's vertebrates (Myers *et al*., 2000, Zamora *et al.*, 2001). Such a diversity is the result of a high local diversity, but also that of a high regional diversity, due to the fact that both landscape and ecological conditions are subject to sudden changes (Blondel and Aronson, 1999).

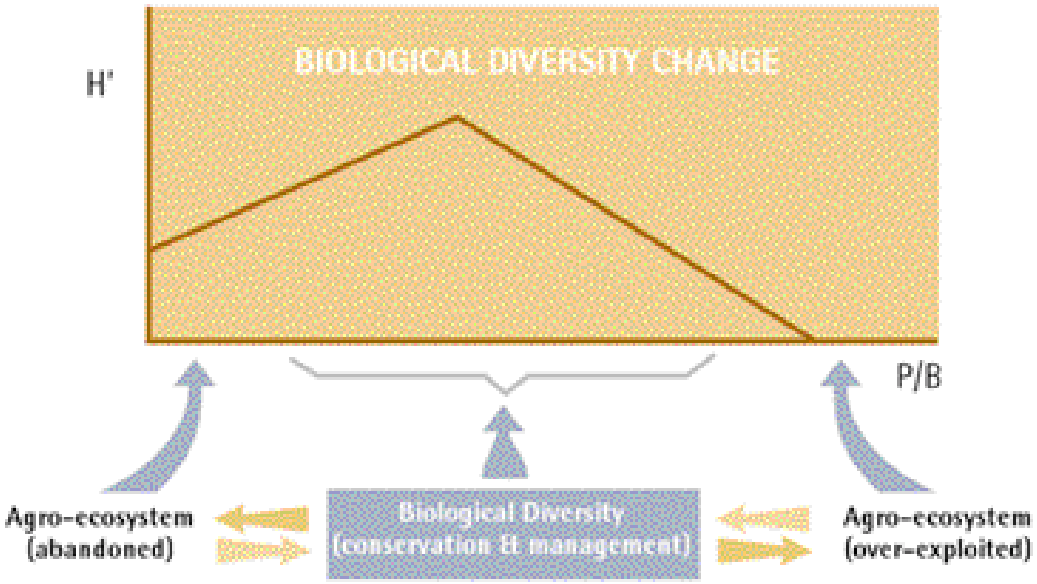


Figure 3. In over - exploitation (highly accelerated flow of energy) or abandonment (greatly slowed - down flow of energy) situations, the lowest biodiversity values are reached. In cultural landscapes, the highest biodiversity values are reached in situations characterized by intermediate management or exploitation levels (Source: Pineda and Montalvo, 1995).

However, the Mediterranean region is currently evolving from heterogeneous and diverse landscapes and ecosystems towards a gradual homogeneousness of the territory. The new technological advances applied to and focused on a maximal exploitation, as opposed to an optimal one, of the resources have had an effect on the cultural and ecological impoverishment of the landscape. This fact, which in other regions of the planet has a much lesser impact within the framework of protected areas, is, in the Mediterranean case, one of the main questions to be taken into consideration in order to reach the goals which justify the existence of the ecoregion's protected heritage. For in the Mediterranean Basin is not possible to separate man from nature, since we are not talking about natural landscapes in any strict sense, but about cultural landscapes (Naveh and Liberman, 1993). It is not enough to combine productive activities and conservation; on the contrary, it is basic to maintain a diversified use of the territory and to imitate the traditional culture aimed at making the most of the resources and the ways of life which have determined, to a great extent, the shaping of a heterogeneous and ecologically complementary landscape. It is so much so, that the singularities, the high level of endemism, the diversity, the ecological value and the high productive potential which are currently to be found in protected areas and in a large part of the rural areas in the Mediterranean region, are the result of the historical attitude of human societies in this territory, who have used the natural mechanisms as a source of inspiration to orientate the production and the uses of the land.

The establishment of linkages in the Mediterranean landscape; the movement from protection islands to networks and systems, in which the relationships between protected areas and the territory (protected nature - unprotected nature and nature - society) are considered along with the relationships between and within maritime, coastal and terrestrial protected areas, requires a suitable approach explicitly set within the social, cultural and environmental context of the ecoregion. This must be based not so much on the establishment of the traditional ecological corridors and buffering zones successfully tried in other areas, but rather, and basically, on the multiple functionality - environmental, cultural and social - of its protected areas and of the territory where they are located (García Mora and Rosabal, 2003).

Such an approach does entail, of necessity, taking into consideration the ecological, social, and historical and cultural flows existing in the territory. To the traditional ecological dimension within which the protected heritage is conceived, in the Mediterranean eco- region are added, as a conceptual and vital need, the cultural dimensions (maintenance and recovery of sustainable uses, traditions, etc.), the social ones (aimed at the settlement of the "conservation versus development" types of disputes), the financial ones (by proving the profitability of ecologically unaltered territories) and the political ones (by making progress towards environmentalization and shared management). These five dimensions that shape the territory do coexist in constant, permanent and intimate interaction and interrelationship. As a result, any strategy put forward for the purpose of establishing functional linkages within the Mediterranean landscape must be devised by taking a holistic approach, dealing with and integrating the multiple dimensions of the very concept, and, accordingly, must bear in mind that new administrative networks, which currently act as a barrier, have to be compatible with the natural networks, organised by taking as a starting point the wefts created by water, whether flowing underground or on the surface, and with the cultural networks, adapted to and compatible with the natural ones, and having a secular presence in the territory.

Linkages in the landscape. Conservation beyond the boundaries of protected areas

Traditionally, the conservation of nature has been, in the main, based on the administrative demarcation of fragments of the territory in which, having the conservation of species and/ or areas as the primary purpose, legal and management instruments are applied which are different from those used in the surrounding territory. Through the implementation of these criteria, in many countries belonging to the Mediterranean Basin, sets or inventories of unconnected

spatial conservation units have been gradually consolidated, which are kept separated from the surrounding territory by discrete boundaries, and which are administratively managed in a coordinated manner. The isolation of the protected areas so devised has brought about that in the majority of cases these isolated fragments of nature be not self-sustainable in ecological terms, nor are they so from a social, cultural or financial stand point (Múgica *et al*., 2002).

One of the key questions to break the gradual isolation of the protected areas is that of ecologically permeabilizing the administrative boundaries (Bennet, 1999). However, such permeability is actually non existent nowadays and it is highly unlikely that there be a coincidence of administrative and ecosystemic boundaries in the territory (Figure 4). Reality shows that both superimpose on each other as a rule, and this fact, which in the Mediterranean region is one of the main sources of tension, does condition the stability of the ecosystems and the functionality of the protected areas as conservation areas (García Mora and Rosabal, 2003).

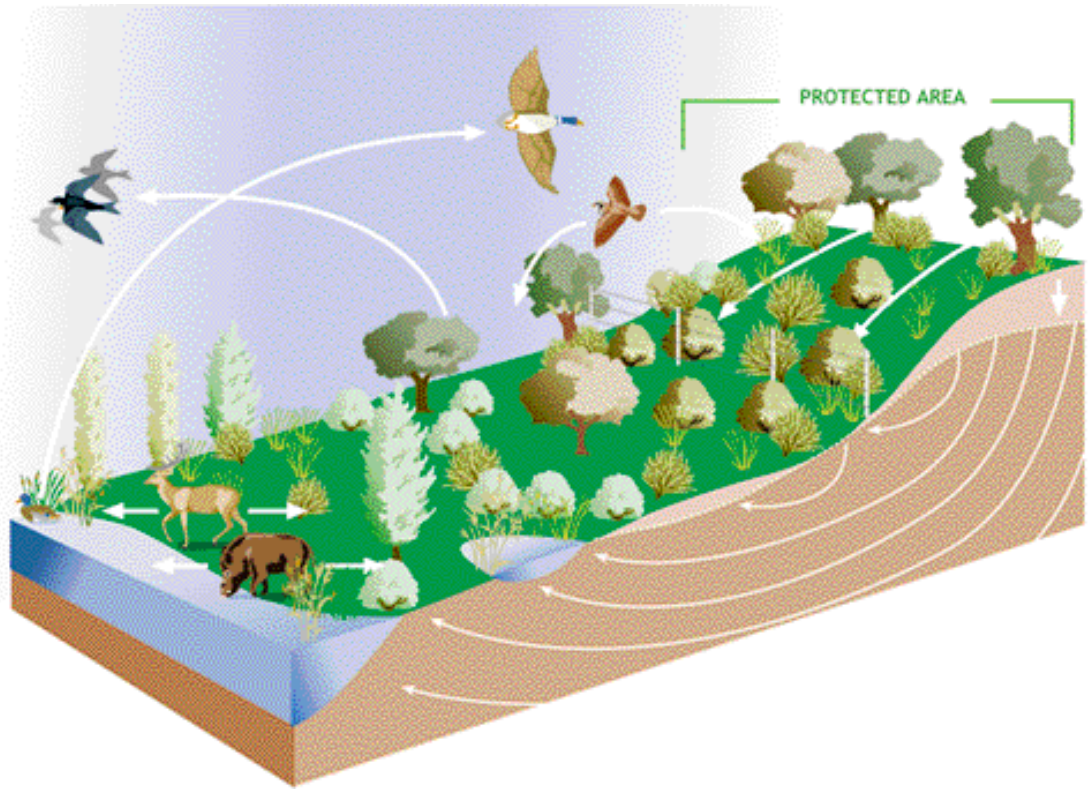


Figure 4. Very few protected areas are sufficiently large to maintain on their own the ecological integrity of their ecosystems, for in the majority of cases the key natural processes determining such integrity appear and operate beyond their legal limits. (Adapted from Montes et al., 1998)

The challenge we are facing in the Mediterranean region is how to understand in put into practice the concept of conservation beyond the administrative limits of the protected areas, and how to integrate these areas into the territory's general context, taking in the different time and space scales in which the different ecological, social and cultural processes occur. This necessary environmentalization of the territorial matrix could be remarkably helped by fostering the horizontal dimension of the conservation policies, so that ecological permeability criteria be incorporated into the whole set of sectorial actions on the territory. It is along this path that we still need to make progress through the integration of system ecology, the regulation of the territory and the conservation of nature, for the purpose of identifying and boosting the different territorial elements that may enhance the coexistence of conservation and development (Múgica *et al.*, 2002). To that end, it is also necessary to achieve a greater environmental awareness and involvement by local populations and by governments - at the different administrative levels - in the use of good practices in the different types of exploitation and sectorial services, in such a way that both the ecological and the social dimension be helped, by means of the maintenance of the flow of goods and services from ecosystems to society at large - e.g.: formation of soil, nutrient cycle, water cycle - deriving from the proper working and structure of the ecosystems (de Lucio *et al.*, 2003). In this regard, two *sine qua non* conditions emerge for the establishment of functional linkages in the landscape; the first one being that these linkages must be based on the ecological, social and cultural peculiarities of each particular region; the second condition is that in order to achieve the greatest possible degree of collaboration - making it possible to maintain the said linkages -, it is necessary to quantify and to prove the financial profitability of the maintenance of ecosystems in the most unaltered possible state (García Mora and Rosabal, 2003).

Over the last few decades several initiatives have been put into effect at an international level aimed at the conservation of biodiversity through the development of management models that include not only the core areas of conservation, but also the ecologically non - neuter matrix in which they are immersed (Box 2). As a rule, these initiatives do approach the conservation of biodiversity at the ecosystem, landscape or region level and the emphasis of the conservation actions is placed on the maintenance or the improvement of the ecological consistency of the protected areas. The achievement of this objective is basically sought:

- By improving interconnectivity between the conservation nuclei, by means of the restoration of degraded ecosystems and the establishment of biological corridors;
- By establishing ecological buffering zones, in such a way that critical conservation areas are guaranteed to be protected from potential impacts originating in the territorial matrix, and

- By fostering the complementariness between productive uses and the biodiversity conservation objectives, particularly, by making the most of the potential value that for the conservation of ecological biodiversity have the semi - natural landscapes.

Box 2 Main conservation initiatives outside the limits of protected areas (Bennet and Wit, 2001)

- Man and Biosphere Programme (UNESCO, 1974). It acknowledges the need to find a balance between the conservation of natural areas and the profitable uses and the needs of local populations. It establishes the division into zones of the territory included in the Biosphere Reserve, drawing a distinction between core conservation zones, buffering zones and transition zones.
- Flyways and Corridors Programme. Focused on aquatic birds for the purpose of responding to the needs of the migratory species (e.g.: Western Hemisphere Shorebird Reserve Network).
- Ecological Networks. Basically developed in Europe. They are based on territorial planning on a landscape scale (e.g.: Pan - European Ecological Network).
- Reserve Networks. Developed in North America, having as their main purpose that of conserving biodiversity on a regional scale (e.g.: Wildlands Project)
- Bioregional Planning. Focused on the planning and management of biodiversity and of the ecosystems' goods and services on a bio - regional scale (e.g.: St. Elias -Northern Borders Bioregion).
- Ecoregional Conservation. An initiative by the WWF aimed at the conservation of the most important ecoregions in the planet (e.g.: Global 200 and Carpathian Ecoregion).

Within the framework of these new conservation approach, the IUCN did take - in the 1996 World Conservation Congress - a decision concerning ecological networks in which the potential value was acknowledged of extending the conservation approaches beyond the protected areas, and in which *an appeal was made to all members of the Union for the fostering of the development of ecological networks on national, regional and intercontinental scales as a means to improve the integrity and the resiliency of biodiversity*, and the Director General was asked to *use all resources to, on the one hand, revise current experiences in the development of ecological networks and, on the other hand, to foster cooperation in order to boost the development of new networks on a regional and an international scale, paying special attention to the ecosystems and species reaching beyond national borders*.

As a result of the previous decision, AIDEnvironment, in cooperation with IUCN, has carried out a revision of 119 initiatives developed by organizations, both governmental

and non - governmental, initially identified as ecological networks. Out of these, only 38 could be really documented, 17 of which were international, 10 were national and 11 were sub - national (Bennet and Wit, 2001). As a general rule, all these initiatives envisage as their objective the conservation of species and habitats, and the majority of them also include the rational use of natural resources, but only a few of them explicitly consider the maintenance of ecological processes and the conservation of the cultural heritage.

In the Mediterranean region a large number of initiatives are currently underway aimed at the devising and implementation of ecological networks on different approximation scales (international, national and sub-national). However, these initiatives are, in the main, being put into effect in the countries belonging to the Northern half of the Basin, while in the countries belonging to the Southern half of the Basin, Mediterranean examples of networks are almost non - existent as yet (Múgica *et al.*, 2002; García Mora, 2003).

A Mediterranean frame of reference

If Mediterranean ecosystems are to be managed with the twofold purpose of preserving and exploiting them in a sustainable manner, it is necessary to do it within the framework of a complex mosaic of elements, not only naturals but also, and specially, cultural. Mediterranean landscapes are to a great extent the result of secular human activities on the territory. They are one of oldest landscapes having been modelled by the human being with a view to rendering himself capable of overcoming the biophysical restrictions imposed by the Mediterranean climate, with regard to the unpredictability of rainfall and the seasonal scarcity of water, the poorness of the land or the effects of natural perturbations such as fire, drought or flooding.

To deal with these characteristic conditions of the Mediterranean region, the human being has developed diverse traditional systems of extensive and semi - extensive use (pasture lands, olive groves, vineyards, cereals, terraces, etc.) of natural resources, characterized by their high efficiency in the use of energy and nutrients, by adjusting their activities to the natural production cycles. The result of this strategy has been the shaping of a multifunctional rural landscape, with a high degree of heterogeneousness both in the space and over time, and a high degree of connectivity (the capability of the territory to facilitate the flow of one species or one set of species) (Taylor *et al.*, 1993) and, above all, of permeability (capability to maintain within the territory the essential ecological wefts and flows) (Noss, 1993; Forman, 1995). Since the wealth of species is closely related to the heterogeneousness and the shaping or spatial structure of the territory, the reason becomes clear why the Mediterranean Basin is one of the most important

biodiversity spots in the planet. Nowadays we know that areas with and old and high cultural diversity frequently match up with places having a high degree of biological diversity (González Bernáldez, 1991; Pineda and Montalvo, 1995). From this Mediterranean approach, the human being and his activities are deemed to be a dynamizing element from inside the natural systems and not an external agent perturbing them from the outside, which justifies the need to integrate the territory's ecological flows together with the social and economical and the cultural ones.

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Figure 5. The rural Mediterranean landscape is characterized by featuring a high degree of heterogeneousness, both concerning time and space, which includes a diverse mosaic of natural, semi - natural and anthropic systems. This diverse - landscape feature provides it with a high capability to facilitate biological and ecological flows within the territory .

These characteristics, heterogeneousness and spatial configuration, typical of the Mediterranean nature require a perspective of their own in the devising of linkages in the landscape, that may respond to the needs and realities of a region in which the achievement of a pristine state of nature is not intended, but, rather, the maintenance of a mixture of natural and cultural values which has proved itself optimal for the conservation of the high ecological diversity values that characterise it. Bearing this goal in mind, it is necessary to consider the Mediterranean basin as a highly heterogeneous semi - natural territory, made up of a mosaic consisting of ecological tesserae having different renovation rates and which are interconnected on different space and time scales (Burel and Baudry, 1995; Farina, 1997). Immersed in this territory, in which cultural and natural diversity are mutually dependent, and in which the resulting heterogeneousness of the landscape allows the maintenance of ecological

diversity (Múgica *et al.*, 2002), the very concept of protected area in the Mediterranean - basically consisting in areas subjected to the action of man and characterised by their multifunctional character - instead of being the traditional subject of the conservation process, becomes a key tool for the organization and integration of the different sectorial policies having a territorial and environmental repercussion, by playing the role of evolutive bridges to move from a compartmentalised and sectorial vision to the holistic and global management of the territory.

It is in this context that the ecosystemic approach, its conceptual and methodological principles, becomes most appropriate to deal with the management of protected areas in the Mediterranean Basin, and the main purpose of the protected heritage in the ecoregion ought to be aimed at *the preservation of the ecological integrity of the terrestrial and aquatic (marine and continental) ecosystems in the context of multifunctional landscapes, by promoting their wise use for the maintenance, today and in the future, of their ecological, social and economic, historical and cultural functions.*

To reach that goal it is basic to make progress towards the shared management for the conservation or restoration of biological and cultural diversity and, as a result, it is necessary to take into consideration not only the administrative boundaries for the delimitation and the management of protected areas, but also the ecological, social and cultural borders that determine the integrity and the ecological health of the territory. In this regard, the approach to the Mediterranean protected heritage from an ecoregional standpoint requires the definition of functional management units by taking as a starting point the ecological and the social and cultural dimensions; in other words, the dimensions that include and characterize the cultural landscapes.

A new concept of protected area aimed at conservation beyond boundaries

According to IUCN (1994), protected areas are defined as *land and/ or sea areas specially devoted to the protection and the maintenance of biological diversity, as well as that of the related natural and cultural resources, and managed through legal means or other efficacious means*. This definition, which envisages the protected areas as being outside the general territory as a whole, makes it obviously difficult to put into effect the ecosystemic approach required for the efficient management of the protected heritage in the Mediterranean region, a new conceptualisation of the term being, therefore, required which may reflect the new reality of protected areas in the ecoregion. In this regard, the concept of these areas that appears in the Master Plan of the Andalusian

(Southern Spain) Network of Natural Protected Areas (Consejería de Medio Ambiente, 2003), namely *a functional and administrative unit - whether continental or marine - managed within the framework of a planning system which, in maintaining the integrity of its ecosystems, contributes to the conservation of the biodiversity and the environmental and cultural services of an ecologically interconnected territory on different time and space scales*, makes it possible to understand the management of Mediterranean nature in a holistic manner as well as to formalize systems of protected areas based less upon the establishment of a reticular mesh than upon the design of a territorial structure in the shape of a mosaic, in which the distribution of the tesserae having different degrees of ecological maturity enables the existence of key processes and that of ecological connectivity over time and throughout space.

Protected areas, according to this definition, and from the ecosystemic standpoint applied to the conservation of nature in the Mediterranean region, are not objectives in themselves, but instruments for reaching the goal of the conservation of goods and services supplied and rendered by the ecosystems. They are acknowledged to be key elements for the conservation of natural ecosystems and the biodiversity they harbour; for the regulation of the water cycle and that of the biological, geological and chemical cycles; for the protection of human communities against natural perturbations; for the reactivation or the maintenance of the local economy or, also, as essential places for research, education, enjoyment and culture (Consejería de Medio Ambiente, 2003).

Management Mistakes and Opportunities within the Scope of the Mediterranean Basin's Protected Areas

Ever since the inception of conservation policies in the Mediterranean region, the dichotomy has been generally accepted that involves the management of protected areas with a view to protecting nature, and that of the surrounding territory in order to make the most of it in financial terms. The progress and the present economic system have accentuated this dichotomous management of the territory, and together with it, the gradual isolation and the biocentric approach in keeping with which the ecoregion's protected areas have been, in the main, managed.

It can be said that, as a general rule, the main elements of tension posing a threat to protected areas in the Mediterranean region are not exclusive to the basin (Box 3): fragmentation of the territory; basically biocentric management criteria; lack of enviromentalization and coordination of territorial policies; insufficient social awareness and participation; scarcity of verified scientific information; lack of adequate management tools and legal instruments, etc. However, and in spite of the universality of these limiting factors, in the Mediterranean environment the solutions

and the answers to the aforesaid problems lay, in the main, under the characteristics inherent in the region's landscape and traditional ways of life.

Box 3 **Main obstacles to ecological connectivity in the Mediterranean territory and main opportunities to mitigate them**

(Findings of the connectivity workshop held as a part of the Mediterranean Conference "Protected areas in the Mediterranean Context. Towards a Rational Use of Protected Areas". Murcia, March 2003)

Obstacles	Ways to Mitigate Them
Lack of physical linkages connecting protected areas.	Preserving the remaining functional elements in the landscape as ecological connecters and identifying critical and strategic areas in order to set priority actions.
Lack of administrative coordination and, as a result, non - coordination of sectorial policies and conflicting objectives concerning the same territory.	Promoting the introduction of strategic environmental assessment procedures and the development of collegiate bodies of social participation.
Lack of environmental awareness in the social sectors that are relevant to the achievement of the objectives envisaged in the protected areas (agriculture, fishing, etc.).	Education and encouragement of an active role to be played by society in the taking of decisions.
Scarcity of scientific knowledge, information and tools for the devising and the appropriate management of protected areas and their connectivity (placing special emphasis on marine protected areas).	Promoting multidisciplinary studies with an ecoregional approach.
Lack of legal instruments for the management of across - the - border biophysical processes.	Promoting the establishment of across-the-border protected areas; specially, marine ones.
Lack of integration of protected areas being different in scope.	Boosting the development of systems of protected areas that include terrestrial, coastal and maritime areas.
Loss of Mediterranean habits and ways of life (e.g.: slow food *vs.* fast food) with repercussions upon the multi -functionality of the landscape.	Adding value to the Mediterranean culture by means of the development of a new type of tourism.
Tendency towards biocentrism in the majority of plans for the management of protected areas.	Focusing the management of protected areas not only on species but also on cultural landscapes.
Lack of a Mediterranean conceptualisation that could make uniform management possible.	Preparing a glossary of terms related to the management of Mediterranean protected areas.

Obstacles	Ways to Mitigate Them
Lack of coordination of the wide variety of international initiatives, instruments and agreements.	Fostering the development of international protection concepts such as Biosphere Reserves and Ramsar zones.

From a Biocentric Approach to an Ecosystemic Approach. From Singular Values to Ecological and Cultural Integrity

The majority of conservation strategies have traditionally adjusted themselves to approaches that encourage the leading role played by species and their populations. For many managers, the existence of protected areas is justified by the fact that they are home to certain unique species (endemic, rare or in danger of extinction) and/ or emblematic ones (i.e.: enjoying popular acceptance) protected, as a rule, by different laws and agreements. According to this concept, the long - term survival of the species and their populations requires as a precondition the conservation of a representative fraction of the environments or habitats where they live and breed. The European Union's Directive concerning the Conservation of Natural Habitats and the Wild Fauna and Flora, the one known as the "Habitat Directive", is the most significant example of a legal regulation that adheres to this biocentric school of thought concerning the protection of nature. The majority of conservation policies supporting this approach take as a point of reference the defence and custody of biological diversity, associated to the *wealth of species* or to the *biological heritage of a territory* (González Bernáldez, 1992b). Usually, this perspective boosts and promotes conservation strategies based upon the creation of protected areas in critical mega - diversity zones, or in those that are home to species or communities enjoying huge popular or scientific acceptance (Prendergast *et al.,* 1993). In keeping with this idea of conservation, conventional management models have been promoted whose priority has been the protection of the biological constituent element of the ecological systems, specially, that of biological singularities, against other global or general visions which are perfectly complementary and even necessary (Montes *et al*., 1998).

On the other hand, the biocentric approach to the management of the natural environment, also brings about some important restrictions whose isolated use causes the generation of management models being limited in scope. In this regard, there are important asymmetries in the choice of organisms being the subject matter of study and conservation. There is a highly considerable conservationist bias towards certain emblematic species of vertebrates and superior plants to the detriment of other, less outstanding and attractive organisms (bacteria, fungi, plankton, ground

invertebrates, etc.), hugely important though they are for the working of the ecological systems in terms of biomass and flow of energy (Montes *et al*., 1998).

By way of contrast, in the functional management models, that is to say, those which observe and analyse the natural environment as a whole in terms of transfers of matter and energy, and which establish their position around the organisms, the populations, the communities and their interactions, natural areas are examined globally and are conceived as entities having their own emergent properties. The biological component - the organisms - gets diluted when it faces the essential processes which control the flow of energy and materials. From this standpoint, the characterization and conservation of the inputs and the outputs of energy and matter ensures the protection of the organisms included in the system, with no need to develop to that end a specific treatment of their populations. However, and even though the greatest part of ecological systems create a unit in their general working model, the functional approach usually fails to take into consideration the important role played by the so called *key species* in the trophic nature that control the rates of regulation of energy and materials (Krebs, 1988; Bond, 1993), and/ or the *engineering organisms of the ecosystems*, which directly or indirectly modulate the availability of resources for other species when they physically modify biotic or geotic materials (Jones *et al*., 1994), in spite of the fact that both types of organisms are ecologically essential; for they have a basic repercussion upon the global working of the system (Montes *et al*., 1998).

In order to overcome the problems deriving from a fragmented and sectorial idea of the natural environment, new approaches have been explored to the management and conservation of ecosystems in increasingly wide frames of reference, including the human being and his activities among the elements that must be taken into account. The said activities include the ecosystemic analysis, which is oriented towards the development of strategies allowing the harmonious and balanced coexistence of the exploitation of natural resources with the maintenance of physical, chemical and biological processes which determine the organization, the working and the dynamics of the ecological systems (Montes *et al*., 1998).

Modern proposals concerning the conservation of nature do acknowledge the importance of maintaining the ecological processes - which link species with habitats - for the conservation and restoration of biological diversity (Pineda and Schmitz, 2003). As a rule, they go beyond the preservation of singular elements and include as fundamental objectives the conservation of ecological processes, as well as the preservation of the ecosystems' natural dynamics, through a sustainable use of them (Noss, 1993; Franklin, 1993; Regier, 1993; Montes, 1995; Knuffer, 1995) (Figure 6). These new proposals, based on the management of ecosystems seeking out, through

an integrated and integrative approach, the harmonious, balanced and reasonable coexistence of the maintenance of the functionality of natural systems, and the sustainable exploitation of the numerous environmental services that these systems generate for the human systems, deal with the management of nature as a set of functional units or ecosystems and not in a compartmentalized way with a view to guaranteeing their sustainability. Taking the ecosystems as the management unit makes it possible to understand and to shape in an integrated manner the response by the natural areas when different management models are implemented in them (Montes *et al.*, 1998). When they take an ecosystemic approach, managers, owners, local population, economic sectors, the scientific community and the institutions, do not act in an isolated way but, instead, they work in a cooperative manner to achieve the sustainability of the ecological and economic systems.

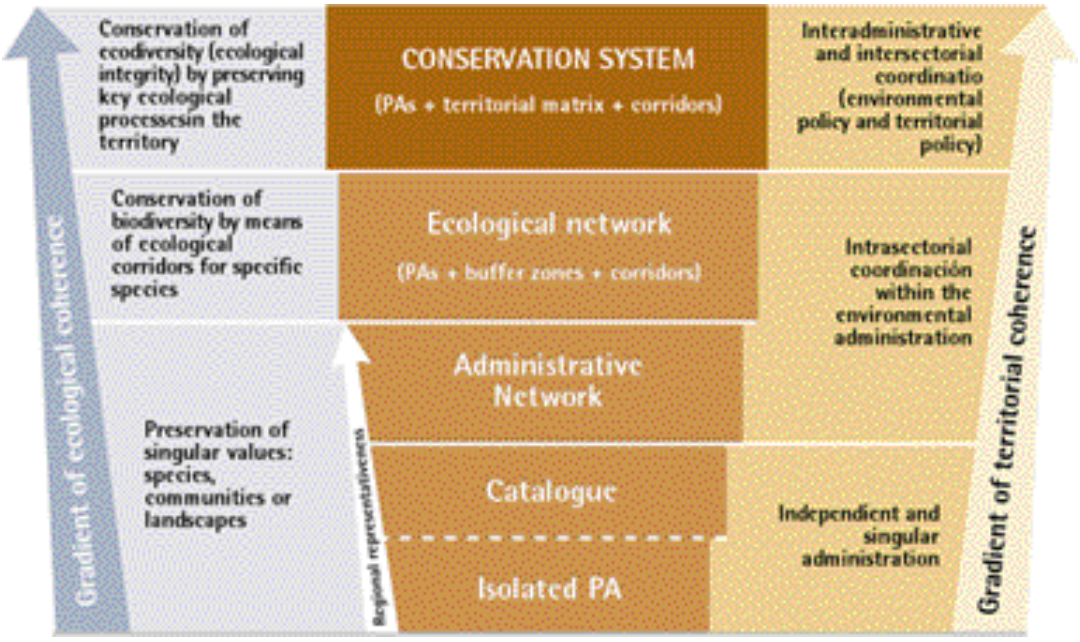

Figure 6. The evolution of conservation policies, from areas to systems, follows a double gradient of ecological and territorial coherence. Conservation systems represent the most coherent end of the gradient from an ecological and territorial standpoint. The conservation objectives are focused on the preservation of the ecological integrity, and the achievement of these objectives is brought about by means of the inter - administrative and inter - sectorial coordination. At the opposite end, the conservation policies are to be found that have been mainly developed up to the present time, based upon the protection of isolated areas from a biocentric standpoint, and upon their management in an independent and individualized manner (Adapted from M gica et al., 2002).

The implementation of the ecosystemic approach is organized around the characterization of two attributes of the ecosystems; on the one hand, the ecological integrity and, on the other hand, the ecological health. The former relates to the

capability by an ecosystem to maintain the structure and the working typical of it throughout the term of its natural evolution, in the framework of changing conditions due to natural or man - made causes, which infuses it with a certain potential to respond to natural and/ or man - made perturbations (resilience). It refers to the persistence of its operation. In other words, what an unaltered ecosystem is telling us is that the components and processes needed to maintain the desired chart of reference are intact and normally working.

The management of protected areas based upon the conservation of the ecological integrity of their ecosystems demands that the territory be managed in a global and coherent way, for the natural processes determining such management generally reach beyond the administrative limits or the walls of the legally protected natural areas (Figure 4).

In the case of the majority of ecosystems outside the Mediterranean Basin, they are deemed to have a maximal level of integrity when their original structure and working remain intact, when they are not under the influence of human activities. But in the case of Mediterranean ecosystems, due to the close inter - relationship established between the human being and the natural environment, together with the ecological integrity is also necessary to take into consideration the cultural integrity of the ecosystems. Namely, they have to be visualized as ecological and economic systems associated to the systems involving traditional uses or historical exploitation of natural resources.

On the other hand, it is necessary to take the complementary concept of ecological health into account, which refers to the social value of ecosystems and is understood as the capability possessed by ecologically unaltered ecological systems to supply, in a sustainable manner, i.e., without interruptions, weakening or losses, a rich and diversified flow of goods and services. It is understood that an ecosystem having a good level of ecological integrity is a sort of natural capital investment, for some of its ecological functions generate services (assimilation of residues, fertility of the soil, purification of water, flooding control, erosion control, aesthetic and emotional pleasure, etc.), and some of the constituent elements of its biotic and geotic structure produce goods (species having a commercial or cynegetic interest, or one related to the fishing industry, to cattle breeding, to agriculture, as a genetic reservoir, for the supply of water, minerals, etc.) which may or may not have economic value in market - led systems, but which, in any case, are the source of indispensable benefits to society (Montes *et al.*, 1998). Ecological integrity does reflect, therefore, the ability of ecosystems to generate and maintain valuable services for human beings. From that standpoint, the ecological concept of health of

the ecosystems is closely linked with the concept of sustainable development (Brudland, 1987), which entails regulatory elements by the managers in order to integrate environmental objectives, together with the economic and social ones, into a development policy.

On the scale of the complex mosaic of uses represented by the Mediterranean landscape, the conservation of its integrity and, accordingly, of its health, requires the maintenance of the heterogeneousness, along with optimal combinations of ecosystems, natural as well as semi - natural or artificial. That is to say, ecosystems having different levels of integrity which, within the territorial mosaic as a whole, changing in space and over time, mean stability translated into a dynamic, sustainable and varied flow of environmental services.

From Passive Management to Active Management

The management of natural protected areas usually entails, as a rule, a passive management, one of control over certain activities thought to be harmful for conservation and aimed, in the main, at vigilance and customer services (Vicens i Perpinyá, 2002). This type of management, useful in the case of pristine areas, is not, however, the most appropriate in the case of the Mediterranean natural areas, in which it becomes necessary to take into consideration both natural and cultural values, as well as the interaction between them (Europarc-España, 2002).

The process of joint evolution involving natural and cultural forces, whereby over centuries or even millennia the human being has modified the Mediterranean natural ecosystems, gradually turning them into semi - natural or cultural ecosystems of an agricultural, forestal and pastoral type, or into ones of an industrial kind, such as the coastal or interior Mediterranean salt - works, results in the Mediterranean region's being the place where, more that anywhere in the planet, the conservation of the ecological integrity of the majority of its ecosystems is inexorably linked with the maintenance of its traditional culture and its characteristic way of life.

This fact explains why in the majority of Mediterranean protected areas the need becomes unavoidable to intervene in an active way - basically through the traditional use systems - in the structure and the dynamics of their ecosystems, for the purpose of maintaining certain desired ecological integrity charts. Only some types of Mediterranean natural ecosystems can accept natural regulation or passive management models.

In this context, moving into a more active management stage entails the integration of natural and human systems, and in this regard the territorial matrix becomes just as important as the protected areas themselves.

From Administrative Units to Functional Units. The Role Played by the Territorial Matrix

It is hardly likely that protected areas become capable of maintaining the biodiversity and the integrity of the ecosystems they support if they are included in a highly degraded territory reducing the genetic flow or perturbing the nutrient cycles and the wefts of the water cycle. On the other hand, it is important to acknowledge that protected areas cannot be managed as islands in a territory of which they are a part, and with which they share a set of biophysical, social and economic, historical and cultural factors. Very few protected areas are sufficiently large to maintain on their own the ecological integrity of the ecosystems, for in the majority of cases, the key natural processes determining such integrity appear and operate beyond their legal limit, which is why action programs must look further afield than the areas' boundaries (Bennet, 1999).

Because of all this, from an ecosystemic standpoint, protected areas must be considered as a part of a larger territory delimited according to ecological criteria. Its borders, which have a functional significance, must define a large area or ecoregion having a certain degree of homogeneousness with regard to one or to several of its abiotic (climate, geomorphology, hydrology, soils) o biotic (populations and natural communities of organisms) components. The eco-regions so defined must be large enough to encompass the time and space dimensions of the natural processes and territorial wefts which define the ecological integrity of the ecosystems taken in by them and, therefore, that of the protected areas.

The ecoregional vision fosters the need to manage the natural systems on the basis of these ecoregions as the safest way to coordinate management plans and programmes having a territorial significance, as well as to optimise the material, human, economic and institutional resources devoted to the conservation of natural populations of threatened organisms or protected areas.

The most important benefits achieved by adopting an ecoregional vision are as follows (Consejería de Medio Ambiente, 2003):

- It makes it possible to think, to plan, and to act according to ecosystems (homogeneous spatial units having functional limits) and not only in terms of legal entities having administrative limits (countries, provinces, municipalities, protected areas, etc.); for, as it has already been mentioned above, the key factors and processes determining the ecological integrity are given in spatial magnitudes which almost never coincide with administrative boundaries.

- It makes it possible to move from sectorial, local and competitive management models into other, integrated, global and cooperative ones; as well as to define which are the official entities or bodies with which a close cooperation must be encouraged with a view to integrating policies or action programmes (which would otherwise be isolatedly put forward) enabling the unified and comprehensive management of the ecosystems extending beyond the boundaries of administrative bodies and authorities.

- It makes it possible to identify voids, overlappings, redundancies or complementarities in the conservation policy of a country or province, enabling the prioritisation of actions and the optimisation of available management resources. In this way it becomes possible, for instance, to show the coherence of a network of protected areas (gap analysis) in assessing whether or not it is representative of a territory's ecological diversity; whether or not it includes the most significant biodiversity points; or whether or not the key ecological processes are being taken into consideration that make an area network truly functional and not a mere catalogue of administrative islands.

- It makes it possible to imbue with a regional character the management criteria and the indicators used in the identification, appraisal and characterization of the ecological integrity of the ecosystems, or in the assessment of the efficaciousness and efficiency of the management of protected areas when adjusting them to the biophysical and social and economic peculiarities typical of each region.

The implementation of an ecoregional vision requires an ecological regionalization process in the Mediterranean region, that make it possible to define functional management units having an ecological and territorial significance, characterized by making up an interconnected mosaic of more or less heterogeneous uses in which natural areas, protected by different legal concepts, become a tool, within the integrated planning, for the multiple management of the territory. The

final goal must be the maintenance of the sustainability of the flow of goods and services of the ecosystems, both protected and unprotected.

From Singular Areas to Networks and Planning Systems

The establishment of ecological networks in the Mediterranean region has, as a rule, being based on the implementation of management concepts and models basically developed in North America. These models are based, in the main, upon the connection of discrete protected areas - through the creation of corridors - and upon the protection of the said areas from the effects of the territorial matrix into which they are integrated - by means of the establishment of buffering zones around their limits (Jongman and Kamphorst, 2002). However, the designs of these networks (Figure 7), imported from other territories - the *Wildlands Project* from the United States or the Pan-European Network, among others - by failing to incorporate the social factor and the maintenance of linkages in the territory as a whole, can hardly become functional as a unit on a regional scale within the scope of the Mediterranean Basin. Such a functionality does require in the Mediterranean ecoregion, as it has already been highlighted, an approach based on the interaction between nature and society, encompassing territories, uses and activities within a wide context of time and space, and in which the conservation model is not confined to the considering of protected areas, buffer zones or corridors, but one in which both the former and the territorial matrix become relevant elements, more in keeping with a conservation system than with an ecological network (Figure 8).

The protected area systems, typical of the Mediterranean context, are characterized by contributing to the conservation of the functionality of the heterogeneous mosaic of traditional uses of the territory within which ecosystems having different degrees of maturity (natural, semi - natural and artificial) combine, coexist and complement each other, in a manner which changes as time goes by (Burel and Baudry, 1995 and 1997; Farina, 1997; González Bernáldez, 1991 and 1992c). However, there are some Mediterranean ecosystems, such as the case of certain types of wetlands, whose conservation demands, as a prerequisite, that they continue to operate in the manner of an ecological network or wetland network in which the connections are established by the biological flow of the movements of aquatic birds between wetlands (Consejería de Medio Ambiente, 2002).

In the case of marine ecosystems, the high degree of physical connectivity typical of fluid environments and the intensity of hydrodynamics in our region's waters, detract from the utility of the concept of ecological network as regards the classic model of the establishment of protected areas and of connection between them. Of

higher relevance may be deemed to be the connectivity or coupling (not exclusively physical, but ecological and natural as well) in the land - sea interface, whose effects can be widely propagated through space in key places such as estuaries, or else thanks to the presence of submarine canyons, thus contributing to the structure and the dynamics of the current regional maritime ecosystems and to the need to take into consideration in a comprehensive way the management of the coastal area in particular (Consejería de Medio Ambiente, 2003).

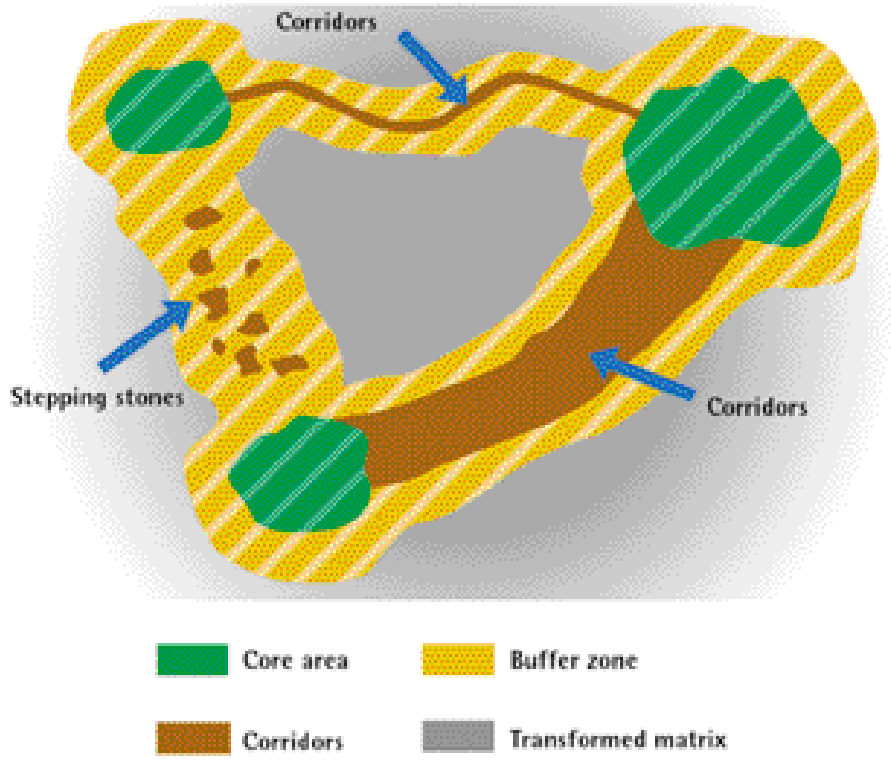

Figure 7. General sketch of an ecological network based on the consideration of core conservation areas connected by linear corridors and protected from the effects of the territorial matrix through the establishment of buffering perimeters (According to Bennet, 1999).

What such a vision entails is that, to conserve the Mediterranean protected areas, it is necessary to extend the scope of the action plans and programmes beyond their legal and administrative limits. It is necessary to consider as a whole the territory where the protected areas are located to be able to, through the maintenance of the complex mosaic of uses, preserve the key ecological processes that determine the ecological integrity or functionality of their ecosystems. It is then assumed that the good functioning of a Mediterranean system of protected areas requires the integration of the conservation policy into the territorial regulation policy with a view to preserve, in that way, the heterogeneousness and the configuration of the landscape mosaic. The final goal of the strategy must be

that of conserving the ecological wefts which maintain the multiple functions of the ecosystems in the territory, thus to guarantee a sustainable, rich and varied flow of goods and services to society (Consejería de Medio Ambiente, 2003).

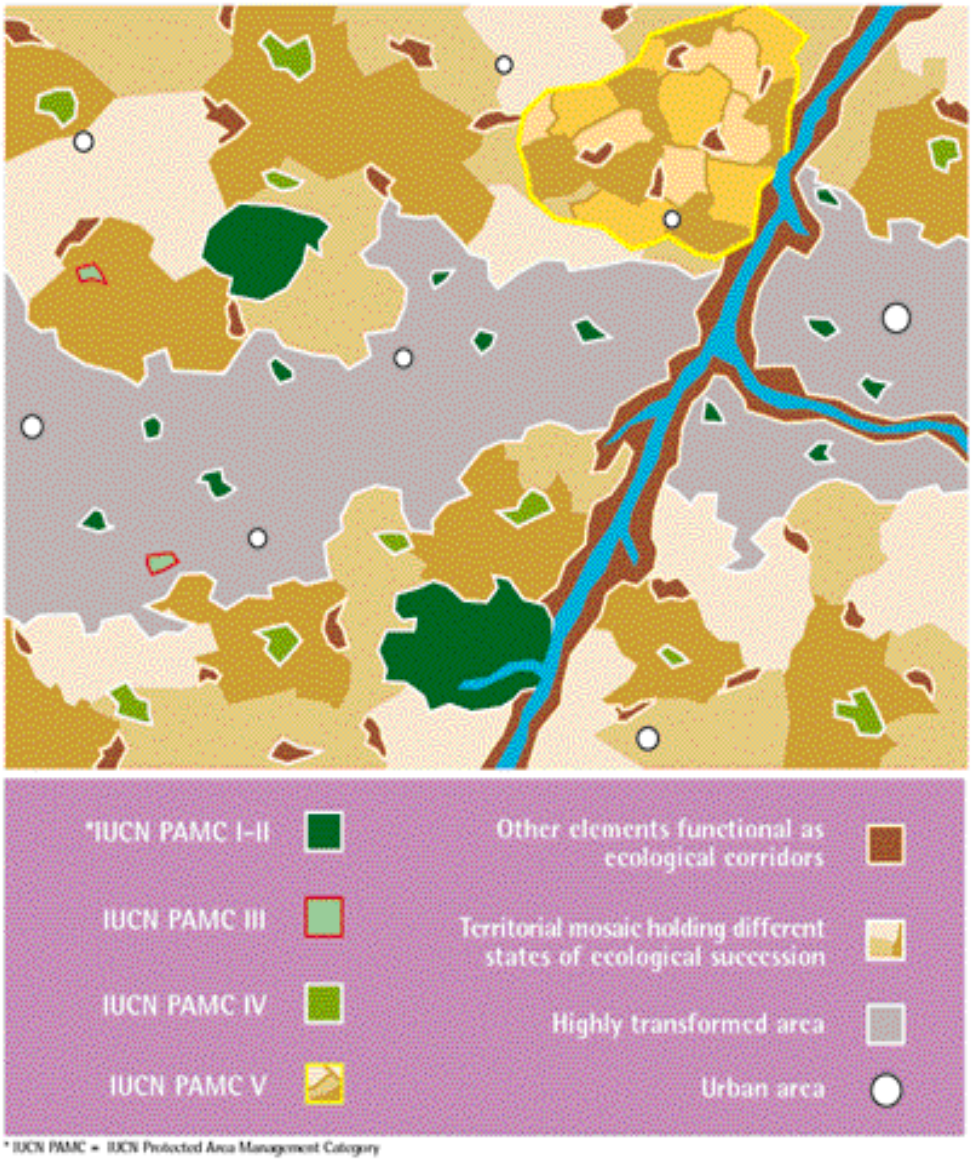

Figure 8. The connection of Mediterranean ecosystems is fundamentally based on the functionality of the heterogeneous mosaic of traditional uses of the territory within which ecosystems having different degrees of maturity (natural, semi - natural and artificial) combine, coexist and complement each other, in a manner which changes as time goes by. In this regard, the conservation of the key ecological processes that determine the ecological integrity of the functionality of the Mediterranean ecosystems entails the maintenance of the complex mosaic of uses which strengthen a territory having a high degree of ecological heterogeneousness and being interconnected on different space and time scales, and where protected areas would act as coordinating and dynamizing elements of the territorial system.

Since the course to follow is to consider the regulation of the territory as the safest way to conserve the connectivity and the permeability among the Mediterranean ecosystems and thus to keep their integrity, the coordination becomes essential between the conservation policy and that of territorial regulation, aimed at the devising of development models that facilitate the manifold use of the territory's ecosystems, strengthening a territory having a high degree of ecological heterogeneousness and being interconnected on different space and time scales, in which protected areas would act as coordinating and dynamizing elements of the territorial system.

The Role of the Mediterranean Agricultural Matrix

In the Mediterranean Basin, where the uses related to agriculture and cattle breeding are predominant in the territory, agricultural modernization has been, over the last few decades, one of the main catalysts of the gradual breach of spatial links between continental protected areas, specially so in the northern basin of the region. The intensification of farming in the most productive agricultural areas, in conjunction with an uninterrupted abandonment of marginal farming areas, have given rise, among other phenomena, to erosion, destruction of habitats, loss of biodiversity, simplification of the landscape, increase numbers of forest fires and diffuse agricultural pollution (Varela-Ortega and Sumpsi, 2002). The European Union's agricultural policies, prior to their reform in 1992, have strengthened the duality intensification - abandonment in the Northern part of the basin, thus aggravating the environmental damages (Baldock and Long, 1988) and magnifying the inhospitable nature of the territorial matrix into which the protected areas are integrated. Following the reform of the Common Agricultural Policy (CAP), carried out during 1999, and taking as a reference the Treaty of Amsterdam (1997), the reversal is intended of the negative repercussions of the new models of farming in the European Union's member states, by fostering agricultural models based upon environmental sustainability and on the preservation of agricultural landscapes and on that of the forms of rural life (Comisión Europea, 1999). These objectives are being, up to some extent, exported to the Mediterranean countries which are not members of the European Community, through measures envisaged in the MEDA II, an instrument of the Barcelona Process which, among others, stresses the need to preserve the agricultural diversity in the Mediterranean Basin, and acknowledges as one of the basic foundations of the functionality of a free -commerce zone in the Mediterranean the preservation of the social and ecological framework of the region's countries (Parlamento Europeo, 2003).

The importance of traditional agriculture with regard to the conservation of landscape heterogeneousness and the preservation of the ecological integrity in the Mediterranean, does basically derive from its diverse and multifunctional character, stable and adjusted to local conditions, which makes it possible to maintain over time the balance between productivity and quality of produce, on the one hand, and environmental factors on the other (Labrador - Moreno and Altieri, 2001). Traditional Mediterranean agriculture not only takes productive aspects into account, but also the environmental and cultural ones, and harmonizes the relationships existing among the mountain areas, the intermediate regions and the littoral zones (Bello *et al.*, 2002). Vertical relationships among the highest zones, where extensive cattle breeding is predominant; the intermediate zones, characterized by the cultivation of cereals and vineyards, and the valleys where the most productive zones are located, are essential, on different scales, for the equilibrium of the traditional Mediterranean productive systems and, at the same time, to act as connection systems linking ecological systems. From an ecological point of view, transhumance does determine the connection of two systems being apart in space, although, as a whole, they share the same exploitation burden. Many species and biological communities depend on the maintenance of these links, for they have their life cycles synchronized with the repose or exploitation stages associated with the movements of livestock (de Miguel and Gómez Sal, 2001).

The huge diversity of cultivated species in the traditional Mediterranean agricultural systems, the highest in the whole of the temperate zone (Parlamento Europeo, 2003), does contribute to the creation of heterogeneous landscapes into which cultivation areas and conservation areas are intercalated, and the resulting distribution of ecologically complementary tesserae is one of the keys in the region to the maintenance of the working capability of ecological and agricultural systems. On the other hand, man - made landscape structures in these agricultural landscapes, such as the living and the non - living hedges (e.g.: stone walls), likewise perform a key ecological function, by enabling an increase in the biological and physical activity of the soils and by diminishing the erosion risks, and, from the standpoint of protected areas, they are significant units in the establishment of conservation systems, for they also work as stepping - stones. According to Baudry (2003), in the improvement of ecological connectivity in the Mediterranean region, the development is basic of agro - ecological models that, using the advances of science, take as a reference the traditional rural management in the region and perceive the agricultural systems as a whole, as analysis and management units. On the basis of what has been expounded, it is clear that the design of networks and systems of protected areas in the Mediterranean region must take into consideration

the restoration of relationships among agriculture, rural culture and their physical environment. To that end it is basic to protect, to recover and to improve the traditional systems and models of agricultural production, placing special emphasis on the maintenance of the functional elements of the agricultural landscape as ecological connectors (Múgica *et al.*, 2002).

The IUCN's Fifth Category as a Tool to maintain the Ecological and Cultural Integrity of the Territory

Protected areas and ecological corridors not only perform an ecological function in the Mediterranean Basin, but a social and cultural one as well, and, in that regard, the majority of the region's protected areas fit into the definition established by the IUCN (1994) for areas included in the Fifth Category, in which the nature - society interaction, which characterizes cultural landscapes and makes them unique, is stressed:

Land surface, with coasts and seas, depending on the case, in which the interactions between the human being and nature throughout the years have created a defined - character zone having significant aesthetic, ecological and/ or cultural values, and which often is home to a rich biological diversity. Safeguarding the integrity of this traditional interaction is of the essence for the protection, the maintenance and the evolution of the area.

As a general rule, in the Mediterranean Basin, protected areas incorporate within their administrative boundaries a diverse mosaic of areas having different management values and objectives. Even though, as a unit, a typical protected area in the Mediterranean region fits into the Fifth Category of the IUCN, the latter does contain, in turn, areas that could be included in other more biocentric categories, and which are encompassed in a humanized territory in which the natural and cultural values included in it are highly significant from an economic, social, cultural and environmental point of view. In this regard, the vast majority of protected areas in the Mediterranean Basin perform the functions of conservation core zones, but at the same time act as buffer zones and as landscape corridors, thanks to the existence of a space and time pattern of productive uses and management models that makes it possible to reconcile a way of life with the maintenance of ecological flows in the territory. Accordingly, in the devising of linkages in the Mediterranean landscape, regional protected areas, the majority of which can be easily included in the IUCN's Fifth Category, play an important role in the maintenance of the ecological and cultural integrity of the territory (Phillips, 2002), allowing the different space and time

scales to take in the mosaic of core conservation areas and productive uses by way of landscape corridor. The functionality of this type of areas with regard to the establishment of linkages in the landscape does depend, therefore, on taking into consideration the multifunctionality - environmental, social and cultural - of their constituent elements. In delimiting such elements it is necessary to define beforehand the priority management goal; to identify the key processes determining the ecological and social connections in the landscape; to associate each one of these functions with specific goals, and to establish the work scales needed for each one of the objectives under consideration.