



THE MASTER PLAN OF THE ANDALUSIAN NETWORK OF PROTECTED AREAS. AN OPPORTUNITY FOR THE ESTABLISHMENT OF CONSERVATION SYSTEMS IN THE MEDITERRANEAN AREA¹

Andalusia, due to its peculiar geographical location, is a bridge linking continents, seas and cultures. This characteristic of being an intersection of bio - geographical and cultural streams, together with the heterogeneousness of its lithology and modelling, does explain why it has one of the most diverse and best preserved natural heritages in the European Union. This heritage, highly diverse though it is, has a common identity feature: its "Mediterraneanness". Up to five types of Mediterranean climates are located in the Andalusian region, from the oceanic to the sub - desertic one, which have determined the ecological, historical and cultural integrity of the different kinds of natural and human systems in its territory.



Figure 9. The position of Andalusia in the Mediterranean context.

¹RENPA Master Plan has been elaborated under the direction of Mr. Hermelindo Castro (Director General of the RENPA y SA, Ministry of Environment of Andalusia), Mr. Jos Guirado (Director General of the Natural Environment Management, Ministry of Environment of Andalusia) and Fernando Molina (Head of the Service of Management and Coordination of RENPA, Ministry of Environment of Andalusia). The Scientific staff involved has been coordinated by Carlos Montes (Fundación Interuniversitaria Fernando González Bernáldez, Autónoma de Madrid University) and have participated: Jaime Rodríguez (Málaga University), Francisco Borja (Huelva University), Pedro Lomas (Autónoma de Madrid University) and Miguel Hernández, Amaya Sánchez, Paula Fraile, José María Román and M. Rosario García Mora (Oficina Técnica-Dirección Territorial de Andalusia, TRAGSA).



In the littoral field, the Andalusian region shows two clearly different sea - fronts: one facing the Atlantic Ocean and the other, the Mediterranean Sea, which contribute to highlighting the high degree of biological, cultural and landscape diversity of the region's natural heritage. The processes which characterize the Mediterranean nature of the Andalusian territory end up moving through such a highly permeable border as the coastal - littoral strip, towards the interior of the marine environment. This, in conjunction with the peculiarity of the physical and ecological processes typical of our regional seas, has determined to a great extent the use to which human settlements have put the coastal areas to, and its consequences for the integrity of the marine ecosystems, whose landscape structure could undoubtedly share the "cultural" nature usually associated with the terrestrial landscape.

RENPA's Master Plan. Towards an Integrated Planning of Protected Areas

The concept of protected area and the use which has been made of such areas, have undergone quite important changes over the last century in an international context and also in the Andalusian context. Initially, the justification for the creation of protected areas was based on the maintenance of landscape and wildlife sanctuaries, which became privileged locations to be enjoyed by a few. Nowadays, the protected natural heritage is recognised as a basic need for the welfare and even the survival of many societies, since the flow of goods and services being generated for mankind is immense. Nevertheless, and in spite of the fact that the recognition of the instrumental value of protected areas has gradually increased, their capability to generate environmental services is put every day under a growing threat stemming from numerous tension factors, which act on different scales and do it basically from outside their administrative boundaries. This happens because the protected areas were envisaged, years ago, as isolated entities having a management model more or less unrelated to the whole of the territory where they were located. Today, we know with absolute certainty that protected areas, if they are to perform their ecological and social functions, cannot be managed as islands in the territory, and that they are inseparably linked with the ecological, social and economic, historical and cultural reality of the social and ecological systems of their environment.

This is the reason why, since the World Park Congress held in Caracas in 1992, numerous international, European and national institutions related to the conservation of nature are both demanding and promoting a new challenge in the management of protected areas: *to adopt a planning of an integrational nature*. The



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

idea consists in evolving from isolated protected areas to the creation of networks or systems making it possible, on the one hand, to maintain ecological connections linking protected - area ecosystems and, on the other hand, to move towards a greater integration of the conservation policy - based upon protected areas - into the territorial planning, as well as to improve institutional and administrative coordination.

In this context, and at a national level, Spain's Action Plan for protected areas (EUROPARC-España, 2002), in addition to encouraging the move from administrative networks to ecological ones, does recommend, as a priority, the preparation of a planning document for each regional system of protected areas that includes its relationship with territorial planning and the definition of its contents. Likewise, it recommends the integration of the Natura 2000 Network into the general protection outline of each territorial environment, by defining the management of future ZEC's within the framework of the appropriate networks or systems of areas in each self-governing region.

The Self-Governing Region of Andalusia, ever since Act 2/89 on the inventory of natural protected areas was promulgated fourteen years ago, has created, both in terms of numbers and area, one of the largest regional administrative networks of protected areas in the European Union (RENPA), consisting of 144 protected areas and covering more than 18% of the regional protected area (Figure 10). However, the intensity and the speed with which the RENPA's configuration process has taken place has prevented the carrying -out of a deep analysis of the path already covered and, above all, a reconsideration, in global terms, of the management of this important protected natural heritage.

Besides, throughout all this period of time, certain legal instruments and initiatives have been developed which facilitate and provide an excellent opportunity to put into effect the necessary changes in the natural protected area policy of the Andalusian region, and which enable the RENPA to produce a new concept for the integration and coordination of sectorial policies having a territorial repercussion. In this way, an important set of rules and regulations concerning the environment and being regional in scope has been promulgated, which directly or indirectly bears on the conservation of Andalusian protected areas. The Andalusian Forestry Act 2/92 and its Rules of Implementation, the Decree 208/97; the Environmental Protection Act 7/94; the Forest Fire Prevention Act 5/99, and the Fauna and Flora Act, still to be passed by Parliament, among the most important, deserve mention.

On the other hand, the enforcement at a national level of two legal provisions such as the Habitats Directive (EEC Directive 92/43), for the development of the Natura 2000 Network, concerning which it does take and ambitious proposal of SCIs as a starting

The role of protected areas in the territorial context



point, as well the national Act 4/89 on the Conservation of Natural Areas and the Fauna and Flora, as amended by Act 41/97, in which a new framework of responsibilities is set up for the joint management of national parks by the State's Central Administration and the concerned self-governing region, requires a series of important changes in the policy of conservation of the Andalusian natural protected areas.



Figure 10. The Andalusian Network of Natural Protected Areas has been configured in the last few decades, both in terms of numbers and area, as the largest regional administrative network of protected areas in the European Union. It currently includes 144 protected areas (all, regional, national and international in scope) and covers more than 18% of the regional territory.

In this regard, and for the purpose of guaranteeing the conservation of the Andalusian network of protected areas at the dawn of the new century, and correcting certain inaccuracies it has been deemed to be basic to have a Master Plan for RENPA (hereinafter called RENPA's PD), which, in the framework and according to the guidelines laid down in the Andalusian Environmental Plan may become the higher level in the planning scheme concerning the region's protected areas, and establish a new vision of the protected heritage, determining how it must be planned and managed.



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

In this regard, the Master Plan has been conceived as the strategy and planification document that establishes-starting from a conceptual model of reference - the management goals, guiding principles, criteria and guidelines, the sectorial plans and programmes as well as the necessary procedures concerning the management of the Andalusian Network of Protected Areas by taking an ecosystemic approach to it. In this regard, the RENPA's Master Plan has been put forward as a basic tool for the creation and the definition of a Planning System for the Andalusian protected areas that may allow to reach the following goals:

- **To guarantee** the conservation of the Andalusian natural heritage, by homogenising, guiding and providing with coherence the taking of decisions by the managers involved in the conservation of the RENPA's protected areas. To that end, the Master Plan does establish a common and standardized framework for managing the RENPA as a unit and in an integrated manner, acknowledging the peculiarities and the role played within the system by each protected area that the RENPA consist of.
- **To integrate** into the same conceptual framework and action strategy the results and the resources of the numerous action plans, programmes and strategies, with a view to guaranteeing the conservation of the Andalusian natural heritage. In this regard, the RENPA's Master Plan means a connection, integration and coordination point of the different sectorial policies undertaken by the Andalusian environmental Administration having a repercussion, be it direct or indirect, on the region's protected areas.
- **To coordinate** the actions to be put into effect by the Andalusian environmental Administration and those undertaken by other local, regional and national public bodies, as well as the guidelines laid down in other international initiatives on conservation. Specially, the MaB Programme on Biosphere Reserves, the Ramsar Convention and the Barcelona Convention for the protection of the maritime environment and the Mediterranean's coastal zone.

The Master Plan takes as a reference the legislation and the documents on environmental and territorial planning officially approved by the Andalusian Regional Government, and the basic principles, general objectives and recommendations envisaged in the Action Plan for Spain's Natural Protected Areas (EUROPARC-España, 2002). This is a unique opportunity to go in depth into a conceptual model of reference that defines and justifies some useful planning and management guidelines on how to adapt this important natural protected heritage to the new socio - political and economic scenarios which are emerging at the beginning of this century. With the preparation of

The role of protected areas in the territorial context



the Master Plan the development has been intended of a functional and organizational structure, dynamic as well as flexible, that may enable the RENPA to respond, in conservation and development terms, to a highly changing and globalized world context. In the final analysis, this is a question of reviewing and improving the network of natural areas existing in Andalusia for the purpose of finding solutions to the whole set of its problems beyond the specific conservation objectives of each protected areas.

Box 4

The most important challenges the RENPA's Master Plan is being faced with:

- **To Consolidate an Active Management Model**, that is to say, that both at the level of the RENPA and at that of the protected areas the network consists of, there must be a management plan in which specific and measurable objectives are identified to which the necessary material and human resources be allocated, and which envisages a management efficiency monitoring and assessment programme.
- **To Create a Representative and Functional Network** that guarantees the ecological connections linking the ecosystems included in the protected areas, for the purpose of preserving their ecological integrity and, as a result, the conservation of the biological diversity they harbour.
- **To Integrate the RENPA into the Territorial Planning** and into other sectorial policies, seeking a high degree of institutional cooperation and coordination.
- **To Incorporate the RENPA into the Life of the Population** both rural and urban, so that by enhancing its economic, educational, recreational and spiritual value a shared feeling be generated concerning the protection and custody of a natural and cultural heritage that determines one of the identity signs and roots of the Andalusian people.

The Master Plan's management guidelines are based upon a previous work in which, using the Logical Framework methodology as applied to the planning of protected areas, the analysis and the diagnosis have been performed of the starting situation, identifying RENPA's potential and establishing the causes of the main management problems and mistakes, as well as finding a scientific and technical justification for the network model and the planning system to be created (Department of the Environment, awaiting publication).

Finally, the vast experience gathered by the Andalusian environmental administration throughout the whole of this quantitative (declaration of protected areas) and qualitative (management of protected areas) process leading to the establishment of the RENPA, infuses it with a soundness and an advanced and advantageous starting position from which to launch this new phase which opens with the implementation of the Master Plan and which tries to move the RENPA from being an administrative network to becoming a planification system. A new stage in which we shall be talking more often in terms of



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

ecological networks, conservation systems, ecological integrity, connectivity, ecological functions, biological diversity, goods and services, sustainable development, territorial planning and regulation or cultural landscapes.

Aim and Scope of the Master Plan

The framework objective of the Master Plan is *to provide the necessary mechanisms to contribute to the building of a territorial model of Andalusia, enabling the conservation of the ecological integrity and the biodiversity of its ecosystems, by fostering a rational use of its environmental and cultural services in order to facilitate a sustainable, balanced and solidary economic development.*

The Master Plan of the RENPA covers all eight provinces which make up the territory of the Andalusian Self - Governing Region. It is aimed at the planning and management of all natural areas, located within the Self Governing Region of Andalucía, holding a special protection regime according to all, regional, national or European Union laws, as well as international conventions and accords (Decree 95/2003). Likewise, the Plan's Programmes and Actions are directed to all sectors of society, regardless of their belonging to the urban or to the rural environment, and try to involve individuals, associations and institutions whose work and area of responsibility may directly or indirectly contribute to the conservation and the sustainable use of the natural and cultural heritage of Andalusia.

Basic Objectives

The purpose of the Master Plan is that of consolidating the RENPA as an adequate, efficient and well - managed planning system. To that end, it is necessary to achieve a series of basic objectives which are developed by means of a series of sectorial plans and programmes (Box 5).

- 1. To guarantee the conservation of the ecological and cultural integrity as well as that of the biodiversity** of the RENPA, using the development of an ecological network being representative of the natural and semi - natural (cultural) ecosystems and of the species of the microbiota, Fauna y Flora of Andalusia.
- 2. To incorporate the RENPA into the Andalusian territorial model** established in the Andalusian Territorial Regulation Plan - and in other sectorial policies - for the purpose of creating forums and mechanisms



for the coordination and cooperation between institutions that make its integration easier into different economic sectors, so that local communities may profit from the wide range of goods and services generated by protected areas.

3. **To optimise the RENPA's management capability** by providing it with the necessary resources, by laying down management principles, criteria and guidelines and by putting into effect a procedure for the assessment of the efficaciousness and the efficiency of the management.
4. **To increase the support given to RENPA by the Andalusian population** by disseminating the social value of its functions, by promoting participative models of management through their collegiate bodies and by taking advantage of the opportunities provided by protected areas for environmental education and public use, for the purpose of enhancing public awareness of the importance and the need for their conservation and custody.
5. **To improve the level of the scientific, technical and interdisciplinary knowledge** of the natural and social and economic systems of the RENPA.
6. **To boost international cooperation** and to support, within the field of its responsibilities for matters pertaining to the environment, the fulfilment of the international commitments made by Spain concerning agreements, directives and policies, European as well as international, related to the conservation of protected areas.

Box 5 To reach the goal set by the Master Plan, the latter is structured into sectorial programmes, developed by means of general objectives that set the appropriate framework to define specific objectives. Specific objectives are achieved through a set of particularized actions at the level of RENPA, UEG and Protected Area.

General Objective of RENPA's PD

To guarantee the conservation of RENPA's ecological integrity and biodiversity.

Conservation and Restoration of RENPA's ecological integrity, biodiversity and geological diversity.

Sectorial Programme

- RENPA's representativeness and Connectivity

- Development of the Natura 2000 Network
- Environmental Quality



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

General Objective of RENPA's PD	Sectorial Programme
To integrate RENPA into the Andalusian territorial model.	<ul style="list-style-type: none"> • Strengthening the Inter-institutional Coordination and Cooperation Capability • Sustainable Development • Strengthening the Andalusian Network of Biosphere Reserves
To optimise RENPA's management capability	<ul style="list-style-type: none"> • RENPA's Registry and Environmental Information • Administrative Organization • Compliance with and Improvement of the Legal Framework • Training of technicians • Monitoring and Assessment of the Efficiency of Management
To increase RENPA's level of support among the Andalusian population.	<ul style="list-style-type: none"> • Environmental Education • Public Use and Ecological Tourism • Raising Public Awareness, Participation and Social Integration. • Image and Communication
To improve and to incorporate the interdisciplinary, scientific and technical knowledge of RENPA's natural and social and economic systems into the taking of management decisions.	<ul style="list-style-type: none"> • Technological Research and Innovation • Information and Documentation
To boost international cooperation and to support the fulfilment of the international commitments made by Spain with regard to agreements, directives and policies, both European and international, related to the conservation of protected areas.	<ul style="list-style-type: none"> • National and International Cooperation

In short, what is intended is to develop the necessary mechanisms to carry out a qualitative change in the current model of management of the Andalusian protected areas and to envisage a new paradigm according to which the RENPA must be understood as an adaptable, dynamic and regulated social and economic system having the capability to be ahead of and respond to the perturbations stemming from the rapid, deep and globalizing changes which characterize society in the early Twenty-First century. To achieve that it is necessary to move:

- From the priority and sole conservation of unique species and their habitats, to also taking into consideration the protection of the biophysical processes determining the ecological integrity of the



continental and maritime ecosystems which maintain biodiversity in Andalusia.

- From a conservation policy based on the declaration and management of isolated protected areas, to the devising, creation and integrated management of a system of protected areas.
- From the concept of protected areas as an end in themselves for the conservation of nature, to their being deemed to be a basic territorial planification and regulation tool.
- From the traditional custom of considering and exploiting the natural resources in the protected areas as isolated elements, to envisaging them as components of an ecological system by fostering sustainability models based upon the multiple use of their goods and services as against a sectorial and fragmented use.
- From a sectorial and competitive vision of the management of protected areas, to a different, cooperative and integrated one, by coordinating and enviromentalizing other sectorial policies affecting different constituent elements of the territory where they are located.

As a result of everything contained in the preceding paragraphs, four priority axes are defined around which the new model for the configuration and management of the RENPA is intended to be organized:

- ***The conservation of the ecological integrity, the cultural integrity and the biodiversity*** of its protected areas.
- ***The sustainable development*** or rational use of the goods and services of its ecosystems.
- ***The integration of the conservation policy into the territorial planning policy.***
- ***The improvement of the scientific interdisciplinary knowledge*** applied to the management of the protected areas.

The Master Plan does, in turn, establish a series of sectorial plans related to the conservation of wetlands and marine protected areas in Andalusia. Both sectorial



plans originate from the need to guarantee the conservation of the Andalusian heritage contained in this highly valuable ecosystems; to integrate into the same management concept and strategy the different plans and programmes of the Andalusian Ministry of Environment concerning these ecosystems, and to establish coordination mechanisms among the different levels of government. In both plans, the management principles and criteria, the sectorial programmes, the prioritized actions and the necessary procedures are laid down to achieve the coexistence of the maintenance, respectively, of the ecological integrity of the Andalusian wetlands and the maritime areas, with the sustainable utilization of the multiple goods and services their functions provide society with. The ultimate end of both sectorial plans is to conserve the ecological integrity of both types of systems by fostering a rational use of the same in order to maintain their ecological, social and economic, historical and cultural functions over time.

Concept and Functions of Protected Areas in Andalusia

Protected natural areas are defined within the framework of the RENPA's Master Plan *as 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.*

From this perspective, the RENPA and the Andalusian natural protected areas that make it up cease to have as their sole end the conservation of their fauna, flora and mineral wealth to adopt a multifunctional character and become a tool for:

- The conservation of biological, geological and cultural diversity as evidenced in the maintenance of Andalusia's most representative natural and cultural landscapes.
- The conservation of key natural processes (hydrological cycle, nutrient cycles, transfers of nutrients, of individuals, of migrating species, propagules, pollination, mitigation of natural perturbations, etc.) to the sustainability of the territory.
- The setting of standards to assess and predict changes as against different uses and to make it possible to understand how certain actions can alter the landscape.



- The development of living observatories concerning management experiences that enhance sustainable development models and may be shown to society and be extrapolated to the territory as a whole.
- The enjoyment, the environmental education and the awareness of the need to conserve nature.

An Ecoregional Vision. Conserving Beyond the Boundaries of Protected Areas

The RENPA's Master Plan does adopt an ecoregional vision and, to that end, an ecological regionalization process has been established in Andalusia, being hierarchical in nature, on the basis of which a set has been defined of continental and marine ecoregions (Figure 11). However, the natural ecosystems being characteristic of each one of the ecoregions have a different general use (or suitability) capability and a specific aptness for certain types and intensity levels of human activity (agriculture, cattle breeding, forestry, etc.). In this regard, in order to maintain the functionality and the retrieval capability of the ecosystems integrated into these units against natural and/ or man - made perturbations, it is necessary to assume that such units also reflect the different traditional - use systems (be they extensive or semi - extensive), which have jointly evolved with the natural ecosystems instituting a set of semi - natural ecosystems or cultural landscapes, more or less varied and typical of each eco -region.

In the Master Plan, these ecoregions are deemed to be the basic management units on a global scale (Ecological Management Units), which determine the territory into which the conservation and use regulation policy is intended to be integrated. They represent an space sphere having ecological and territorial significance, which is characterized by the inclusion of an interconnected mosaic of more or less heterogeneous uses, in which the natural areas are a first - class tool within the integrated planification, by means of which a contribution to the multiple management of the territory is intended to be made. The ultimate objective is, therefore, to maintain the sustainability of the flow of the goods and services of the ecosystems - both protected and unprotected - of each Ecological Management Unit (UEG).

RENPA's Master Plan is proposing, as an attempt, 11 Ecological Management Units for the continental ecosystems (Figure 11). Based on these UEGs, coordination and action proposals are being organized reaching beyond the boundaries of the Andalusian protected areas, achieving, at the same time, the integration of these areas into the specific context of their territorial matrix.



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

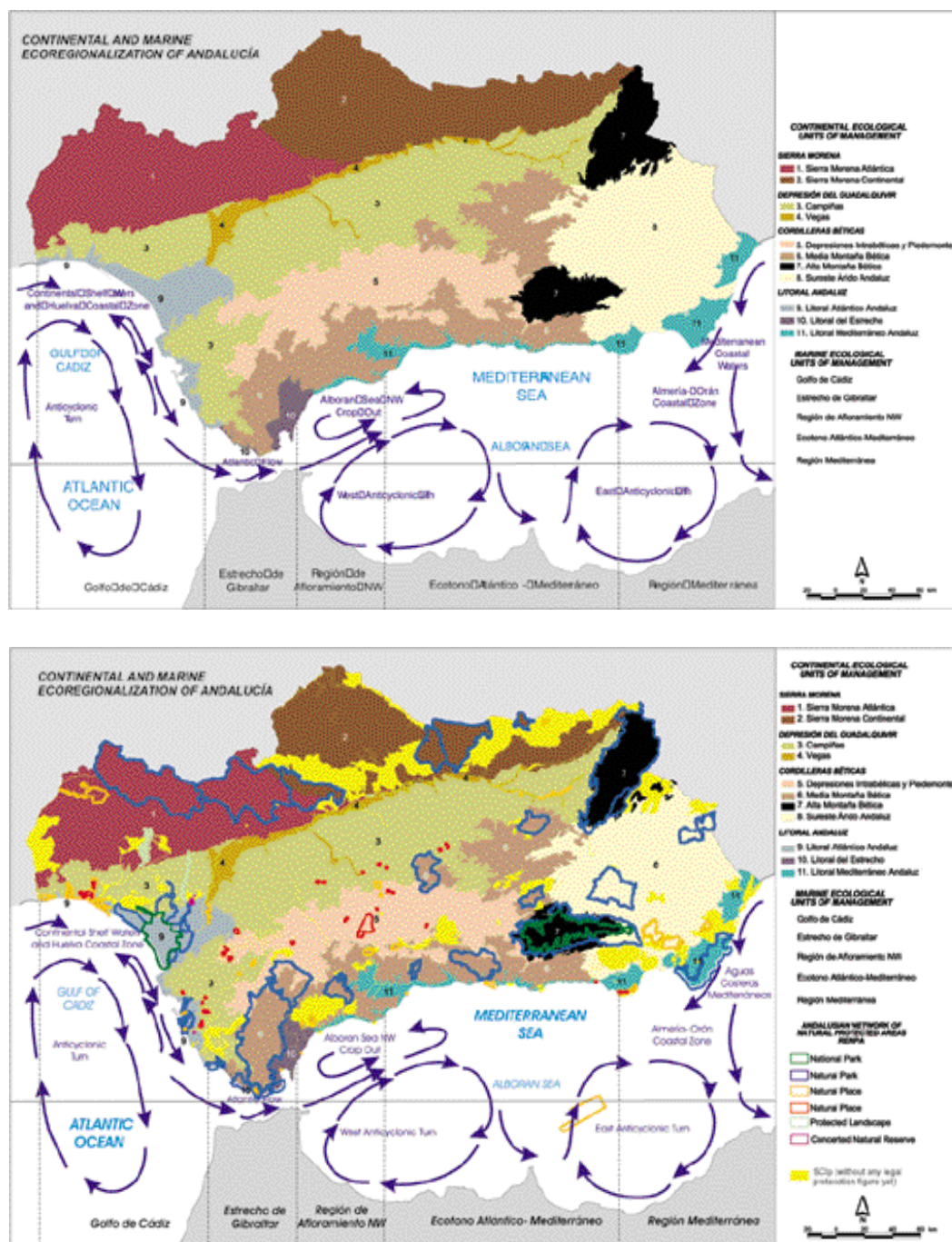


Figure 11. Continental ecoregions in Andalusia (a). Under the Master Plan they are deemed to be the RENPA's Ecological Management Units, that is to say, areas having ecological and territorial significance on the basis of which conservation proposals are organized and coordinated reaching beyond the boundaries of the Andalusian protected areas (b).

In the case of the Andalusian regional seas, the ecological regionalization process, at least at a preliminary level, is conditioned by the following elements:



- The currently poor level of scientific knowledge concerning the spatial distribution of species, habitats or physical characteristics more or less easy to chart.
- The putting into effect of the ecosystemic approach, which prevents the delimitation of well - defined borders between regions whose differences are basically determined by flows of a physical and ecological nature, and
- The combination of these elements leads to the definition of five large marine ecoregions (Figure 11) in which the hydrodynamics, and its repercussions on the biological productivity, the structure of communities and the behaviour of migrating species, do create the basis for further special analysis on a finer scale which, gradually, get closer to the cartography of the habitats and populations of the relevant species.

La combinación de estos elementos lleva a la definición de cinco grandes ecorregiones marinas (Figura 11) en las que la hidrodinámica, y sus implicaciones sobre la productividad biológica, estructura de comunidades y comportamiento de especies migradoras conforman la base para posteriores análisis espaciales de escala más fina que, progresivamente, vayan aproximándose a la cartografía de los hábitats y las poblaciones de especies relevantes.

Leading Principles for the Management of the RENPA

The Master Plan of the RENPA does adopt some leading principles for preparing and putting into effect the different actions suggested in its sectorial plans and programmes. It is also intended that they act as regulation principles in the taking of decisions by managers and other social sectors involved in the conservation and the management, whether direct or indirect, of Andalusian protected areas.

In this way, the preparation and the implementation of the plans, programmes and projects, as well as the taking of decisions related to the management of the RENPA, shall be based on the following general principles:

- ***The conservation of the ecological integrity***, which must be the chief objective of the management programmes. Its protection does guarantee the functions being produced by the environmental goods and services which, in turn, are generated by the ecosystems, as well as the preservation of the biodiversity, by protecting the key biophysical factors and processes linking the species with their habitats;



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

- ***The soundness in the taking of decisions***, based upon the availability of a better interdisciplinary scientific and technical knowledge (environmental, social and technological sciences) of the natural systems in the protected areas and of the relationships established between the latter and the associated human systems;
- ***The prevention***, through the promotion of a management model in which actions are directed towards anticipating problems, and not only towards acting once these have already arisen. To that end Environmental Impact Assessment procedure is deemed to be basic in all those projects which may affect the conservation of the ecological integrity and the biodiversity of the RENPA's protected areas;
- ***The precaution***, against the uncertainty of the negative effects which, on the ecological integrity and the biodiversity of a protected area, may generate a certain activity, the viability or otherwise of its implementation being determined on the basis of the necessary scientific, technical, social and economic information;
- ***The participation***, by providing access to information and by fostering citizen participation at all levels, in the planning and management of the RENPA;
- ***The monitoring and the assessment***, by incorporating a continuous monitoring, assessment and adjustment procedure to face the changes that may come about in the social demands and needs during the implementation of the Master Plan. To that end, the Plan does adopt an adaptable management model, which is translated into sectorial programmes with objectives devised in such a way that they can be monitored and assessed - on different space and time scales through an indicator system;
- ***The inter - institutional coordination***, for the purpose of boosting a fluid communication, a harmonization of actions and an active participation by and among the different official bodies and the different social actors involved in the conservation and the management of Andalusian protected areas, in addition to obtaining the highest degree of support in the implementation of their sectorial plans and programmes. To reach that goal, the Master Plan incorporates the Strategic Environmental Assessment of plans and programmes into the taking of decisions, as the most suitable instrument to achieve the correct coordination between the sectorial policies and the protected area policy;



- ***The diffusion of initial information*** and of that generated by the implementation of the Master Plan, using different ways and media and in a clear and responsible manner, for communication purposes and in order to involve specialists and average citizens in the ideas and actions envisaged in the different sectorial plans and programmes. What is intended is to increase the knowledge and the understanding of ecological, social and economic, and cultural and historical values of the Andalusian protected areas and to promote social awareness of the need for their conservation; and
- ***The environmental fairness and ethics.*** The Master Plan will be implemented by accepting the limits set by an environmental ethics. Promoting the adoption of attitudes and values in favour of the conservation of the Andalusian protected areas, on the basis of social and economic fairness, environmental sustainability, solidarity and cooperation.

Box 6 Basic Criteria for the management of the ecological integrity and the health of RENPA's ecosystems

1. The need to put into effect a multi - disciplinary and an interdisciplinary approach, both in the diagnosis of the state of integrity and health of the ecosystems and in the management aimed at the conservation of these characteristics.
2. The need to protect the persistency of the physical, biological, geological and chemical processes which, on different space and time scales, determine the heterogeneousness of the habitats and support the dynamics of the ecosystems and maintain biodiversity.
3. The need to protect the persistency and the natural variability of the ecological processes which, on different space and time scales, determine the biodiversity and the productivity of the ecosystems.
4. The need to know, control and predict the effects of the potential external sources of perturbation which, on different space and time scales or in an unpredictable manner, may affect the integrity and health of the ecosystems.
5. The need to know and manage functional biodiversity (key and engineering species).
6. The need to put into effect an adaptable management model in view of the progress of the scientific knowledge and the responses and evolution of the social and economic component of the management process.



The RENPA's Planning System (SPR)

The fast growth in the number and in the area covered by protected areas in Andalusia has to be accompanied with a proportional increase of the RENPA's management capability, capable of dealing, in all their dimension, with the global threats to their conservation. In such a context, within the framework of the Master Plan, the RENPA's Planning System has been defined, having as its purposes: a) carrying out a global and integrated management of the Andalusian protected areas based on their ecological relationships and on their social, economic and cultural connections; and b) supplying the necessary conceptual tools and methodological procedures to guarantee that the whole of the Andalusian protected areas amount to more than the administrative sum of its parts.

This new organizational structure of the planning and management of the Andalusian protected areas is defined in the framework of the Master Plan as an *interdependent set of natural and semi - natural areas, legally protected or managed by other means, ecologically and administratively connected, related to the more or less transformed matrix in which they are located and having as its purpose that of preserving the eco - cultural integrity and the biodiversity of the territory in order to maintain a sustainable flow of environmental goods and services towards society.*

From this perspective, the RENPA's protected areas do have, vis-à-vis the development of their regulation and management plans, a dual character within a hierarchy of administrative and ecological relationships (Figure 12). On the one hand, the protected area is an administrative unit legally delimited by technical and political criteria and managed by means of its appropriate Use and Management Ruling Plan (PRUG). It is a part, at a first level, of the provincial administrative network (together with the rest of PA of the province in which it is located) and, at a second level, of the regional administrative network or RENPA (together with the rest of PA of Andalusia).

On the other hand, and from a functional point of view, the protected area is a part of an Ecological Management Unit, that is to say, of a certain ecoregion, defined according to scientific criteria, with which it shares, beyond its administrative limits, essential biophysical processes. From this functional point of view, the management of the protected area becomes integrated, according to the protection concept, into the UEG to which it belongs through its corresponding PORN, reaching beyond, in this way, the administrative limits of the area and even the provincial borders. The protected area must maintain a weft of ecological relationships with other protected areas included in the same UEG, and keep certain biophysical links with areas belonging to other UEGs in order to, as a whole, create the RENPA's Conservation System - a group of protected areas maintaining ecological links in the context of a more or less transformed territorial matrix.

The role of protected areas in the territorial context



This functional vision infuses the RENPA's administrative management with an ecoregional nature, in which the administrative network being managed by taking an eco-regional approach and in the context of the territorial regulation does define the management model known as RENPA's Planning System.

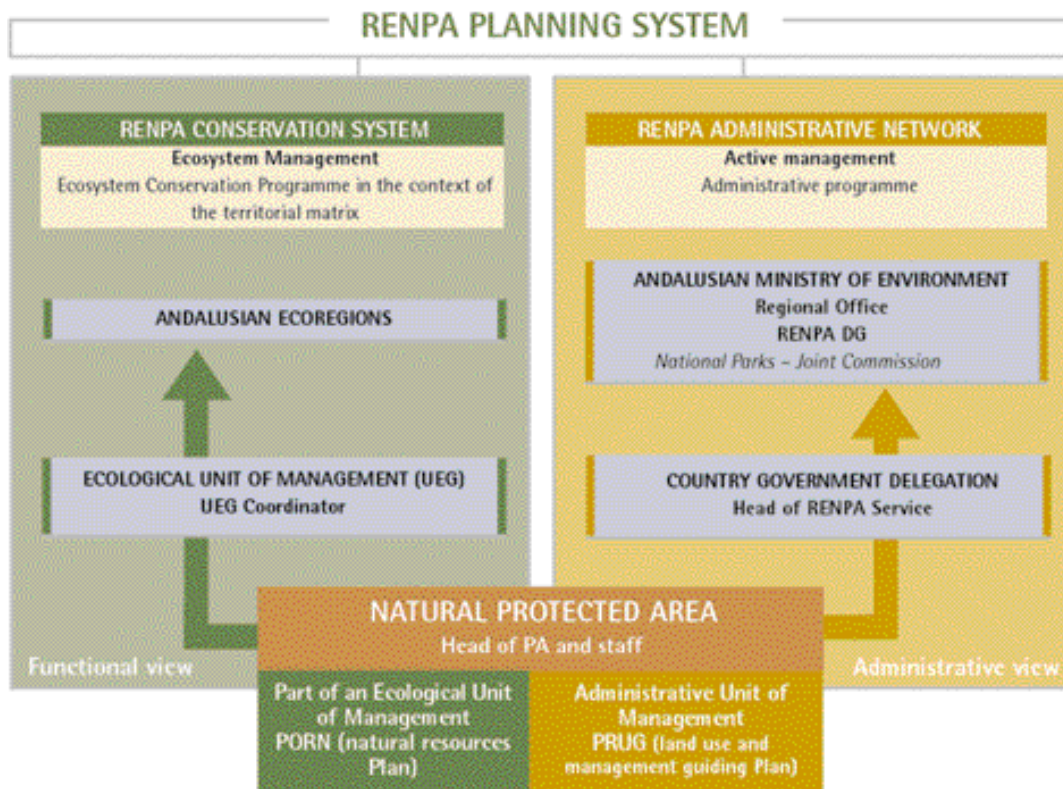


Figure 12. The RENPA's Planning System is understood as a hierarchical organizational structure that enables the management of its protected areas as interdependent administrative entities which interact, from an ecoregional perspective and through the regulation of the territory, with the more or less transformed matrix in which they are located.

With the RENPA's Planning System the creation is intended of an appropriate context to preserve the natural and cultural ecosystems along with the biodiversity so characteristic of the Andalusian region. To reach that goal it is necessary to achieve:

- The conservation of a minimal sample of the ecosystems - natural and cultural landscapes so characteristic of the Andalusian natural heritage,
- The maintenance of the key biophysical processes which preserve the ecological integrity of the terrestrial, aquatic - continental and maritime ecosystems so characteristic of Andalusia,



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

- The maintenance of viable populations of the microbiota, flora and fauna species so characteristic of the region, and
- The sustainable use of the environmental services of the Andalusian ecosystems, by promoting development models adjusted to the ecosystems' capability to absorb and regenerate.

In order to achieve these objectives - on a local and a regional scale - the RENPA's Planning System has been established incorporating the following definitory characteristics:

- **Representativeness.** It must include a diversity, both in terms of numbers and in terms of area, of the Andalusian terrestrial, aquatic - continental and maritime ecosystems (eco-diversity), as well as a sample of the populations and the communities of the microbiota, flora and fauna species (biodiversity) typical of each Andalusian ecoregion.
- **Equilibrium.** The existence must be avoided of a redundancy of the species and ecosystems included in the RENPA.
- **Coherence.** A representative and balanced system must, consequently, be a coherent one, with mutually complementary constituent elements which provide something significant and different from the whole. Each area in the RENPA must, therefore, contribute to the network's administrative and ecological coherence.
- **Consistency.** The management objectives of each one of the RENPA's protection concepts not only must adjust themselves to the specific needs being typical of each area, but also contribute to the ecoregional objectives and to those of the entire planning system, in order to provide it with a greater resistance, stability and adaptation capability to face perturbations and changes.
- **Efficiency and Equitableness.** Both the protected areas and the RENPA must reach their management goals on the basis of an adequate balance and an equitable distribution of ecological, social, and financial costs and profits, committing the lowest number of areas and the smallest extension of protected area.



Protection levels of the Andalusian natural areas

To be able to serve the purpose of conserving Andalusia's biodiversity by maintaining the ecological integrity and the soundness of its ecosystems, it is necessary to take into account, as one of the starting points, the levels or types of conservation rules and regulations at our disposal. In Andalusia, three protection levels are superimposed

1. The general *environmental legislation* and that enacted by the Andalusian Self - Governing Region in particular, which constitute a first level of horizontal protection being universally binding everywhere in the Andalusian territory, whether protected or non protected. Consideration must be given, due to their direct involvement in the RENPA, to the regional Acts 2/92 on Andalusian Forestry; 1/94 on Territorial Regulation; 7/94 on Environmental Protection; 5/99 on Forest Fires as well as that on the Flora and the Fauna, the latter still to be passed by the Legislature.
2. *The SCIp* put under no protection concept yet. They constitute a second protection level, due to the very nature of the proposal and, as laid down in the Habitat Directive, these areas have, from the start, the benefit of a basic preventive protection regime that ought to prevent them from undergoing major transformations before they are, in the context of the RENPA's planning systems, given a legal protection concept or they are integrated into an existing legal status. It is, therefore, a potentially protectable area reserve.
3. *The RENPA's protected areas*. They are the third protection level which concerns those Andalusian natural protected areas having their own legal regulation under the protection figure by virtue of which they have been declared protected areas.

The Role of Protected Areas in the SPR

To create a consistent planning system it is necessary to have a range of protection concepts making the existence possible of a management capability on different scales and with different intensities, and to be able to achieve the conservation objectives respectively put forward at the levels of area, UEG and system. It is intended that each area and each protection concept, either current or future, acquire their significance within the system as a whole. In Andalusia we have, by virtue of the national Acts 4/89, on the Conservation of Natural Areas, and 3/2001, on Marine Fishing; and the regional Act 2/89, on the Inventory of Natural



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

Protected Areas, nine protection concepts for the RENPA's protected areas, which include, with the exception of Category III, the entire set of the types of protected areas that the IUCN (1994) considers necessary to encompass the wide spectrum of conservation objectives of a wide territory. (Box 7 and Figure 13)

Box 7

Role played by the different types of protected areas in the RENPA's planning system

Nation - wide concepts

1. National Park (IUCN Category II . Protected area managed, in the main, for the conservation of ecosystems and for recreational purposes).

Areas of a considerable extension and highly representative of the natural system to which they belong. Human intervention is limited, which is why natural ecosystems prevail over the cultural ones. They can have human settlements but not inhabited urban areas. Their environment is susceptible of being declared a peripheral protection area. They would act, within the planning system, as essential core areas, maintaining very - well conserved natural ecosystems whose function would consist in being the source of flows of species and ecological processes, as well as acting as ecosystems of reference to asses and to predict changes vis - - vis different uses, and to set standards and points of reference in ecological restoration programmes.

2. Natural Park (IUCN Category V. Protected area specially managed, for the conservation of terrestrial and maritime landscapes and for recreational purposes).

Large areas scarcely transformed or modelled by centuries - old human activity into cultural landscapes. Its main purpose is the conservation of the ecological, cultural, aesthetic, educational and scientific values, but also the sustainable social and economic development and the public use compatible with the conservation goals. They maintain important extensions of representative natural and cultural ecosystems. They would act as large core areas within the system although, due to their large size, they can contain core areas and corridors inside them.

3. Natural Reserve (IUCN Category I. Protected area managed, in the main, for scientific purposes or for the protection of nature).

Barely transformed intermediate - size areas intended for the conservation of natural ecosystems or communities which, due to their unaltered ecological processes, rarity, fragility, importance or uniqueness have a special value. They are areas intended for strict conservation, research and monitoring. Their use by the public is restricted. In the RENPA this concept has been used for the protection of continental and littoral wetlands. They would act as source core - areas or as transit points in the marshy networks established by aquatic birds.



4. Protected Landscape *(Not equivalent to any IUCN Category).*

Natural areas encompassing a landscape structure and some cultural values worthy of special protection. In the RENPA, this concept has been used mainly for the protection of those conserved areas of a linear character (rivers and river - banks) which facilitate functional connections to other natural areas, both protected and non - protected, in their environment. Their main management objectives are focused on the preservation of ecological and social and cultural flows in the territory, the sustainable development, the research and the performance of activities of public use and environmental education. They would act as eco - cultural corridors linking the system's large core areas and the maritime and continental areas.

5. Natural Monument *(IUCN Category III. Protected area managed, in the main, for the conservation of specific natural characteristics).*

Areas of small or very small size, declared such for the protection of unique elements in the rural environment. They are micro - reserves for the conservation of geological formations, individuals or populations of fauna and flora species whose habitats are restricted. They require hardly complex management measures through specific plans or strategies for the conservation of those species, communities or that geological diversity.

6. Marine Reserve *(IUCN Category III. Protected area managed, in the main, for the sustainable utilization of the natural ecosystems).*

This concept originated with the Spanish national fishing authority (MAPA) and seems to come close, in their conservationist objectives, to the highest protection level ("A" reserve or degree) as defined by the Andalusian Self - Governing Region in the typification and zoning of uses applied to RENPA's protected areas. However, in the "Marine Reserve" certain professional fishing activities as well as recreational activities (such as scuba - diving) are allowed, except in a core area defined as "Total Reserve" in which no type whatsoever of maritime fishing, removal of fauna or flora, or underwater activities, with the exception of those having scientific purposes, are allowed. In this way, the "Marine Reserve", as the concept has been implemented in the RENPA's maritime protected areas, would be the equivalent to the concept of "Natural Park" (IUCN Category V), except in the core designated as "Total Reserve", which would be the equivalent to the nation - wide concept of "Natural Reserve", defined, though, for the maritime environment, as well as to category IA of the IUCN. They would act as core areas within the maritime subsystem and as source areas.



Self - Governing Region - wide concepts

7. Natural Spot (*IUCN Category II. Protected area managed, in the main, for the conservation of ecosystems and for recreational purposes*).

Intermediate - size areas having exceptional values due to the state of conservation of their natural and cultural ecosystems - landscapes, or to the maintenance of populations and/or communities of unique plants or animals. The priority purpose is the conservation of their natural values, but traditional activities are also allowed for the sustainable exploitation of their resources. Public use is possible if compatible with the conservation objectives. They could act as buffering zones or to increase connectivity within the system.

8. Natural Reserve under Agreement (*IUCN Category IV. Protected area managed, in the main, for conservation under supervised management*).

Private property, highly managed, areas of variable size which, in spite of not having exceptional natural values, do maintain habitats of threatened species or cultural ecosystems of interest, which are susceptible of being conserved by means of cooperation agreements between the owners and the environmental authority. Since the conservation objective is closely linked with the maintenance of the rational use of its resources, they could act as areas for the maintenance of heterogeneity and for the configuration of agricultural or forestal matrices in which the protected areas are included.

9. Periurban Park (*Not equivalent to any IUCN Category*).

Areas of small or intermediate size close to urban areas. They can be artificial or highly managed, and their objective is that of being used by the nearby population for the purposes of open - air recreation, rest or leisure. Recreational activities are the priority through a public use programme. They can act as recreational areas to alleviate the pressure on the public use of other, more natural areas, as well as for environmental education activities. Their function in the system would be that of lightening the pressure of social use of other nearby and better conserved protected areas.

The Conservation System's Constituent Elements

The characteristics of heterogeneity and spatial configuration of the Andalusian landscape, typical of the Mediterranean nature, demand an ecoregional perspective in the devising and development of a model for the management of the RENPA and the protected areas the network consists of. Because of this, the ecological network model currently put into effect in other non - Mediterranean countries, based on three well - defined elements (core areas, buffering areas and corridors) aimed to increase biological connectivity and to break the isolation of the

The role of protected areas in the territorial context



populations of species inhabiting protected areas in territories deeply transformed by man (Figure 7), is clearly insufficient for the protection of nature in Andalusia.

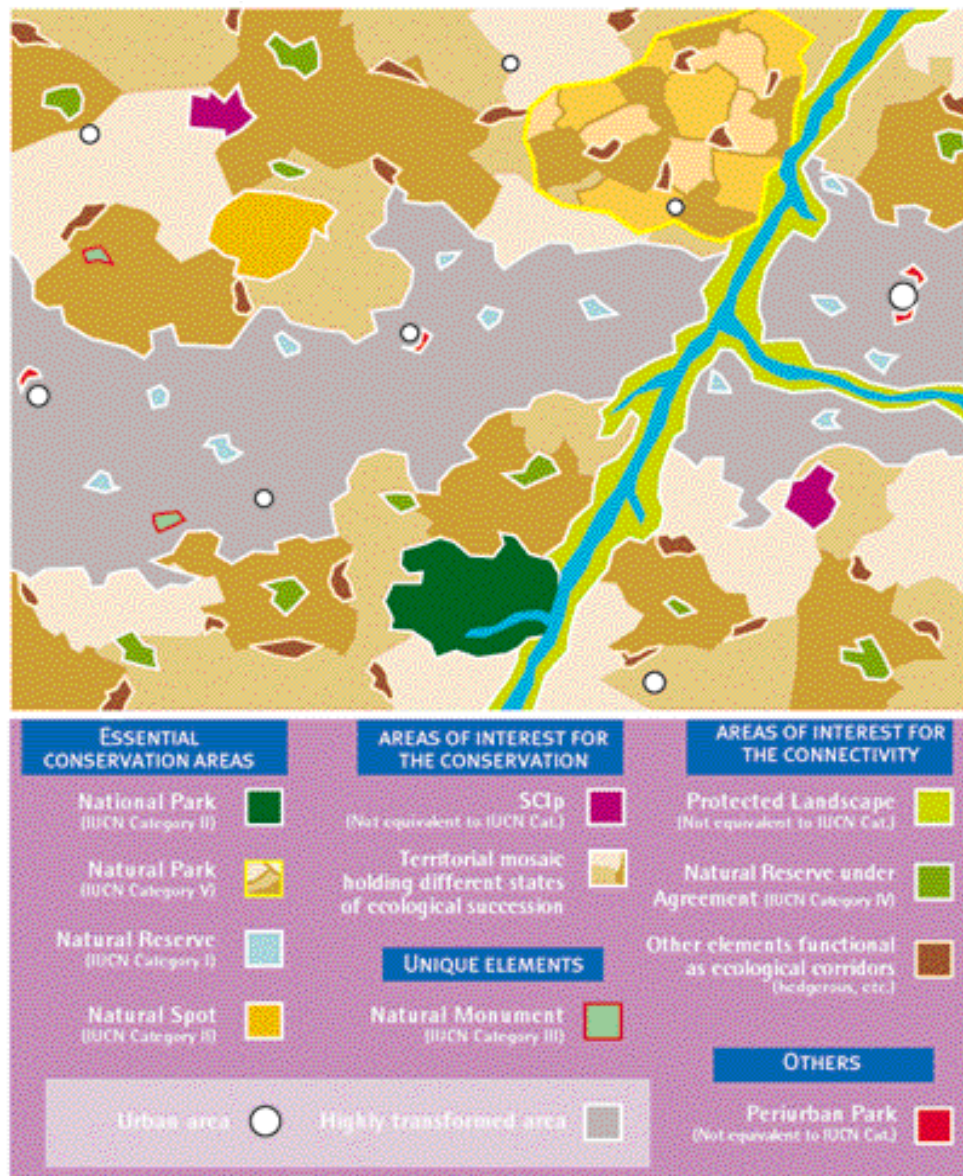


Figure 13. In RENPA as a whole, each protection concept plays an important role and has a specific significance within the Conservation System. The nine protection concepts, nation and region - wide, existing in the RENPA make it possible to encompass in Andalusia the wide spectrum of conservation objectives typical of a large territory.

The model to be adopted by the RENPA is, in general, in keeping with the conservation systems suggested for the Mediterranean region in the first part of this document, based on the functionality of the heterogeneous mosaic of traditional uses of the territory in



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

which, in a manner that changes over time, ecosystems having different degrees of maturity (natural, semi - natural and artificial) combine, coexist and complement each other (Figure 8). Anyhow, and as it is the case in the rest of the Mediterranean region, there are some ecosystems (e.g.: wetlands) in which the connections linking each other in the shape of an ecological network are basic for the persistency of their working as ecological systems (Consejería de Medio Ambiente, 2002).

RENPA's conservation system must be understood as a coherent and consistent assembly of elements and areas existing in the Andalusian territory which, managed from an ecoregional perspective and within the territorial regulation framework, guarantee the conservation of biodiversity in Andalusia. The components the system is made up of have complementary functions which, in a dynamic and flexible way, are connected to shape a territorial structure subordinated to the achievement of the conservation objectives of the RENPA as a whole. These components are:

- **Essential conservation areas**

These are the core areas, and must provide a minimal area of natural and cultural ecosystems to guarantee the working of the system. These are areas acting as corner - stones from which the environmental regulation of the entire territory is undertaken, for the purpose of shaping a coherent spatial structure enabling the maintenance of the landscape's essential ecological flows.

This group includes the largest part of the intermediate and large - size areas in the RENPA. It contains, to begin with, the natural areas protected under the concepts of National Park, Natural Reserve and Natural Spot, whose main purpose it is to protect a representative sample of the best - conserved ecosystems and to enable the existence of viable populations and communities of the characteristic species of the Andalusian natural heritage. Because of this, conservation objectives are a priority. Within the system, these protected areas can act as recipients and sources of organisms for the re - colonization of other areas, in addition to contributing to the conservation of organisms showing local extinction patterns and re - colonization at the level of meta - populations.

Secondly, the largest - extension protected areas are included in these core areas: the natural parks, which cover 67% of the RENPA's entire area. These large areas would have the twofold objective of conservation and sustainable development. With regard to conservation, they would be aimed at preserving assets belonging to a typical sample of the most representative cultural landscapes in Andalusia, which



maintain a high level of biodiversity and are the habitat of some emblematic and threatened species, such as the Iberian lynx or the imperial eagle. On the other hand, and due to their extension, they are - together with the national parks - key areas for the conservation of essential processes in the maintenance of territorial integrity, such as happens, by way of example, with regard to the maintenance of the natural wefts related to the hydrological cycle.

• Areas of interest for the conservation

They are areas located in the vicinity of the *essential conservation areas*. Their priority function consists in acting as buffering areas or peripheral protection areas, but also in improving connectivity among the best conserved areas in the system by acting as stepping - stones.

Included in this group are:

- The intermediate and large - size pLICs (18% of the pLICs in Andalusia). In spite of the natural values that these areas do incorporate, their selection as future components of the Natura 2000 Network has been basically made by taking into consideration the connection function that they perform, by territorially completing the protected areas of the large natural parks,
- The non - protected areas harbouring traditional use systems, whether extensive or semi - extensive. These areas play an important role in the system as a whole, for they represent living cultural landscapes of a great ecological heterogeneousness, suitable, on the one hand, for harbouring a large degree of biological diversity and, on the other hand, for contributing to the increase in the permeability of the matrix where the essential conservation areas are located, and
- The source areas, that is to say key areas for the conservation of essential ecological processes for the maintenance of the ecological integrity of the territory. This group includes, for instance, the aquifers' replenishment areas, the headwaters of hydrographic basins or the slope systems which maintain the integrated agrarian and mountain systems.

In the preservation of these areas of interest for the conservation, a highly significant role may be played by the regional protection concept Natural Reserve



under Agreement, since by means of this concept the use is encouraged of good practices and the shared management through the joint responsibility of different social groups (landowners, farmers, hunters, etc) having a direct interest in the conservation of the territory. The joint responsibility management agreements already have a legal character and have been implemented in several places in Andalusia for the conservation of the fauna, through cooperation agreements between the owners and the environmental authority. In exactly the same way, some of the measures included in the Andalusian Forestry Plan (for forest areas) and in the Andalusian Agriculture Modernization Plan (for agricultural areas), can become important tools for the maintenance of the traditional uses contributing to the conservation of the territorial matrix into which the RENPA is integrated.

• Areas or elements of interest for the connectivity

Included in this group are those elements or areas whose existence, due to their having certain spatial configuration, does facilitate the maintenance of the biological flows (movement of species) and the biophysical wefts (hydrological circulation above and below ground, nutrient circulation, etc.) connecting the protected areas to a network configuration (protected areas + linear corridors) or to a territorial system one (protected areas + territorial matrix + corridors). They constitute the ecological and cultural corridors of the RENPA's Conservation System. Such corridors can be linear (river courses and banks, hedges, stonewalls or certain types of livestock ways) or transit spots (scattered wetlands in a transformed matrix, island forests, thicket spots or even groups of isolated trees).

In order to encourage the conservation of these landscape elements which enhance connectivity, the Andalusian Forestry Plan (2002-2006) includes among its objectives "to coordinate the natural environment, by connecting the different elements and areas making it up, and to diversify the rural landscape". To that end, it incorporates different strategies such as the development of the Andalusian Livestock Way Plan; the retrieval and regulation of the Andalusian river - bank network, or the creation and conservation of forest enclaves and living hedges in agricultural land.

The legal protection of some of the most significant and largest ecological corridors can be achieved by means of the concept of protected landscape, used in Andalusia for the first time for the protection of the middle - low course of the Guadimar River for the purpose of retrieving the ecoregional connection between Sierra Morena and the Andalusian Atlantic coast (Arenas, 2003). Likewise, as a part of the SCI proposal for Andalusia, an important number of river stretches have been



included which, in a general context, contribute to the improvement of the territorial connections through the river systems.

Be that as it may, for the general protection of all those types of elements or areas whose existence within the territory contributes to the maintenance or the enhancement of ecological connection areas included in the RENPA, the Master Plan puts forward, in the framework of the Territorial Regulation Plan (POTA) the preparation of a Plan on Elements Having an Incidence on Connectivity (PEIC). The PEIC is envisaged as one of the measures laid down in its strategy for the configuration of a Regional Protection System of Natural and Cultural Resources of a Territorial Interest, and whose goal is that of integrating protection elements into each other, with a view to generating coherent and interconnected networks. Under the said PEIC the uses would be regulated which are compatible with the maintenance of the connectivity function performed by a set of indispensable elements for the maintenance of the territory's biophysical relationship web.

• Unique areas or elements

These are areas or elements of small or very small dimensions which, even though they are neither essential nor indispensable for the working of the system, play a very important role for the conservation of some types of very restricted habitats, for the development of specific stages of the life cycle of some species or even of unique individuals belonging to some arboreal species. Also included in this group are spots having geological or geomorphologic formations of outstanding value.

They constitute opportunistic reserves or microreserves, whose creation is important for the conservation of certain unique elements of the biotic or geotic structure of the ecosystems. By way of example, the protection of certain rare, endemic or threatened species may require the protection of very specific spots, although these may not meet the protection conditions imposed upon the RENPA as a whole. The Natural Monument protection concept would be the most appropriate one to these cases.

The Architecture of the System. Integration of RENPA into the Andalusian Territorial Model

As it has been justified in the preceding sections, only through the integration of the conservation policy into the territorial regulation policy will the conservation be possible of the Andalusian natural heritage, whose rich and varied eco - diversity and



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

biodiversity are closely linked with the heterogeneousness and the temporal and spatial configuration of a Mediterranean landscape, modelled by man for centuries.

Andalusia, the fourth largest region in the European Union, has historically been a region with a productive structure closely linked with the traditional and rational use of its natural resources (mainly in the spheres of agriculture and fishing) keeping a well - distributed and balanced population with hardly any uninhabited zones. Thus, in conjunction with the territory's network of natural infrastructures, consisting in ecological junctions and interconnections, the Andalusian Mediterranean culture has built another rural network, perfectly integrated into the natural one, by imitating its natural production cycles and preserving the essential biophysical processes. But in the last three decades, and specially since Spain's entry into the European Union, very fast and very important changes are taking place in Andalusia's productive systems, as a result of the modernization of its agriculture and of a belated and slow industrialization process along with the gradual growth of tertiary activities such as the tourism and the service sector at large. The result is a transformation of the Andalusian economy, growing increasingly more globalized, from a predominantly rural base towards a mixed (i.e., urban and rural) economy in which, basically, the service sector and, moderately, the industrial one, are starting to acquire an ever greater importance.

Gradually, Andalusia is being configured as an agriculture and service - sector region, specially a touristic one, whose specialization levels are highest in these areas and lowest in industry. This change process is taking place in an incomplete and accelerated manner, making increasingly clear that strong social, economic and cultural contradictions are currently arising in Andalusia, as a result of the said coexistence, which is undergoing a crisis, of modernity with traditions; or of the urban world with the rural world.

Such a change in the productive structure of Andalusia is giving rise to the building of a new artificial network of urban areas, large and medium - size ones, interconnected through new communication infrastructures, growing increasingly apart from the natural and cultural networks. This fact is creating important alterations to the structure, the working and the dynamics of the Andalusian territory, as well as the gradual isolation of the natural ecosystems - whether protected or non protected - stemming from the enlargement of a territorial matrix successively more homogeneous due to rural intensification or abandonment. The medium - term consequence is a gradual loss of the region's biological and cultural diversity.

This is the reason why, in Andalusia and in the rest of the Mediterranean world alike, the eco - cultural dimension of territorial regulation, it being understood as the



spatial expression of society's economic, social and cultural policy, aimed at achieving a balanced development, at improving the quality of life, at managing natural resources in a responsible way and at rationally using the territory, acquires priority significance.

The Decree (103/99) on the Foundations and Strategies of the Andalusian Territory Regulation Plan (POTA) does set, as the framework objective of the self-governing region's territorial policy, the vertebration of the Andalusian region by means of the consolidation of a common ground from a political, social, economic and cultural point of view. In this context, the RENPA's Planning System is endeavouring to develop the ecological dimension of Andalusian Territorial Model laid down by the POTA, for the purpose of fostering the sustainable use of the environmental and cultural services related to the vast Andalusian natural heritage. It is necessary to bear in mind that the sustainable exploitation of the natural and cultural resources is one of the basic principles on which both the Model and the Master Plan stand up.

The Andalusian Territorial Model - the desirable territorial image whose function it is to play the role of a frame of reference for the entire set of sectorial activities, public as well as private, to take place in Andalusia - is structured, in the manner of a network or system, into three mutually dependent components (Figure 14)

- a) **The Regional Urban - Area System**, consisting of large - size (>100.000 inhabitants), medium - size (20.000 – 100.000 inhabitants) small - size (5.000-20.000 inhabitants) population settlements, and rural settlements (<5.000 inhabitants).
- b) **The Internal and External Relation System**, consisting of the transport and communications network, which includes in an integrated manner the linkages which are established to connect the different types of population settlements in the urban - area system.
- c) **The Ecological System** or natural foundations and the extensive uses of the land.

Out of these three constituent elements, it is the first, the urban - area system, the one making up the fundamental scope of reference of the Territorial Model for the devising and the implementation of the strategies laid down by the Plan. On how the latter is going to be structured and evolve will depend, to a great extent, the conservation of the Andalusian natural heritage, to which it is closely bound by an interdependence



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

relationship. It is necessary to take into account that in Andalusia the future of the most thriving economic sectors, namely, intensive agriculture and tourism, is very closely related to the sustainable exploitation of the environmental services provided by its natural and cultural ecosystems (use of water, land, energy, biodiversity, landscapes).

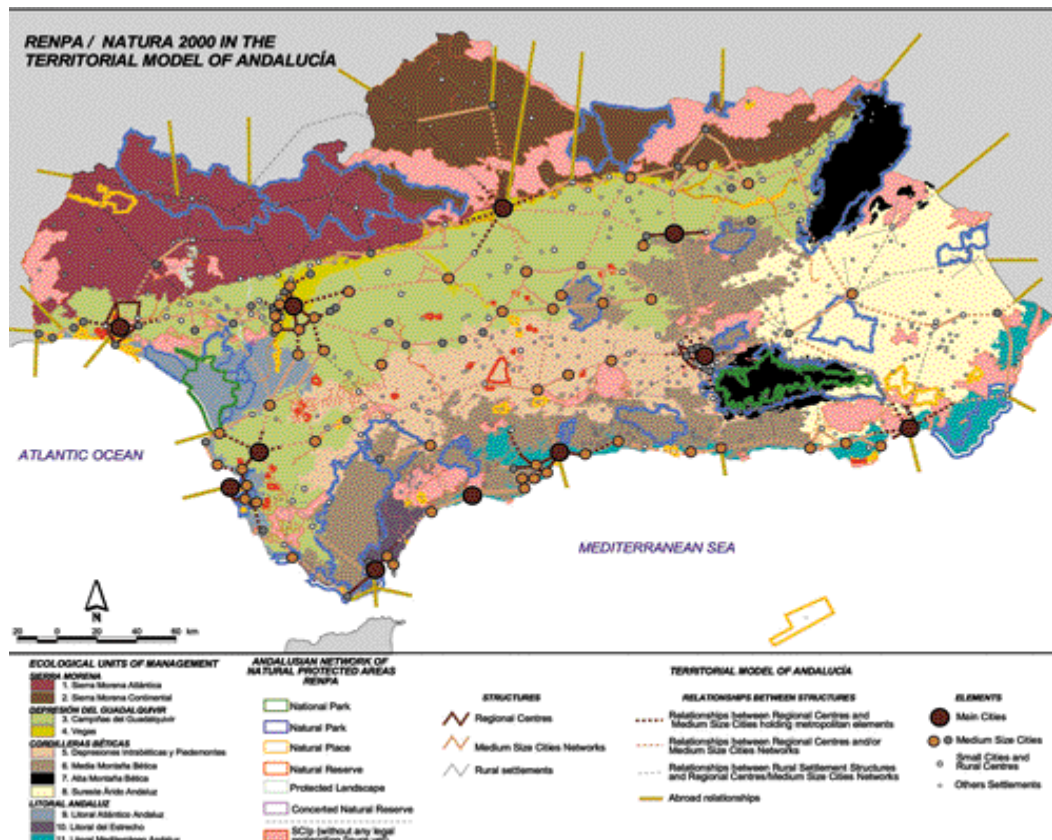


Figure 14. The RENPA (including the future Natura 2000 Network) plays an essential role in the configuration of the Territorial Model established in the Andalusian Territorial Regulation Plan.

On the one hand, the model's natural base is shaped through six large Territorial Units or physically homogeneous areas having common development problems and opportunities. They constitute coherent environments on which common development strategies are put forward, in keeping with the sustainable management of their resources. These units have a good correspondence with the organization of the urban - area system, which is why, broadly speaking, they can be considered as the natural environment with which the Andalusian human settlements establish more or less close ecological and economic links. They are, therefore, the primary productive base associated with the said system, and they constitute the referent used in the identification of the fields in which sub - regional Territorial Regulation Plans are put into effect.



These POTA Territorial Units are, up to some extent, the equivalent of the Ecological Management Units included in the RENPA's Master Plan and they make it possible to incorporate the natural and cultural variability of the Andalusian territory, by setting the burden or reception capability of the different economic activities being compatible with the maintenance of the ecological integrity of its ecosystems. In this context, it is necessary to take into account the essential role played by the area currently under the protection of the RENPA - along with that being potentially protectable (pLICs) - in the territorial coordination and regulation of Andalusia. The territorial importance of the Andalusian proposal concerning SCIs is stressed by the fact that it covers almost 30% of the whole of Andalusia and that it affects 90% of the Andalusian municipal areas. These data give relevance to the fact that the conservation of the eco-cultural values of a large part of the Andalusian rural environment is closely linked with environmental management. Some ecoregions are, practically in their entirety, protected areas and in some others, the area already protected or protectable, covers the majority of their respective areas. The significance, in terms of numbers and area covered, of protected areas in Andalusia succeeds in finally taking the RENPA and the future Natura 2000 Network away from the conservation sanctuary model, to become basic tools for the planning and the management of the territory.

It is, therefore, quite clear that in order to achieve the objective set by the Andalusian territorial policy-vertebrating and strengthening its physical coordination by promoting the sustainable use of natural and cultural resources - it is basic to have the planning and management model of the current and of the future RENPA (including the future Natura 2000 Network). What we are dealing with here is, in the final analysis, the integration of territorial regulation policies into the protected area policy, with a view to encouraging a regulation of the uses of the land that could make an economic development possible as determined by the endogenous possibilities being characteristic of each one of the UEG that make up the Andalusian territory.

This is the reason why in order to conserve the eco-cultural heritage of Andalusia, by combining the policies of territorial regulation and conservation, the RENPA's Planning System is defined within the framework of the POTA and that of the Master Plan, providing what is known as the *Regional System for the Protection of Natural and Cultural Resources of Territorial Interest*, laid down in the POTA for the integrated conservation of the natural heritage resources having an ecological content and significance.

Under the RENPA's Planning System the coherence is being sought of the relationship weft that maintains the ecological integrity of the ecosystems; an integrity by means of which the territorial order established in the POTA supports itself. It is thus necessary, in the first place, to assess whether the current and the future Andalusian transport and



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

communications system, as defined by the Infrastructure Master Plan (1997 -2007) and consisting of an infrastructure network (roads, railways, hydraulic works) is integrated into, or otherwise does interrupt or alter, the ecological flows determining the territory's natural networks. The break - up of the natural and rural networks entails a degradation of the ecological foundations of the Territorial Model and, accordingly, a loss of the region's economic development capability, due to the high degree of dependency of the Andalusian productive system on the sustainable use of the environmental services provided by its ecosystems.

On the other hand, and from the ecoregional vision's perspective being fostered in the Master Plan, the priority functions of the areas included in the RENPA are established within the framework of the different UEG within which they are located. In this manner, protected areas, far from being a tension factor in the area, become a unique opportunity to promote social cohesion and territorial cooperation. What this is all about is the seeking of management strategies, appropriate to each UEG, that enable the harmonious and balanced coexistence of the conservation of the natural and cultural heritage with the economic development of the local population, through the sustainable use of the rich and varied flow of environmental services generated by the continental and marine ecosystems.

• The Andalusian protected areas in the environment of the main urban areas

The fast and asymmetric growth of the economy of the main urban areas is entailing an intense territorial transformation having negative repercussions on the conservation of the Andalusian natural heritage, something which makes it important to determine the role to be played by the RENPA's protected areas and by their relationships with the structure and the evolution of the Urban - Area Regional System and, specially, with the main cities and their Regional Centres. The Andalusian large cities and metropolitan areas, located, in the main, in the coast and in the interior meadows, are home to more than 50 % of the Andalusian population and harbour the most important industrial and tertiary activities. These main urban areas are the most important focal points of the demand of natural resources (water, energy and raw materials) as well as the main source of solid and liquid waste. By way of example, the demand for resources and the generation of waste, measured in terms of area and pressure on the ecosystems (ecological mark), of the Seville metropolitan area requires an area eleven times larger than the one it currently has to achieve sustainability. Likewise, the Andalusian population requires something larger than another Andalusia to satisfy its needs in a sustainable manner.



The urban regional centres have, therefore, a huge capability to transform the near-by rural areas where, in many cases, natural emblematic protected areas are located (Seville/ Huelva - Doñana, Granada - Sierra Nevada, Almería - Cabo de Gata- Níjar, etc). On the other hand, it is also necessary to bear in mind that it is in these main urban areas where the greatest part of the demand for the public use of the RENPA's areas originates. Due to this twofold nature, source of perturbations and demand for nature, the main urban areas, envisaged as a whole, are focal points in the Master Plan. On the one hand, the Plan does foster, within the framework of the POTA and as a part of the strategies concerning the urban - area system, the development of territorial regulation instruments that may boost a balanced metropolitan area of influence, that may, in turn, enable the conservation of adjoining rural areas and the protected areas supported by them. On the other hand, the Plan considers the protected areas close to the large cities as nature and culture schools, but also as a source of touristic and recreational services. This is why its sectorial programmes on Environmental Education and Public Use include specific actions aimed at increasing, from its very origin and not only in the natural areas, an environmental awareness of the social value and the functions of the RENPA. What is intended through it all is to create among citizens a proactive current of opinion in favour of its custody and conservation. In this regard, it supports the Andalusian Environmental Education Strategy, which also stresses the importance of the natural protected areas as one of the essential scenarios for the development of its lines of action.



- The highlands protected areas



With regard to the role that ought to be played by protected areas in the highland regions of Andalusia, it is necessary to bear in mind the structure and the trends of the productive system of these areas. Nowadays, as it is happening in the rest of mountain areas in the Mediterranean region, they are going through a period of severe economic and demographic crisis. They have been left outside the aforesaid fast process of territorial and economic transformation currently underway in Andalusia, and are, accordingly, deemed to be marginal areas from an economic standpoint. Since the second half of the last century a migratory flow has been taking place from the rural mountain settlements towards the intermediate - size and main urban areas and, consequently, a gradual abandonment of the extensive and semi - extensive traditional use systems which were maintaining their cultural ecosystems and the landscape mosaic. They are fragile ecological and economic systems which, generally well - conserved though they currently may be, are also under threat in the short or the medium term, depending on the whether the use their heritage resources are put to does sever or respect their eco - cultural foundations.

These mountain areas play a basic strategic role in the maintenance of key ecological, social and territorial processes on a regional scale. They preserve the head-waters of the river systems and some of them are the replenishment areas of different aquifer systems. They are, therefore, areas for the collection of waters and for the keeping of the reserves of hydraulic resources so paramount for Andalusia, as



well as the origin of vectorial connections of the source - drain type (water flows, nutrients, fauna and cattle movement, etc) linking the mountains, the slopes and the valleys and determining the natural productivity of the soils. Likewise, they include the largest part of the natural and cultural Andalusian forestal ecosystems, among which the holm oak and cork oak meadows stand out. The heterogeneousness and the configuration of its natural and cultural ecosystems explain why the Andalusian highlands are one of the most important biodiversity spots at a national level, and even at a Mediterranean level (as it happens, by way of example, in Sierra Nevada). On the other hand, more than half the archaeological zones and the historical monuments of Andalusia are located in mountain areas.



The conservation of such a vast natural and cultural heritage is the framework objective and the *raison d'être* for the protected areas included in the mountain UEG within the RENPA's planning system. To reach this goal is quite a viable proposition, for it is in the mountain areas where the largest part of Andalusia's protected areas is located. It is the regional protected - area zone, that is to say, that of the large Andalusian natural parks.

In view of the Mediterranean character of the highland natural world, a prerequisite for its conservation is the maintenance of its natural, agricultural, forestal and pastoral landscapes. In other words, the preservation of a living territorial and cultural heritage. Because of this, the natural parks located in mountain areas also have a role to play in the comprehensive development of the affected territory, by fostering and supporting



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

economic initiatives compatible with the conservation of the ecological and cultural integrity of their ecosystems. The objective is to eliminate from these mountain areas the excessive dependence on economic subsidies which reduce the endogenous development initiatives, and to reverse their social and economic marginality by means of an appreciation, whether or not it is acknowledged by the market, of their environmental services. Among the economic reactivation activities deserve special mention those related to rural tourism, for they are fundamentally based upon a high-quality and diverse natural and cultural landscape. In the final analysis, what is intended to achieve is that the natural parks located in these mountain areas be seen by the local population local as income, employment, and welfare opportunities.

In short, protected areas being a part of the highland area have, within their regional context, the twofold purpose of conserving, on the one hand, the key ecological processes existing between the mountain areas and the valleys; specially, the ones related to the superficial and subterranean water flows, as well as their biological, geological and cultural diversity; and, on the other hand, they must act as a bridge between conservation and lasting social and economic development.

For the protected areas located in the highlands to perform this twofold function, the RENPA's Master Plan, in the context of a Mediterranean territorial matrix, is promoting different actions as a part of several of its sectorial programmes. For the conservation of the forestal or agricultural landscape mosaic it finds useful tools in the Andalusian Forestry Plan which, in its 2002 - 2006 adaptation, has as one of its basic goals "to articulate the Andalusian natural environment by connecting the different forestal elements and areas that it consists of and to diversify the rural landscape", through a strategy aimed at the creation and conservation of forestal enclaves and living hedges in agricultural landscapes. In the same way, and within the Forestry Plan's framework, it is of great importance the implementation of its strategy concerning the comprehensive management of meadows. On the other hand, and with regard to the diversification of the agricultural landscape maintaining certain management practices, several programmes of the new agricultural modernization plan (2002 - 2006) are taken as references. The said plan is being implemented by the Department of Agriculture and Fisheries, and as a part of it different measures and programmes for rural development are coordinated for the purpose of modernizing agricultural production and its integration into environmental policies.

To perform its function as the driving force of comprehensive development, the Master Plan is incorporating the conceptual weft, the objectives and the methodological procedures of the MaB Biosphere Reserve Programme, and is including among its sectorial programmes one for the strengthening of this



international protection concept. Nowadays, under the philosophy of the MaB Programme, the Sustainable Development Plans (PDS) of the RENPA's natural parks are being put into effect. It is in these mountain areas where the multiple purpose of natural parks in keeping with the Biosphere Reserve model - conservation, sustainable development and logistic support (education, participation, public use and research and monitoring) - acquires its best territorial expression.

• Protected areas in the context of plantation lowlands and the countryside

The protected areas integrated into the Andalusian plantation lowlands and the countryside are immersed in a territorial matrix largely transformed and homogeneous. In the low countryside there has been a movement from a traditional extensive mixed - farming and rotatory system to a highly technified monoculture of herbaceous crops, while in the plantation lowlands the use of irrigation has been intensified for industrial crops. Only in the highland countryside, the olive grove, one of Andalusia's most emblematic forestal crops, and one of the greatest ecological significance, has found stability.





LINKAGES IN THE MEDITERRANEAN LANDSCAPE

These are areas with a high demand for superficial and subterranean water, as well as for phytosanitary products and fertilizers, which is why they create serious problems related to the intensive exploitation of aquifers and to the pollution of river courses and subterranean waters. These interior agricultural works have stabilized their population around medium - size cities (20.000 - 100.000 inhabitants) which have lost a large part of their cultural identity and which are supported by intensive agriculture and agro - industrial complexes. This development model has given rise to major changes in the structure and the working of the territory, which have altered the ecological wefts and flows which used to act as a connection between the highland and the coast ecosystems (Sierra Morena and the Atlantic coast and the bridges with the Andalusian Mountain Ranges), due, in the main, to the destruction of the river - bank forests and to the pollution of the waters in the courses of the affluent river systems in the right and the left banks of the Guadalquivir. The result of this fast transformation process has been the creation of a homogeneous landscape, dotted with a considerable number of countryside wetlands of a high ecological value, included in the RENPA as natural reserves.

The RENPA's Master Plan is dealing with the conservation of these wetland ecosystems by attempting to break their gradual ecological isolation in the framework of their own sectorial plan called the Andalusian Wetland Plan (Consejería de Medio Ambiente, 2002). In this manner, it is intended that at the heart of the future Andalusian Wetland Committee there be coordination with other regional and national authorities linked with the management of some constituent element of these ecosystems. On the one hand, with the hydrological authority, with a view to fostering the efficient use of the superficial and subterranean waters which determine the hydrological regime and the hydrological period of the wetlands, and, on the other hand, with the agricultural administration, with a view to fostering the rational use and the good practices in their emptying basins.

The wetlands are envisaged as basic stopover or transit points for the conservation of the biological connectivity created by the flows established by aquatic birds between source and satellite wetlands, and which constitute the Andalusian marshy networks, connected, in turn, to other national and international networks. On the other hand, within the framework of the Master Plan, it is deemed to be determining for the retrieval of the connection function between the highlands and the coast, and between the highlands and the valleys that these ecological units used to perform, to prioritise in this area the strategy of the Forestry Plan on the reclamation and regulation of the Andalusian river - bank network. Likewise, it is of great interest within the framework of the Andalusian Livestock Way Plan to prioritise in the valley and countryside areas, the conservation/ restoration of



elements of this cultural network performing, besides, the function of ecological corridors.

- **The protected areas in the arid Andalusian southeast**



The arid Andalusian southeast does maintain ecosystems of great uniqueness and rarity in the context of the European Union, which contribute to the enhancement of the high degree of biodiversity in the Andalusian region. Although it has undergone some significant transformations as a result of reforestation and ground erosion processes, in general its ecosystems do maintain good levels of ecological integrity. For the RENPA's Master Plan, to the basic purpose of the protected natural areas which currently cover a small part of this Unit, namely, the conservation of these unique ecosystems, is added, besides, that of appreciating these arid ecosystems/ landscapes in order to boost a sustainable development based on a specialized type of rural tourism. This function is covered by the Andalusian Forestry Plan, which intends to launch, as a part of its Protected Natural Areas and Public Use programme, one measure aimed at "adding value to aridity" by means of the granting of subsidies and through publicity campaigns to promote sustainable rural tourism.



- Protected areas in the littoral of Andalusia



Andalusia has an important marine dimension divided up into two marine basins: the Atlantic and the Mediterranean. Its littoral façade, connecting the continental and the marine environments, consists in a strip 875 Km. in length (17,5 % of the Spanish coastline) for an area which does not exceed 10% of the region's territory. Far from being a homogeneous strip, this extension harbours an exceedingly high diversity of ecosystems of great ecological, cultural and economic value. In the Atlantic coast are located some of the most important and best kept riverine and littoral complexes in the European Union, among which stands out the Abalarío - Doñana, which harbours riverine marshlands, riverine and tidal wetlands, dune fields, beaches, pools, salt - works and estuaries. By way of contrast, the Mediterranean façade is characterized by rocky coasts, littoral lakes and beaches.

The Andalusian littoral strip is the location of the most productive, dynamic and competitive sectors of Andalusia, which is the reason why this area is undergoing, since the last quarter of the Twentieth Century, the fastest and most important transformations in the traditional productive system. Along with these changes, a degradation and destruction of its valuable natural heritage is being brought about. Some of the main activities of the regional productive system are being introduced into this territory, such as harbour installations, airports, industrial and power -

The role of protected areas in the territorial context



generation complexes and, above all, a type of tourism specialized in "sun and beaches", as well as the new "plastic - wrapped" agriculture, these last two activities being the most dynamic ones from an economic point of view.



Consejería de Agricultura y Pesca. Junta de Andalucía. J.C. Velasco

Such an intense economic flow has given rise to the highest population growth in the region. The Andalusian coast is currently home to 33% of the Andalusian population, a figure which significantly grows during the summer with the arrival of tourists. It includes five of the nine large urban areas in Andalusia, as well as an important number of medium - size cities and specialized urban environments, such as the Costa del Sol, where population density reaches far too high figures (1.381 inhabitants/ Sq. Km in the Torremolinos area).

Since such a growth, based on a relentless demand for land, has taken place without any regulation criteria and plans appropriate to the characteristics of the territory, important and serious unbalances have occurred in the demand for and the exploitation of its natural resources. Demand for building space has caused roughly half the Andalusian coast to be urbanized. Water demand from the numerous urban areas and, above all, the "plastic - wrapped" agriculture, has created serious overexploitation problems in coastal aquifers, as is the case, for instance, in the Campo de Dalías in the west of Almería, in addition to the alteration of the river network of the neighbouring highlands. The pollution problems affecting continental



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

and marine waters, beaches and soils are basically created by urban and agricultural waste and, in the marine environment, by large harbour and industrial complexes such as those in Huelva or Algeciras.

The result, a summary of the whole set of these tension factors, has been the taking over and the degradation of a large part of the Andalusian coast. This fact has been translated into an intense process of fragmentation affecting natural ecosystems, the resulting fragments being left isolated in a deeply transformed environment; some of the most valuable ecosystems have even lost a large part of their original area (e.g.: the Guadalquivir marshlands, the Bay of Cadiz, etc.). Nowadays, part of these fragments of natural ecosystems, some of which are as emblematic as the Doñana Natural Area or the Cabo de Gata Natural Park, are areas included in the RENPA, scattered like islands throughout the Atlantic and the Mediterranean coast.

The seriousness of the problems created by the unsustainable growth model being put into effect in the Andalusian coast - and which is mortgaging its natural assets, the very base of its touristic and economic heritage -, turns it into one of the highest - priority areas for the implementation of the Andalusian territorial policy. Because of that, several Sub - Regional Territorial Regulation Plans are being put into effect which, within the framework of the POTA, are trying to set regulation models for littoral sectors compatible with the conservation of their natural heritage.

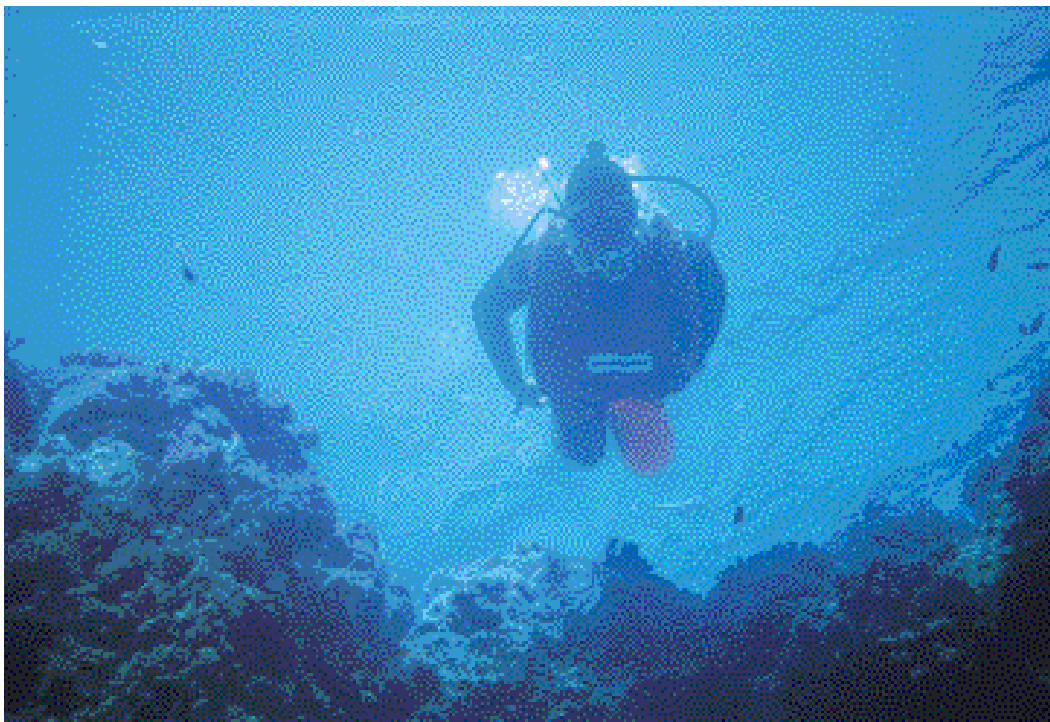
The RENPA's Master Plan lays down that its littoral protected areas must develop a management model having greater influence and weight beyond their boundaries and thus break their gradual isolation. The entire protected area in the Andalusian coastline covers a considerable stretch of land (229.163,75 Ha) and almost 30% of the entire coastal area has been catalogued by the Special Plans for the Protection of the Physical Environment. Taking this as a starting point, and in view of the very high transformation rate that the Andalusian coast is being subjected to, the implementation of the *representativity* criterion is deemed to be a priority for the effective conservation of a representative fraction of each one of the genetic - functional types in its ecosystems. It is, therefore, quite urgent to protect the ecological diversity of the Andalusian coast by increasing, to the greatest possible extent, the size of the protected coastal area and the number of spots included in it. With their greatest part already under protection, the RENPA's littoral areas are destined to play a pre - eminent role - not in an isolated manner, but as a whole - in the fostering of sustainable touristic development strategies, re - orienting the current model towards a quality offer based on the health and the landscape quality of their ecosystems. The protected areas and the cultural landscape must be the



driving force and the base for a new diversified and qualified touristic offer, compatible with the conservation of natural and landscape values of the Andalusian coast. In short, the Master Plan establishes the protection, in the short term, of the maximum of littoral area having ecosystems in a good state of conservation for, simultaneously, enhancing the adding of value to that heritage.

In this approach, whereby protected areas are deemed to be one of the more important assets of the Andalusian coastal region, it is fundamental to encourage the awareness of the population and the economic sectors and to maintain a minimal reserve of this natural capital (the current protected areas) to guarantee its renewability.

• Protected areas in the seascape

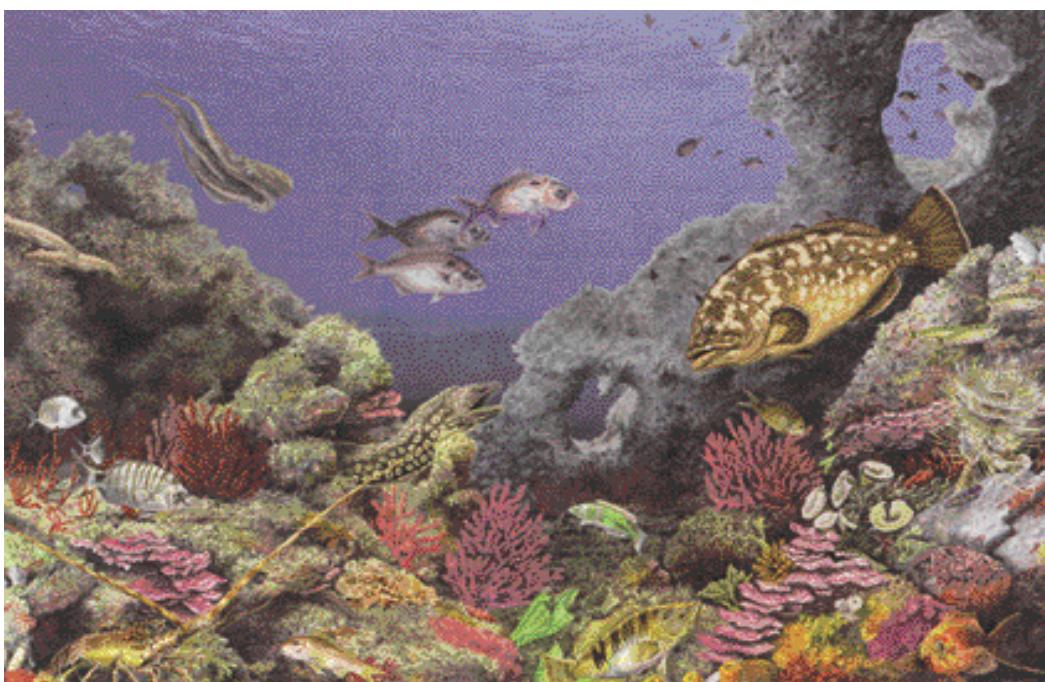


The marine scope of the Andalusian coast is one of the most valuable natural heritages in the European territory. Facing to two biological and geographical provinces as different as the Atlantic Ocean and the Mediterranean Sea, the strictly marine Andalusian ecosystems show, accordingly, a far higher degree of biological diversity than the one that could be expected from its already important size. The



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

complex hydrology resulting from the exchange of water between the Mediterranean Sea and the Atlantic Ocean does, furthermore, generate a high degree of heterogeneousness in the biological diversity and the resource biomass on different space scales, both in the horizontal and in the vertical dimension. Atlantic and Mediterranean streams of water, turns on different scales, high - activity fronts, areas where cold and nourishing water rises, etc, are some of the processes contributing to the intense heterogeneousness and diversity of our regional marine ecosystems.



Consejería de Agricultura y Pesca. Junta de Andalucía. J.C. Velasco

On the other hand, since the Andalusian marine environment is one typical of the transition between biological and geographical areas, we are witnessing the continuous process of natural invasion by species in both directions as a result of the hydrodynamic exchanges between the Atlantic and the Mediterranean. The species of either origin, particularly those of a more or less coastal nature, do reach limits in the distribution of their populations in keeping with their environmental preferences and optima, although these limits can be altered by man - made pressure factors. Be that as it may, these biological exchange processes are a positive contribution to the Andalusian marine heritage as a whole and they imbue its ecosystems with a degree of heterogeneousness unparalleled in other European regions.

However, the Andalusian marine ecosystems do not escape the pressure exerted by a series of processes which are common to the entire Mediterranean basin and



which operate on different scales. Some of these processes take place on a global, basin scale (such is the case of the different effects of the climatic change or the increase in the ultra-violet radiation) and some other do it on a local scale (such as the case of the eutrophicating of a specific bay or the destruction of a stretch of *Posidonia oceanica* meadow). Nevertheless, the intense physical connectivity typical of the fluid environments and the peculiarities of that connectivity in the Atlantic - Mediterranean marine environment which encompasses the Andalusian coast enable the interaction between and the proliferation of processes on different scales. The generic effects that derive and can be expected from global planetary changes, such as the global warming or the reduction in the ozone layer and the increase in the ultra - violet radiation, as well as the possible responses by the ecosystems (terrestrial and marine), are the subject matter of continuous research and debate, basically on the basis of the use of predictive models. Although the European Environment Agency (EEA, 2001) includes some predictions made by the PNUMA/PAM concerning the possible effects of the global climatic changes on specific Mediterranean areas and on the Andalusian dimension of the regional marine ecosystems, given the current state of knowledge, it is not possible to make any assessment in this respect.

Within the scope of the most specific problems affecting regional marine ecosystems in Andalusia and, consequent upon the ecoregions and Management Units defined in this Master Plan, the identification is possible of the following processes or driving forces that, acting as pressure agents, entail a whole sequel of direct and indirect effects:

I. Urban development pressure on the coast

- Modification of the uses of the land, with invasion of the marine - terrestrial public domain.
- Erosion and modification of the littoral profile, with alteration to the distribution of sediments.
- Fragmentation of habitats and communities.
- Input of organic materials and inorganic nutrients.
- Loss of aesthetic and cultural values.

II. Touristic and recreational uses of coastal waters

- Physical fragmentation and destruction of habitats, populations and communities
- Generic pollution (solid waste, organic and inorganic inputs, etc)
- Release of invading species; generally, of an exotic and opportunistic nature (that is to say, having great capability to disperse, to use resources and to displace indigenous species).



III. **Agricultural activities at the hydrographical - basin level**

- Input of organic materials (either natural or synthetic) and inorganic nutrients.
- Input of sediments, erosion and modification of the littoral profile.

IV. **The fishing industry**

- General overexploitation of populations and exhaustion of fishing grounds.
- Exploitation of immature fish through illegal nets and non - industrial fishing.
- Physical destruction of habitats and communities by different trawling nets used under illegal conditions.

V. **Intensive aquiculture activities**

- Input of organic matter and inorganic nutrients.
- Overexploitation of populations of small fish species for the fattening of cultured carnivorous species.

VI. **Industrial activity**

- Input of toxic materials (heavy metals, synthetic organic compounds, etc)

VII. **Marine transport**

- Input of diverse chemical products, in a more or less diffuse (e.g.: tank cleaning) or concentrated way in the event of a maritime accident.
- Release of invading species; generally, of an exotic and opportunistic nature.

We could identify an additional eighth driving force: *the lack of knowledge and awareness by the citizenry of the social value represented by the maintenance of the integrity of marine regional ecosystems*. One of the fundamental goals of the RENPA's Master Plan is to contribute, through several of its Sectorial Programmes, to improving the level of knowledge by the users concerning the value of marine ecosystems in order to finally integrate the citizens' attitude into the said ecosystems' protection and conservation process.

The set of identified pressure factors, by acting either individually or synergistically, do determine some of the general problems which characterize the current state of the marine environment and the marine ecosystems in Andalusia:



Eutrophication of coastal waters

The eutrophication process derives from an increase in the rate of input of organic matter to the ecosystem, which results in the enrichment of inorganic nutrients (in the main, nitrogen and sulphur) and in the increase of the biomass and the system's primary production. It is generally assumed that the increase in the input of nutrients derives from human activities (urban sewage, agriculture, aquiculture, etc). Its negative consequences range from changes in the specific composition of the communities, to the reduction in specific diversity, the risk of proliferation of toxic species, the reduction in the oxygenation of waters and sediments and the resulting increase in the mortality rate of animal populations. In short, a loss of the integrity and health values of the affected marine ecosystems.

The eutrophication problem could be significant in areas close to river water inputs (specially important in the Gulf of Cadiz), urban developed areas with dumping of untreated waste or semi - closed environments under strong human pressure (by way of example, the case of the Bay of Cadiz). On an open or oceanic - water scale (pelagic ecosystems), both Atlantic and Mediterranean, the predominantly oligotrophic nature (scarcity of nutrients and low primary productivity, in particular in the interior of the Mediterranean Basin) results if the eutrophication not being a specially significant problem in these waters, which ought not to be used as an argument to prevent all necessary measures from being put into practice for the alleviation of this degradation process on a coastal ecosystemic scale.

Human health hazards

In a diffuse way, such a hazard does exist throughout the whole coast in the vicinity of spillages, in general through submarine outlets, of untreated sewage of an urban origin and effluents having an industrial origin. However, the different Comprehensive Cleaning Up Plans put into effect over the last few years on a municipality or municipality community scale, as well as the immediate implementation of the EU Framework Directive on Waters make it possible to believe that the presence of pathogenic organisms or that of toxic compounds in recreational - use waters be a minor hazard now and will be a controlled one in the future.

Reduction in fishing resources

Thanks to the differential development of aquiculture and to the greater extent of the continental shelf in the Gulf of Cadiz, the problem of exhaustion of fishing grounds is a more serious problem in the case of the UEG in the basin of the Sea of



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

Alborán, particularly for the whole of the demersal resources (those linked with the solid substratum) and, specifically, for the stocks of immature fishes exploited through forbidden non - industrial techniques (e.g. the use of a small dragnet) or by means of illegally used techniques (e.g. trawling above authorized depths).

It is important to highlight the concern that currently links the intensive aquiculture activities (particularly the one intended for the fattening of carnivorous species, whose extreme example would be the tuna fish) with the overexploitation of populations of small pelagic fish (sardine, anchovy, etc) to be used to feed the cultured species. If the individuals to be fattened come, in turn, from wild stocks (as it happens in the abovementioned example), such commercial activity not only jeopardises the survival in the wild of the populations of the species having commercial value (something that must be considered a common asset), but also of those populations, also wild, that they required for food. Without a doubt that will eventually affect in a negative way both the integrity and the health of the regional marine ecosystems on a wide time and space scale, as will the sustainability of the very social and economic activity of intensive aquiculture, which creates economic profits originated from and concentrated on the exploitation of a common asset.

Reduction in biodiversity

The most significant general consequence of all these processes, acting either isolatedly or synergetically, is the *reduction in general biodiversity* or that affecting some biological groups in particular. Such a reduction is basically shown through the reduction in the area they occupy and in the distribution area of many populations of the Andalusian marine environment, the populations entering a decline process and experiencing an increase in their vulnerability in the face of new external changes or perturbations.

It is important to emphasize the potential role which does play or could play the substitution of autochthonous species for *invading species* generally exotic and opportunistic in nature, a process which, according to what has been expounded at the beginning of this analysis of marine UEGs, must not be mistaken for the biological exchanges which are a natural part of process of configuration of the Andalusian marine ecosystems along the Atlantic - Mediterranean gradient.

Whatever the origin of the species artificially introduced (transport and release in ballast water, accidental leaks from aquarium - type installations or, even, the consequence of engineering works such as the opening of the Suez Canal Suez), the result is a biodiversity loss with changes in the structure of the communities, a trend towards homogenisation with adjoining regions and, in short, a loss of biological identity by the affected ecosystems.



The Master Plan, in taking into consideration and paying attention to the sustainable conservation of the regional marine ecosystems, envisages the development of an Andalusian Plan for Protected Marine Areas, with a Sectorial Plan status equivalent to that of the Andalusian Wetland Plan and other already in existence, in which, by means of a set of Sectorial Programmes, the inventory is identified of specific actions making it possible to guarantee the conservation and sustainable development objectives being the conceptual and political foundation of the RENPA.

A hierarchical planning

For the performance of the functions of the protected areas in the Andalusian territorial context, it is necessary for the RENPA to be organised as a system which must work in a coherent way starting from an institutional Master Plan which, subordinated to the existing legal framework, lays down the guidelines which must rule the planning and the management of the Andalusian protected heritage, from the network level to that of protected area. Such a planning not only has to be integrated into other sectorial projects but also must have an integrational character concerning the planning of the territory as a whole.

The Master Plan does adopt a hierarchical, or from - top - to - bottom, planning model to guarantee the coherence of the RENPA. The model establishes three planning and management levels.

The first level consists in the Master Plan itself, in which the management principles, criteria, guidelines, plans and programmes are laid down, as are the system's components and architecture. For the national parks, the management model is established in the National Park Network's Master Plan, prepared by the Ministry of the Environment and enacted in 1999.

The second planning level is made up of the Ecological Management Units set up in the ecological regionalization of Andalusia (Figure 11). At this level, the RENPA's Master Plan intends to carry out an effective administrative coordination of the Natural Resources Regulation Plans (PORN) of the protected areas which share the same functional unit, which, in turn, must determine the measures (regulation, administration or contract - related) which are necessary for getting the SCIs ready in each UEG. To this end, the Master Plan suggests the preparation of the Regulation and Management Programmes of the Andalusian Ecological Units (POGUEA).

At this level, therefore, a planning is put forward not being regulated by the UEG, which must be understood to be one not requiring a legal support. This would enable,



LINKAGES IN THE MEDITERRANEAN LANDSCAPE

on the one hand, the coordination and articulation, in the framework of the RENPA planning systems, of such changes as it is necessary to include in the PORNs of the SCIs, in order to meet the planning and management requirements demanded by the Directive, adapting them to the biophysical and historical and cultural characteristics of the territory of the UEG where they are located. Likewise, the POGUEA, in addition to enabling the harmonization of all management programmes affecting the same UEG, would facilitate the coordination with other planning instruments such as the Regional Forestal PORN established by the Andalusian Forestry Law or the Sub-Regional Regulation Plans developed by the Andalusian Territorial Regulation Plan.

The last level would consist of the Use and Management Ruling Plans (PRUG), in which the specific plans are laid down for the management and regulation of uses and activities of each protected area in the RENPA.

With this from - top - to - bottom planning model, in which a hierarchy of management objectives is established, the solution is attempted to one of the most important problems related to the long - term viability of the programmes for the management of protected areas: the fragmentation and the scarce coordination among the different authorities involved in the exploitation - conservation of the Andalusian natural heritage. To overcome such a problem, the planning through the hierarchical organization and operation model of the natural and man - made systems, makes the development easier of a coordinated, multi - dimensional and hierarchical management of the ecosystems' environmental services. In short, it makes it possible to develop integrated models for the management of the natural environment at different planning levels, from a regional to a local scale. It therefore facilitates the establishment of an integrated flow of information from top to bottom and vice versa, an easy one to understand by managers, planners, technicians, scientists and, in general, people responsible for the management of natural systems.

The Master Plan envisages a sectorial programme for the monitoring and assessment of the efficiency of the management, that enables the measurement of changes in the System and in the elements that it consists of, and, accordingly, the feeding back of the series which consecutively links diagnosis with regulation with management.

In short, the Master Plan both defends and fosters and environmental policy in which protected areas are a tool within the territorial regulation policy and never an end. This objective is achieved by boosting multidimensional models for the sustainable exploitation of the ecosystems' environmental services. What it does

The role of protected areas in the territorial context



concern is the modulating of an ecologically heterogeneous territory, by boosting diverse human activities resulting in ecosystems, whether protected or non protected, with different stages of ecological succession. But, besides, the different functional types of ecosystems have to be interconnected by a wide variety of processes and wefts, which become apparent on different time and space scales. In this way, rather than devoting our attention to seeking and protecting areas being unique from an aesthetic, a biological or an ecological point of view, we must encourage the implementation of policies and instruments promoting the multiple management of the territory, in keeping with the functionality of the ecological systems on different space scales. The existence of a powerful network of protected areas, both in terms of numbers and in terms or area, is an important territorial strength to achieve the physical articulation of Andalusia based on a eco - cultural heritage with an excellent state of ecological health.

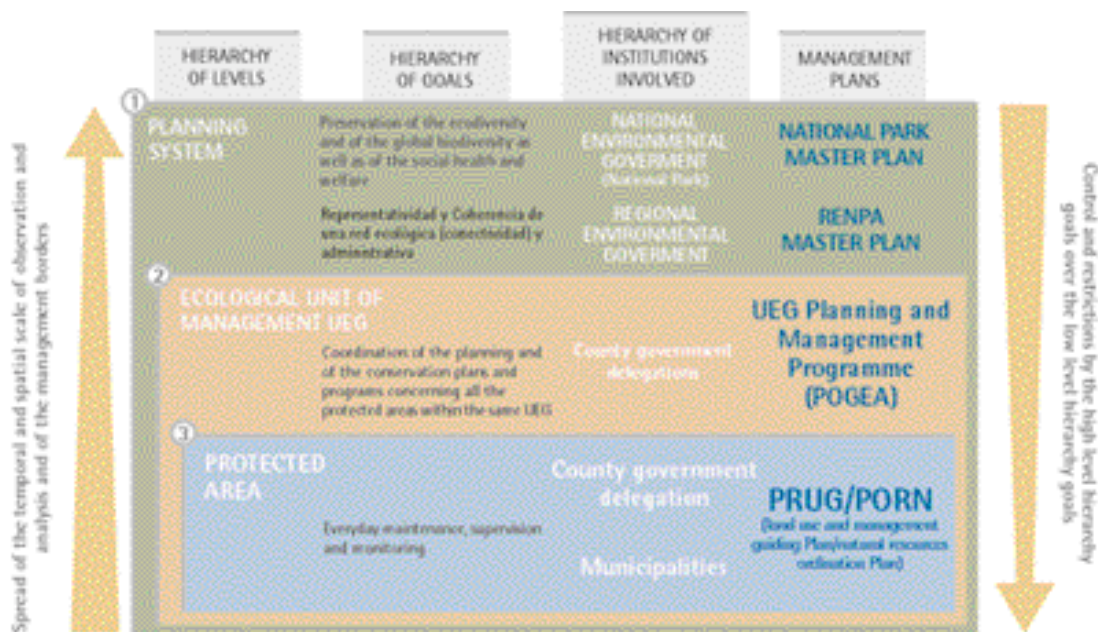


Figure 15. Hierarchical, of from - top - to - bottom, Planning Model established in the RENPA's Master Plan which conceives the management of the Andalusian protected heritage as a set of mutually dependent analysis and management levels. This hierarchical organization makes it possible to plan and to manage the RENPA from a multiple - dimension and multiple - scale perspective and conceive it as a whole, that is to say, as an integrated and single unit