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GUIDELINES FOR THE ESTABLISHMENT AND MANAGEMENT OF MEDITERRANEAN MARINE AND COASTAL PROTECTED AREAS

Arturo López Ornat, Editor.

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MedMPA Project

UNEP - UNITED NATIONS ENVIRONMENT PROGRAMME
MAP - MEDITERRANEAN ACTION PLAN
RAC/SPA - REGIONAL ACTIVITY CENTRE FOR SPECIALLY PROTECTED AREAS
MedMPA - REGIONAL PROJECT FOR THE DEVELOPMENT OF MARINE AND COASTAL PROTECTED AREAS IN THE MEDITERRANEAN REGION

Guidelines for the Establishment and Management of Mediterranean Marine and Coastal Protected Areas

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The programme of the MedMPA Project was organized and coordinated by the Regional Activity Centre for Specially Protected Areas (RAC/SPA), in charge of its execution.
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For bibliographic purposes this document may be cited as:

López Ornat, A. (Editor). 2006. Guidelines for the Establishment and Management of Mediterranean Marine and Coastal Protected Areas. MedMPA project. Ed: UNEP-MAP RAC\SPA. Tunis.

The MedMPA project is financially supported by the European Commission

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Foreword

Protected areas are essential for the conservation of biological diversity, to ensure important environmental services, and for meeting a range of community objectives. After the Convention on Biological Diversity (1992), and more specially the Barcelona Convention and its Protocol on Specially Protected Areas and Biodiversity (both reviewed in 1995), the Mediterranean countries are committed to establishing and managing protected areas. In consequence, there has been a significant growth in coastal/marine PAs in our region: both the number of sites and the area under protection have increased substantially over the recent decades.

But ensuring that appropriate management is in place to realise the potential benefits remains a major problem in many places. An assessment done by RAC/SPA in 1997[1] underlined that staffing in SPAs is usually short for the management needs (estimated at a 46% of the optimum). As the areas grow in importance and complexity the original staff may not receive any formal training in protected area management. The qualifications of SPA staff, when known, are considered to be moderate, while the training opportunities for MPA managers are very limited (only existing in 27% of the countries).

In this context the RAC/SPA, with a financial support from the MedMPA Project of the EU-SMAP Programme, organized a Regional Training Seminar on "Mediterranean Marine and Coastal Protected Areas Management and Planning", together with the edition of the present Guidelines. The Guidelines will proof a basic management and training material for the future work, not restricted to the MPA managers present at the training course, but for over 100 MPA managers around the Mediterranean coasts.

These Guidelines are intended for use by all those concerned with the policy and practice of marine and coastal protected areas, not only the practitioners but also decision-makers at the various levels of government, others such as NGOs and academics, and international funding agencies. Through the publication and distribution of these Guidelines, RAC/SPA hopes to improve the understanding of the needs of protected areas management and the standards of management on the ground.

[1] RAC/SPA. 1997. "Assessment on the Management of marine and coastal Specially Protected Areas in the Mediterranean". Regional Activity Centre for Specially Protected Areas. Mediterranean Action Plan. Tunis.

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1. Role of Protected Areas in conserving the Marine Environment

Diego Moreno Lampreave (EGMASA)

1. Introduction

Despite the great length of coastlines and the vast distances in the sea, marine ecosystems are closely linked to each other and to land use activities, mainly coastal. Seawater has 800 times the density of the atmosphere and correspondingly greater capacity to suspend, sustain and transport molecules, particles, plants, animals, pollutants and debris. The density of seawater links distant areas to an extent that unless an area is very large, it is rarely appropriate, even for the convenience of research and design, to be considered in isolation. Yet, an integrated approach to the management of the global marine ecosystem is yet to be implemented.

The sea and seabed are more than two and a half times as extensive as the total area of land masses of the world, but less than one per cent of that marine area is currently within protected areas. Conservation efforts for the marine environment have lagged behind those for the terrestrial environment. Many marine areas face serious problems, e.g. stress from pollution, degradation of resources, including species, conflicting uses of resources, and damage to the habitats. In most cases, threats are connected to terrestrial activities.

The ideal situation may be expressed as a nested hierarchy with co-ordinated management of catchments, coastal lands and waters linked to management (spills, fisheries, etc.) of the deeper seas. Under such umbrella there should be control and limiting levels of resource extraction, inputs to the marine environment, and some areas set aside, as protected, for reference, research, non-extractive recreation, and other for subsistence of local residents.

Integrated management can be achieved either by establishing a series of relatively small marine protected areas, very important to particular habitats, benthic species, non planktonic and territorial species, as a component of a broader framework on integrated ecosystem management; or by establishing large, multiple use zones and marine protected areas, together with fishing regulations and no-take zones.

Defining the location and extent of MPAs involves considering objectives as (a) maintaining essential ecological processes, (b) ensure sustainable use of species and ecosystems, and (c) preserving the biological diversity.

Different from land, in the sea, habitat are rarely precisely or critically restricted. Survival of species cannot usually be linked to a specific site. Many free swimming species have huge ranges and water currents carry the genetic material of sedentary or territorial species over great distances. Endemism is rare and extinctions have not been documented recently for species with a planktonic phase. Those concepts can be applied to areas critical to marine mammals, sea turtles and sea birds, and to the habitats of occasional endemic species. Therefore in the sea, the ecological case for the protection of an area can less often be based on critical habitat for endangered species, but it may more probably be based on protection of important habitats for commercially or recreationally important species, or for protection of a particularly good example of a habitat type with the associated genetic and specific diversity of its communities.

In the next pages a brief exposition of the present status of marine environments is presented, in two sections: A) Marine Ecology and B) Marine Protection, both with examples from the Mediterranean basin.

2. Marine Ecology

2.1. Marine ecological parameters and characteristics

A 70 percent of the earth's surface is covered by oceans and seas. Water is a substance with a fundamental role in life and environmental processes. Its physical and chemical properties are unusual. The ice, as solid water, is less dense than liquid water and therefore floats at the surface in the polar regions. Were it not for this aberrant behaviour (compared with other substances) ice would become more dense than the surrounding watermass and would sink. If ice did sink, the polar seas would be frozen solid, permanently, with far-reaching effects on sea life and world climate.

Other important physical attributes of water are: its remarkable capacity to store heat, its capacity to dissolve more substances than other liquids, its condition of incompressible substance, its viscosity and its optical properties (Bramwell, 1977).

Also it is important to know that the continuous distribution of seawater around the world produces a uniform environment.

Chemically, seawater has an extremely interesting composition. It is an unusual pure substance, with more than 95 percent of water, a degree of purity that exceeds that of a great many commercially produced compounds (Bramwell, 1977). The total salt concentration of seawater is expressed in parts of thousand (‰ or "per mill"). In open oceans the value around 35‰, but salinities of 38 to 39 "per mill" are found in the Mediterranean Sea, a basin with a high evaporation.

Tides are the oceans' response to two umbalanced forces at earth surface: gravity (caused by the attraction of celestial objects as the moon and sun) and centrifugal force. The Mediterranean Sea, a closed basin, only has small tides (50 cm high), with limited effect on the littoral life if compared with the coasts open to the Atlantic Ocean.

Currents, produced by tides or winds, drive watermass on the surface of seas and oceans. There are also movements of deep water, because of different density of warm and cold watermass.

The Mediterranean has only a natural contact with other seas, the Strait of Gibraltar. This unusual basin, peculiar for its high evaporation, has a surface current from the Atlantic Ocean to the Mediterranean (cold water with low salinity) and a deep current in the opposite direction (warm water with high salinity) (Rodríguez, 1982).

Sea currents, specially at the surface, have an important role in dispersing plankton, included larvae of several marine organism, more of them inhabiting sea bottoms (benthos).

2.2. Marine ecosystems

The properties of water change everywhere in the sea very much faster in the vertical plane than in the horizontal, specially temperature, pressure and radiation. Light penetrates to only two hundred meters depth in open waters. This fact determines fast changes in the environmental conditions when moving from the shore to the deep bottoms.

Each organism lives in a special whole of environmental conditions, so usually every species is present only in a kind of bottom (sand, rock, seagrass meadows), or in a fixed depth (at shore, at 30-50 m depth), etc.

The concept of *shore zones* is a powerful tool for the study of biological communities. Vertical zonation (Margalef 1989) divides the sea bottom in several zones:

- Supralittoral (over the sea surface), intertidal (shore between the low and the high tide),
- Infralittoral (always under the sea surface),
- Circalittoral (under the presence of seagrasses meadows),
- Bathyal zone (under the limit of sun radiations), abyssal zone (on the deep abyssal plain).

In the Mediterranean Sea all this zones are present, being the last, the abyssal zone, very restricted.

Also *the kind of sea floor* determines the distribution of species and communities:

- The soft substrata, composed by mud, sand or gravel, occupies the greater part of the sea bottoms. It shelters a high diversity of fauna that lives buried in the sediment (worms of different groups, bivalves, gastropods, crabs, starfishes and fishes).
- The hard substrata, composed by stones or rocks, has the highest biodiversity, with several groups of algae, sponges, corals, anemones, worms, molluscs, echinoderms, crustaceans and fishes).
- Seagrasses meadows form very complex ecosystems grown by phanerogams plants (they are not algae), living on soft bottoms. The presence of the seagrass meadows change extremely the conditions of the substratum. The major functions of seagrasses are:

  a) the plants stabilize bottom and shore sediments

b) the leaves slow and retard water movements (waves and currents), promoting sedimentation
c) the meadow serves as a shelter and refuge for juvenile and adult animals, many of which have a commercial importance
d) the plants attain a high growth and production (biomass and oxigene).

Open waters shelter pelagic and planktonic organisms. Phytoplankton, composed by microscopic algae as diatoms, and zooplankton, with several kind of larvae or small animals, are moved by the currents, while the animals that make up the necton (cephalopods, fishes and cetaceans) are good swimmers.

2.3. Natural history aspects significant to conservation of marine habitats and species: reproductive strategies

Marine life can use the open waters to dispers and to shelter juvenile stages (larvae). Many groups and species from the benthos have larvae feeding in the plankton (planktotrophic development), with a metamorphosis, while other groups and species have larvae usually feeding on the yolk inside an egg capsule (lecitotrophic or direct development), without a metamorphosis.

Species with planktotrophic development usually produce eggs on a large scale, as the oyster that spawns 10-12 million (this strategy is called "R"). They are effective pioneers and have a very important dispersion capacity because the larvae may live between a week and several months. On the other hand, species with lecitotrophic development, usually without a planktonic life, spawn a few and large egg capsules (this strategy is called "K"). Their capacity of dispersion is limited, but the populations are more stable.

2.4. Mediterranean marine biodiversity: species, endemism, habitat

The diversity of life, or simply, biodiversity, occurs at several hierarchical levels of biological organization: genetic, species, higher taxonomic groups, and ecosystem diversity (Norse, 1993).

The lowest level, the genetic diversity within species, is the least visible and studied. Each species consists of one or more populations of individuals. Because different populations have limited genetic mixing, they tend to diverge genetically by mutation and natural selection.

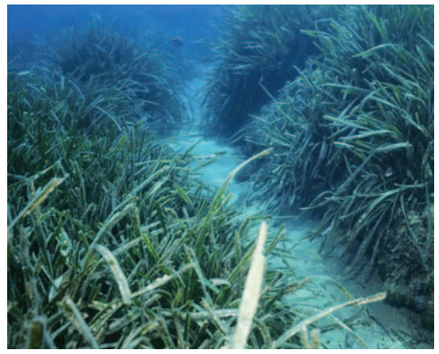
Species diversity

The species diversity is the most obvious level (the middle) in our hierarchical model. The number of species varies greatly among higher taxonomic groups, such as families or classes, and also among geographical areas. There are, for example, far more species of molluscs than of echinoderms. There are more small species (as molluscs) than large ones (as seagrasses).

Among plants several groups of algae have an important role in infralittoral environments: green (Chlorophyta), brown (Phaeophyta), and red seaweeds (Rhodophyta). There are hundreds of species of these organisms usually living on rocky bottoms. Within the Clorophyta eatable species we find the Sea-lattuce (*Ulva spp.*), and other species of the genus *Caulerpa*, with small roots to settle on soft bottoms, a condition very unusual among algae. *Caulerpa prolifera* is a Mediterranean species and *Caulerpa taxifolia* an alien species.

The brown seaweeds of the genus *Cystoseira*, present in the upper zone of the infralittoral areas, are threatened species (Barcelona Convention, Annex II, see Appendix 1) and also good indicator species.

Some red algae are encrusting and calcareuos, as *Lithophyllum byssoides* (Barcelona Convention, Annex II, see Appendix 1, as *Goniolithon byssoides* and L. *lichenoides*), living on rocky shores, and forming interesting cornices in the upper zone of infralittoral areas, called "trottoir". Other red seaweeds can live in the circalittoral zone with scarce sun radiation.



The seagrass *Posidonia oceanica* is a Mediterranean endemic species with an important role in the infralittoral environments (Cabo de Gata - Níjar Natural Park, Almería, Spain). PHOTO: Diego Moreno

Seagrasses, as *Posidonia oceanica, Cymonodocea nodosa, Zostera marina* and *Zostera noltii,* are not algae. This fanerogams (= with flowers) plants, have a terrestrial origin and a secondary adaptation to marine habitats. The role of these plants is very important in the infralittoral environments (Luque and Templado, 2004) of all around the world (see above). Among them, the most important species is, without doubt, *Posidonia oceanica* (Habitat Directive 92/43/EEC as priority habitat; Barcelona Convention, Annex II, see Appendix 1), an endemic species of the Mediterranean Sea, with large roots and leaves, that can live between the shore (where it can form reef-barriers) down to 30 metres depth, making up meadows with high production and biodiversity.

Among animals, a lot of different groups live in marine environments. The Sponges (Porifera) are primitive and sesile organisms (fixed on the substratum), with numerous pores for filter feeding by ciliary action. *Axinella polypoides* is a large species inhabiting coralligenous biocoensis (Barcelona Convention, Annex II, see Appendix 1). Other sponges, that of the genus Spongia (bath sponges), are included in the Annex-III of the Barcelona Convention (see Appendix 1).

The *Phyllum Cnidaria* comprises some interesting animals, as the seaferns (Hydrozoa), anemones, seafans and corals (Antozoa), and jellyfish or medusae (Scyphozoa). Among them, the orange coral *Astroides calycularis*, a spectacular species, is present only in the West Mediterranean basin (Barcelona Convention, Annex II, see Appendix 1). The red coral (*Corallium rubrum*) and black corals (*Antipthes sp.*) are species whose exploitation is regulated in the Annex-III of the Barcelona Convention (see Appendix 1).

The popular name "worm" is given to animals belonging to several and different groups, as Turbellaria (flat worms), Nemertina (ribbon worms), Nematoda (roundworms), Priapulida, Echiurida, Sipuncula (peanut worms), and Annelida (segmanted worms). Among the last group,

earthworms live in terrestrial environments (except one species in accumulations of *Posidonia* leaves on shore areas), leeches live in freshwater and marine habitats, and bristle worms (also called polychaetes), are all very abundant in marine environments.

Molluscs (Mollusca) have been immensely successful in a wide variety of ways of life, and constitute the second phyllum in size only to the Arthropoda. Most molluscs are marine (although land and freshwater species also are widespread) and they occur in every part of the marine environments. Among molluscs there are different groups: Chitons (Polyplacophora), with eight plates, gastropods (Gastropoda) with a spiral shell (or without shell in nudibranchs), bivalves (Bivalvia), presenting a shell with two valves, elephant-tusk shells (Scaphopoda), with tubular shells like tiny elephant tusk, and octopuses, squids and cuttlefish (Cephalopoda), with an internal chambered shell or without it.

Some gastropods and bivalves are endangered species (Barcelona Convention, Annex II, see Appendix 1), because of their large size or beautiful shells, making them an objective for collectors. Among them, the limpet Patella ferruginea is a very endangered species, endemic of the Mediterranean Sea and extinct by human beings (harvesting and shellfishing) in a great part of its distribution area, because this species lives above the water surface when the sea is calm. At present its populations live only in the West Mediterranean basin in some islands (Corsica, Alborán, Chafarinas) or in small continental areas (Strait of Gibraltar, Morocco and Algeria) (Templado, 2001).

The Limpet *Patella ferruginea* is an endangered species extinct in a great part of its distribution area by human beings (harvesting and shellfishing) (Alboral Island Natural "Paraje", Almería, Spain). PHOTO: Diego Moreno

Other important gastropod is the vermetid Dendropoma petraeum forming small but interesting reefs in rocky shore areas in the southern parts of the Mediterranean basin: Spain, Sicily, Israel, and coasts of North Africa. The great species of the genus Charonia are also threatened in the Mediterranean basin, although also present in other seas and oceans because of their long live planktonic larvae.

Among bivalves, Pinna nobilis, the largest invertebrate species in Europe only to the giant squids, live in Posidonia oceanica meadows.

Crabs, lobsters, shrimps and prawns (Crustacea) are by far the more important group of marine Arthropoda. Some of the greater species, as the lobster (*Homarus gammarus*), the Crawfish (*Palinurus elephas*), the Greater locust lobster (*Scyllarides latus*), and the Spiny spider crab (*Maja squinado*), are species whose exploitation is regulated in the Annexe-III of the Barcelona Convention (see Appendix 1).

The Echinodermata is the largest purely marine phyllum. The most peculiar features of echinoderms are their fivefold symmetry, their calcareus skeleton and their water- vascular system.

Among starfish, Asterina panceri (that lives in *Posidonia* meadows) and *Ophidiaster ophidianus* (characteristic of precoralligenous biocoenosis) are included in the Annexe-II of the Barcelona Convention (see Appendix 1). The Brown long-spined sea urchin (*Centrostephanus longispinus*), also was included in the same Annexe II, while the common rock urchin (*Paracentrotus lividus*) appears in the Annexe-III.

There are about a hundred known fishes in the European seawaters. Some of them are endangered or threatened species (included in the Annex II of the Barcelona Convention), as the Sturgeons (*Accipenser spp.*), the Pipefishes (*Hippocampus spp.*), and also several sharks, as the Basking Shark (*Cetorhinus maximus*) and the Great White Shark (*Carcharodon carcharias*). Other fishes are included in the Annex III (see Appendix 1), as species whose exploitation is regulated, e.g. the eels (*Anguilla anguilla*), the Dusky grouper (*Epinephellus marginatus*), the Atlantic bluefin tuna (Thunnus thynnus) and the Swordfish (*Xiphias gladius*).

All the sea turtles present in Mediterranean waters are endangered species. The more frequent species, still nesting in some beaches (mainly in Greece, Lybia, Turkey, Cyprus), is the Loggerhead Turtle (*Caretta caretta*). The Green Turtle (*Chelonia mydas*) is rare and only nests and apparently feeds in selected beaches of Cyprus and southeastern Turkey.

Seabirds range from waders, wich live and feed in estuaries and littoral lagoons, as the Greater Flamingo (*Phoenicopterus ruber*), to birds of the open ocean such as Shearwaters (*Puffinus yelkouan* and *Calonectris diomedea*) or Storm-petrels (*Hydrobates pelagicus*). Other seabirds, as Gulls (*Larus audouini*), Terns (*Sterna albifrons* and *Sterna sandvicensis*) and Cormorants (*Phalacrocorax aristotelis*) live in the interface between earth and sea, and usually feed in marine environments and rest on terrestrial areas, as beaches or cliffs. Some species of seabirds are nowadays endangered species in the Mediterranean Sea (see Appendix 1).

Mammals, as whales, dolphins and seals, are the largest animals in the world and therefore also in the oceans. Practically all the marine mammals present in the Mediterranean waters are endangered species because of the human activities: pollution, fisheries, etc. Among Whales, the more frequent species is the Fin Whale (*Balaenoptera physalus*). The Common Porpoise (*Phocoena phocoena*) now is the most rare Odontoceti (with teeth) cetacean in Mediterranean waters. The only seal species in the Mediterranean Sea, the Monk Seal, is one of the most endangered marine species around the world. Its last breeding populations are find in Mauritania (Atlantic Ocean, aprox. 250 individuals) and Greek Islands (Aegean Sea, aprox. 150 individuals).

In the Mediterranean Sea the biota is composed by species from the Atlantic cold waters of Europe, species from the Atlantic warm waters of West Africa, and species typically Mediterranean. Endemic species, those that are only found in a local place or small region, are very important in biological conservation, as their reduced distribution area could be a serious threat to their survival. Among the endemic species, we can mention the seagrass Posidonia oceanica, the red coral *Corallium rubrum*, the orange coral *Astroides calycularis*, the limpet Patella ferruginea, the starfish *Asterina pancerii*, the Balearic Shearwater *Puffinus mauretanicus*, the Audouin's Gull *Larus audouinii*, and the Monk Seal.

Ecosystem diversity

In the Mediterranean Sea the most important communities (or biocoenosis) of the infralittoral zone are, in hard substrata: biocoenosis of the photophilic algae with several facies as the corniche of *Lithophyllum* incrustans and the Vermetid 'trottoir' (also called 'reef') of *Dendropoma petraeum*. In soft substrata we can find the biocoenosis of fine well-sorted sands (with several species of bivalves and worms), and the biocoenosis of *Posidonia* meadows (the most important infralittoral ecosystem) (Pérès, 1967).

In the circalittoral zone on hard substrata the most important biocoenosis is called coralligenous, with calcareous red seaweeds, gorgonarians and bryozoans. Other important biocoenosis is that of semi-obscure caves, where the red coral *Corallium rubrum* and some sponges live. In circalittoral soft substrata the biocoenosis of the coastal detritic is found (Templado et al., 1993). The biocoenosis of the coarse sands and fine gravel under bottom currents has no relation to the vertical zonation, so it could be find in the infralittoral and the circalittoral zones (Pérès, 1967).

2.5. Cases of species with a land phase, reproductive, roosting or feeding

The interface between air and seawater in shores, is the marine area with a higher impact from human beings. The species inhabiting rocky shores (for example, limpets) and sea birds, turtles and seals, that live in open waters but have a land phase (reproductive, roosting or feeding), are the most threatened organisms by the destruction of littoral areas and its ecosystems.

2.6. Threats to marine ecosystems

Human populations have a tendency to live in coastal areas all around the world. Human activities disturb and damage marine ecosystems in ways that can be grouped into five broad classes: overexploitation, physical alteration, marine pollution, introduction of alien species, and global atmospheric change.

The overexploitation of marine resources are the first class of threats for marine ecosystems. Usually the term harvest is used for killing wild populations (whales, fishes, oysters or lobsters), but this is not harvesting. This term is more suitable for agriculture, and in the sea for mariculture and fish-farming. Fisheries of fishes and shellfishes diminishes species' populations and reduces economic return, but also disturbs ecological relationships between species: predators, symbionts, competitors and prey.

The physical alteration can be grouped in some classes. Some are intentional, disturbing the physical environment as an objective (ports, beach renourishment, channelization, dredging, etc.). In other cases physical alteration has been overlooked, as with trawling, human visits, anchoring, diving and noise pollution. Some human activities do not even occur in the sea, but affect it because they disturb the flow of important materials between land or freshwaters and the sea, as the siltation from land-based activities, the modification of river drainage basins, the reduction in freshwater flow, sediments and nutrients, etc.

The pollution. The sea is the ideal dump for undesiderable products from human activities, because wastes simply seem to disappear. Regrettably, there is a complex mix of vast amounts of pollutants on coastal waters, so pollution problems are arising ever farther from land. Pollutants include chemicals (toxic products, oil, heavy metals, PCBs, radioactive particles, nutrients) and solid wastes (rubbish, metal, glass, plastic items, ships).

Attraction of fish shoal (bogues and horse-mackerels) by artificial reefs installed for the passive vigilance of no-take zones (Cabo de Gata-Níjar Natural Park, Almería, Spain). PHOTO: Diego Moreno

The introduced species, also called biological invaders, alien species, or non-indigenous species, are organisms that have been transported by human activity, accidentally or intentionally, into regions where they have not occurred historically. They can arrive from commercial fisheries, mariculture, aquariums, scientific research, new ship canals and shipping. Biological invasions can cause devastating impacts in the new ecosystems, having no apparent effect, or can be perceived as a 'positive' addition to the community. For example, *Oculina patagonica*, a coral from South America (Fine, Zibrowius and Loya, 2003), or *Asparagopsis armata* (a red seaweed from Australia and New Zealand) arrived accidentally to the Mediterranean Sea during the XX Century. On the other hand, some species for mariculture were introduced intentionally in Europe from the American Atlantic or Pacific Ocean, as the oyster *Crassostrea gigas*, and the clam *Ruditapes philippinarum*. At present, there are data of 828 species non-indigenous in the Mediterranean, and the main vector is via the Suez Canal open in 1869 (this organism are called "Lessepsian" species) (Streftari, Zenetos and Papathanassiou, 2005).

The global atmospheric change is closely related with oceans, because seawaters and atmosphere are two parts of one system. Two phenomena directly affect the atmosphere and also have profound potential effects on the oceans: the depletion of the ozone layer (allowing an increase of biologically damaging solar UV-B radiation to the surface of the Earth), and the build-up of atmospheric greenhouse gases (CO2 and methane) producing the "greenhouse effect", resulting in global climatic change, and therefore in the marine ecosystems.

2.7. Status and threats to Mediterranean marine biodiversity

The Mediterranean, as a closed sea with a very important human population from the antiquity, has more problems than other oceans or marine areas. In the Mediterranean Sea overexploitation, physical alteration, marine pollution, introduction of alien species, and global atmospheric change, are greater threats than in other basins.

About overexploitation, in the Mediterranean Sea, trawling fisheries produces the destruction of seagrasses meadows. Beach renourishment seems the most worrying physical alteration the in the Mediterranean. The marine pollution (chemicals and solid wastes) in the Mediterranean Sea

is high and it seems very difficult of remove, because of the small connection with the Atlantic Ocean. Recently, a new alien species was introduced in the Mediterranean, the green seaweed *Caulerpa taxifolia*, from tropical seas, that in some areas (France, Italy and Balearic Islands, and already found in Tunisia) takes the place of Posidonia oceanica, a seagrass endemic and a very important species in the infralittoral zone. At present, other non-indigenous species, or an hybrid between two varieties of *Caulerpa racemosa*, spread rapidly (Durand et al., 2003).

Finally, the global atmospheric change could be very important in a close sea as the Mediterranean. This phenomenon is related with the sea level; in this moment it seems that sea level will rise as the Earth warms up. In other ages (for example, ice-age) the sea level has fluctuated dramatically. During the Messinian age (Miocene) the Mediterranean Sea lost its connection with the ocean and rested dry for large periods.

3. Marine Protection

3.1. History of the marine protection

Because some attributes of organisms transcend the land-sea interface, some aspects of terrestrial conservation are applicable to the sea. But differences in media, dimensionality, and scale between terrestrial and marine realms have major implications for marine conservation. As a result, principles of marine conservation can be very different from that derived from experience of land, included the history of protection.

Table 1.- A brief History of Marine Protection.

Year or Period	Activity or Event	Significance for MPAs
1958	Four conventions, known as the Geneva Convention	Established an international framework for protection of living marine resources
1972	United Nations Environmental Programme (UNEP) established the Regional Seas Programme. The first action plan was adopted for the Mediterranean in 1975	Provided a framework for considering marine environments issues regionally. MPAs were means of addressing some such issues
1976	Barcelona Convention, for the protection of the Mediterranean Sea against pollution (UNEP)	Instruction for declare MPAs
1984	IUCN published "Marine and Coastal Protected Areas: a Guide for Planners and Managers"	This guidelines describe approaches for establishing and planning protected areas
1992	The European Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora (Habitat Directive)	List of endangered marine habitats, that included seagrasses meadows (*Posidonia*, *Cymodocea*, *Zostera*). The Annex IV included 3 marine species: Patella ferruginea, Pinna nobilis and *Lithophaga lithophaga*.
1996	Mediterranean Action Plan (Barcelona Convention: UNEP): Meeting of Plenipontentiaries on the Annexes to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean	Annex I: Definition of a new type of MPA: Specially Protected Areas Mediterranean Importance (SPAMI) Annex II: List of endangered and threatened species Annex III: List of species whose exploitation is regulated (see Annex I, II and III in Appendix 1)
2001	Declaration of SPAMI in Mediterranean basin	14 SPAMI had already been declared in 2003 in the Mediterranean

Human are terrestrial beings, warm-blooded and air-breathing, and therefore the realm beneath the waves is for us an extraneous environment. Research and monitoring are more difficult and expensive in sea than in land, so the conservation of biological diversity in the sea has been more neglected than that on land (Committee on the Evaluation, Design and Monitoring of Marine Reserves, 2001).

For example, the first terrestrial National Park in the world was declared in 1872 (Yellowstone, Wyoming, USA), while park with marine components, as the Everglades National Park (Florida, USA), start its declaration in 1934. In Spain, the first Terrestrial Protected Area, the National Park of the Mountain of Covadonga, was declared in 1918, while the first Marine Protected Area (MPA), the Marine Reserve of Tabarca Island, was declared in 1986 (Ramos Esplá et al., 1992).

3.2. Objectives for marine protected areas: categories, international networks

The Cabo de Gata-Níjar Natural Park, Almería, Spain), also a Marine Reserve, a Biosphere Reserve, and a SPAMI, is a good example of management and conservation of terrestrial, littoral and marine environments. PHOTO: Diego Moreno

All the MPAs have as objective the protection of marine diversity (physical and biological). However, the real protection depends from what organism make the declaration. For example, in Spain there are National Parks, declared by the Ministry of Environment, which are very restrictive areas; Natural Parks declared by the Autonomous Governments allow certain human activities; and Marine Reserves are also declared by the Central Government, but in this case by the Ministry of Agriculture and Fisheries, and have only fisheries objectives.

Nowadays, also there are international networks for MPAs. United Nations Educational, Scientific and Cultural Organization (UNESCO) has a network of Biosphere Reserves. In Spain, the Natural Park of Cabo de Gata-Níjar is also a Biosphere Reserve. The Mediterranean Action Plan (Barcelona Convention: UNEP, 1996), and its Meeting of Plenipontentiaries on the Annexes to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean defined a new network with a new type of Marine Protected Area: the Specially Protected Areas Mediterranean Importance (SPAMI). In 2001, in the Mediterranean basin, several previous Marine Protected Areas were declared also as SPAMI.

In 2001 a new international network: the Latin-American Network of Marine Reserves was born, including Spanish and Latin-American Marine Protected Areas (Moreno and Frías, 2003).

3.3. Marine protected areas in the Mediterranean: functions and values of broad and small areas

There are very different figures for declaring MPAs. Every country and each region have different categories. For example, in Spain there are in Mediterranean waters one National Park

(Cabrera Islands, in Balearic Islands), several Natural Parks (Cabo de Gata-Níjar, Strait of Gibraltar, Columbretes Islands, etc.) (García Raso et al., 1992; Templado et al., 2002), several Natural "Parajes" or "places" (Maro-Cerro Gordo, Alborán Islands, etc.), different Natural Monuments (Bajos de Roquetas, Terreros and Negra Islands, etc.), and several Marine Reserves (Tabarca Island, Columbretes Islands, Cabo de Gata-Níjar, Alborán Island, etc) (Calvo et al., 2001).

On the other hand, some MPAs have different declarations. In Spain, for example, Cabo de Gata-Níjar (Almería) was declared as Natural Park in 1987 by the Autonomous Government), but also after as Marine Reserve (Central Government, 1995), Biosphere Reserve (UNESCO, 1997), and SPAMI (Barcelona Convention, UNEP-2001).

About the extension, there are broad MPAs, that protect important areas of littoral with several types of marine ecosystems, usually in a good status of conservation. This broad MPAs shelter also a high specific diversity, included several endangered species. Other categories, for example in Spain the Natural Monuments have as objective the protection of small areas with only one ecosystem or one endangered species, as the Bajos de Roquetas (Almería), with an interesting formation: a Posidonia barrier-reef (Castro *et al*., 2003).

It is important to declare Marine Protected Areas, in the context of degradation of coast environment around the world, also in the Mediterranean Sea. Each marine reserve has its function, now for broad areas, now for small areas; all are important, when only less than one per cent of the marine environments are protected. In a second step, after the single declaration, these zones must be managed (vigilance, control, monitoring, research, public activities, etc.) to really be a Protected Area.

3.4. Basic studies previous to the declaration of marine protected areas

As with any enterprise, a good design is fundamental for the success of Marine Protected Areas. It is very important to study natural and socio-economic criteria to select a Marine Protected Area and its location (Ortiz García, 2001). The more important issues are: physical environment, biotic environment, socio-economic aspects, and defining the location and extent of marine protected areas.

The study of physical environment is basic for the knowledge of a marine area, including general climate, seawater temperature, marine currents, geomorphology, and sea bottoms (different types of substrates).

Also the biotic environment must be studied. One of the main objectives of any Marine Protected Area is its biological diversity protection. It is important to know the species and its distribution, the marine communities present (animal communities and vegetation), and their interrelations (between species and ecosystems).

Socio-economic aspects, as economic activities affecting the marine environment, have an important role in defining the category and the extension of Marine Protected Areas (Badalamenti *et al*., 2000). Number of human beings, fisheries, tourism, and other activities are closely related with this topics. Also, it is very important the implication of local communities and Governments.

Defining the location and extent of marine protected areas is a difficult subject. Only after all the previous studies above listed, is possible to define the final location and extension of a Marine Protected Area. Usually the socio-economic aspects are determinant, so it is frequent that the Marine Reserves finally do not included all the protection well deserved.

3.5. Legal coverage and applicable regulations

All areas eligible to be declared as Marine Protected Area must be awarded a legal status guaranteeing their effective long-term protection. Each nation, and inside them each autonomous region, must have a legal coverage and applicable regulations for protected areas and also for endangered species. For example, in Spain, there are national and regional laws for conserving nature heritage and natural areas; also in this country, there are laws (National and Regional Catalogues) with lists of endangered species.

European nations have International Conventions for habitats and species protection, as the Habitat Directive (92/43/EEC) (for marine species see Annex IV) (Ramos et al., 2001), or for the exclusive species protection, as the Berna Convention (Annexes II and III) as the Red List of UICN (Rosas et al., 1992).

Nowadays all the nations with coastal Mediterranean areas have a common legal coverage through the Barcelona Convention (UNEP, 1996) (see Appendix 1), that presents several suggestions about new protected areas (Specially Protected Areas of Mediterranean Importance, SPAMI) and a list of endangered or threatened species (see Appendix 1). All this suggestions, little by little, must be included in the body of laws of each Mediterranean nation. In Spain, for example (one more time) there are included in its National Catalogue of Endangered Species (from 1999) only ten species (without Canary Islands): three mammals (*Tursiops truncatus*, *Megaptera novaeangliae* and *Eubalaena glacialis*) and seven invertebrates (*Patella ferruginea*, *Pinna nobilis*, *Charonia lampas lampas*, *Dendropoma petraeum*, *Astroides calycularis*, *Centrostephanus longispinus* and *Asterina pancerii*) (Templado *et al*., 2004), from the about hundred species in the Barcelona Convention Annex II (see Appendix 1), but this list is not closed and it is possible yet to include more species also in Regional Catalogues.

3.6. Marine protected areas in the Mediterranean: areas along the northern coast, and along the southern coast

Governments, singly or as participants in regional or world organizations, can create conditions favoring the protection, study, and sustainable use of marine organisms and ecosystems, or the conditions that encourage their destruction. There are many reasons why governments and international governmental organizations often seem to interfere with, rather than help, efforts to conserve the sea. The profound inequities between industrialized and developing nations are among the greatest political barriers to solving the world's environmental problems. The sea, as a global commons, is at special risk from the resulting conflict. The Mediterranean case is obvious, with a north coast with european industrialized countries (France, Italy, Spain, Croatia, Yugoslavia, Greece, etc.) versus a south coast with North African developing nations (Morocco, Algeria, Tunisia, Libya and Egypt) (Badalamenti *et al*., 2000).

The industrialized nations, located in the north coast of Mediterranean Sea, are comparatively rich economically but poor biologically, have harnessed formidable human resources and technologies to amass financial capital by liquidating their natural capital, and continue to export destructive technologies to the South.

On the other hand, developing countries, located in the south coast of Mediterranean basin, have scarce scientific and technological resources and tend to be poorer economically but richer biologically than the north.

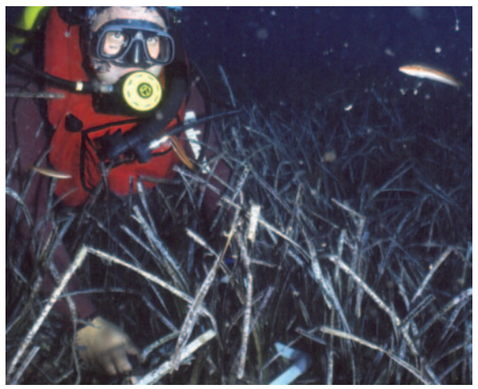
To sustain the marine processes, fundamental for the conservation of the Mediterranean Sea, the North and the South must work together for their mutual benefit. Substantial improved cooperation between them is the key to any meaninful progress in conserving the sea.

There are a lot of MPAs in the Mediterranean basin. Only a selection is showed in the Appendix 2, based in Cogetti (1990) and Badalamenti et al. (2000). The last issue of the Directory of Mediterranean marine and coastal protected areas established by RAC/SPA list 122 protected sites. In terms of surface area, they cover 1,767,032 hectares (for more information see http://www.rac-spa.org/).

3.7. BASIC MANAGEMENT NEEDS: signals, vigilance, control and monitoring: comparison of different methodologies and their relative costs

All the MPAs require a vigilance and a control of human activities. As a first step it is basic to provide signals in the protected area boundaries: landmarks and buoys in the sea, and posters in beaches and ports with basic information about the uses of the protected area.

The vigilance needs a special team with an expensive equipment: ships, boats and diving suits. This type of vigilance is very important for the active control of human activities as fishering, diving, bath, sailing, anchoring, etc. Another type of vigilance, a passive control, is offered by the artificial reefs, great concrete constructions installed on the sea bottom (usually on soft substrates), for supply protection to the areas of major value, no-take zones (called Integral Reserves), where only research activities are allowed. The last type is cheaper than the active vigilance.



Monitoring the biocoenosis of *Posidonia oceanica* meadows by charting methods (obtain density values of seagrass), (Cabo de Gata-Níjar Natural Park, Almería, Spain). PHOTO: Diego Moreno

Assessment of the conservation status of different species in marine environments is very important to know the effective role of Marine Protected Areas. The studies of indicator species, as seagrasses (Moreno et al., 2001), endangered species (in Mediterranean Sea: *Patella ferruginea*, *Pinna nobilis*, *Charonia lampas*, *Dendropoma petraeum*, *Astroides calycularis*, *Centrostephanus longispinus*, etc.), or elements of the macroflora and macrofauna (algae, corals, seafans, sea urchins, lobsters, bryozoans, fishes), allow to make up a monitoring strategies necessary for the decision-making process.

For the evaluation of marine reserves effect on the recovery of species and biocoenosis, is important to know the distribution and evolution of populations of different types of marine organisms. It is possible monitoring certain species using easy and cheap controls, as census, transects, marks, etc. (Goñi et al., 2000). Usually the problem is the lack of monitoring teams, even the presence of biologists in the management staffs.

The study of "Reserve Effect", comparing no-take zones (only research is permited) with zones without protection (with fisheries, tourism, pollution, etc.), can offer an evaluation of the status and evolution of several species and, therefore, of the Marine Protected Area. For monitoring the "Reserve Effect" it is very important to obtain a "Zero Point", just at the moment of the definitive declaration, as the status of species and populations before vigilance. If the Marine Reserve have an effective vigilance, the marine populations increase in number and size, for example using fish species (monitoring by visual census), algae and seagrass (charting methods), seafans, etc. (Goñi et al., 2000).

3.8. Other management programmes: environmental education. Focus of the activities

Children during an environmental education activity in the School of the Sea ("Aula del Mar") (Cabo de Gata-Níjar Natural Park, Almería, Spain). PHOTO: Diego Moreno

All the Protected Areas, on land or in sea, must developed a program for the visitors and tourist, with information about the limits and uses inside the reserve. The program must include an interpretation centre, with panels and expositions, and a environmental education centre, with activities and accommodation for meetings, courses and workshops.

All kinds of visitors must can make activities in the MPAs, always in the allowed zones. Activities in nature, as trekking, diving, snorkeling, or simply walking are grateful for the visitors. Conferences and chats on the equipments, on the physical and chemical aspects, and biological diversity, together with manual activities with scholars and practical trainings for university students are basic. As a last subject, a research team is necessary for a satisfactory knowledge and control of a Marine Protected Area.

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APPENDIX 1
Barcelona Convention (UNEP, 1996)

PROTOCOL CONCERNING SPECIALLY PROTECTED AREAS AND BIOLOGICAL DIVERSITY IN THE MEDITERRANEAN

ANNEX I

COMMON CRITERIA FOR THE CHOICE OF PROTECTED MARINE AND COASTAL AREAS THAT COULD BE INCLUDED IN THE SPAMI LIST

A. GENERAL PRINCIPLES

The Contracting Parties agree that the following general principles will guide their work in establishing the SPAMI List:

a) The conservation of the natural heritage is the basic aim that must characterize a SPAMI. The pursuit of other aims such as the conservation of the cultural heritage, and the promotion of scientific research, education, participation, collaboration, is highly desirable in SPAMIs and constitutes a factor in favour of a site being included on the List, to the extent in which it remains compatible with the aims of conservation.
b) No limit is imposed on the total number of areas included in the List or on the number of areas any individual Party can propose for inscription. Nevertheless, the Parties agree that sites will be selected on a scientific basis and included in the List according to their qualities; they will have therefore to fulfil the requirements set out by the Protocol and the present criteria.

c) The listed SPAMI and their geographical distribution will have to be representative of the Mediterranean region and its biodiversity. To this end the List will have to represent the highest number possible of types of habitats and ecosystems.
d) The SPAMIs will have to constitute the core of a network aiming at the effective conservation of the Mediterranean heritage. To attain this objective, the Parties will develop their cooperation on bilateral and multilateral bases in the field of conservation and management of natural sites and notably through the establishment of transboundary SPAMIs.
e) The sites included in the SPAMI List are intended to have a value of example and model for the protection of the natural heritage of the region. To this end, the Parties ensure that sites included in the List are provided with adequate legal status, protection measures and management methods and means.

B. GENERAL FEATURES OF THE AREAS THAT COULD BE INCLUDED IN THE SPAMI LIST

1. To be eligible for inclusion in the SPAMI List, an area must fulfil at least one of the general criteria set in Article 8 paragraph 2 of the Protocol. Several of these general criteria can in certain cases be fulfilled by the same area, and such a circumstance cannot but strengthen the case for the inclusion of the area in the List.
2. The regional value is a basic requirement of an area for being included in the SPAMI List. The following criteria should be used in evaluating the Mediterranean interest of an area:
   a) Uniqueness
      The area contains unique or rare ecosystems, or rare or endemic species.
   b) Natural representativeness
      The area has highly representative ecological processes, or community or habitat types or other natural characteristics. Representativeness is the degree to which an area represents a habitat type, ecological process, biological community, physiographic feature or other natural characteristic.
   c) Diversity
      The area has a high diversity of species, communities, habitats or ecosystems.
   d) Naturalness
      The area has a high degree of naturalness as a result of the lack or low level of human-induced disturbance and degradation.
   e) Presence of habitats that are critical to endangered, threatened or endemic species.
   f) Cultural representativeness
      The area has a high representative value with respect to the cultural heritage, due to the existence of environmentally sound traditional activities integrated with nature which support the well-being of local populations.
3. To be included in the SPAMI List, an area having scientific, educational or aesthetic interest must, respectively, present a particular value for research in the field of natural sciences or for activities of environmental education or awareness or contain outstanding natural features, landscapes or seascapes.
4. Besides the fundamental criteria specified in article 8, paragraph 2, of the Protocol, a certain number of other characteristics and factors should be considered as favourable for the inclusion of the site in the List. These include:
   a) the existence of threats likely to impair the ecological, biological, aesthetic or cultural value of the area;
   b) the involvement and active participation of the public in general, and particularly of local communities, in the process of planning and management of the area;
   c) the existence of a body representing the public, professional, non-governmental sectors and the scientific community involved in the area;
   d) the existence in the area of opportunities for sustainable development;
   e) the existence of an integrated coastal management plan within the meaning of Article 4 paragraph 3 (e) of the Convention.

C. LEGAL STATUS

1. All areas eligible for inclusion in the SPAMI List must be awarded a legal status guaranteeing their effective long-term protection.
2. To be included in the SPAMI List, an area situated in a zone already delimited over which a Party exercises sovereignty or jurisdiction must have a protected status recognized by the Party concerned.
3. In the case of areas situated, partly or wholly, on the high sea or in a zone where the limits of national sovereignty or jurisdiction have not yet been defined, the legal status, the management plan, the applicable measures and the other elements provided for in Article 9, paragraph 3, of the Protocol will be provided by the neighbouring Parties concerned in the proposal for inclusion in the SPAMI List.

D. PROTECTION, PLANNING AND MANAGEMENT MEASURES

1. Conservation and management objectives must be clearly defined in the texts relating to each site, and will constitute the basis for assessment of the adequacy of the adopted measures and the effectiveness of their implementation at the revisions of the SPAMI List.
2. Protection, planning and management measures applicable to each area must be adequate for the achievement of the conservation and management objectives set for the site in the short and long term, and take in particular into account the threats upon it.
3. Protection, planning and management measures must be based on an adequate knowledge of the elements of the natural environment and of socio-economic and cultural factors that characterize each area. In case of shortcomings in basic knowledge, an area proposed for inclusion in the SPAMI List must have a programme for the collection of the unavailable data and information.
4. The competence and responsibility with regard to administration and implementation of conservation measures for areas proposed for inclusion in the SPAMI List must be clearly defined in the texts governing each area.
5. In the respect of the specificity characterizing each protected site, the protection measures for a SPAMI must take account of the following basic aspects:
   a) the strengthening of the regulation of the release or dumping of wastes and other substances likely directly or indirectly to impair the integrity of the area;
   b) the strengthening of the regulation of the introduction or reintroduction of any species into the area;
   c) the regulation of any activity or act likely to harm or disturb the species, or that might endanger the conservation status of the ecosystems or species or might impair the natural, cultural or aesthetic characteristics of the area.
   d) the regulation applicable to the zones surrounding the area in question.
6. To be included in the SPAMI List, a protected area must have a management body, endowed with sufficient powers as well as means and human resources to prevent and/or control activities likely to be contrary to the aims of the protected area.
7. To be included in the SPAMI List an area will have to be endowed with a management plan. The main rules of this management plan are to be laid down as from the time of inclusion and implemented immediately. A detailed management plan must be presented within three years of the time of inclusion. Failure to respect this obligation entails the removal of the site from the List.
8. To be included in the SPAMI List, an area will have to be endowed with a monitoring programme. This programme should include the identification and monitoring of a certain number of significant parameters for the area in question, in order to allow the assessment of the state and evolution of the area, as well as the effectiveness of protection and management measures implemented, so that they may be adapted if need be. To this end further necessary studies are to be commissioned.

ANNEX II

LIST OF ENDANGERED OR THREATENED SPECIES

MAGNOLIOPHYTA
Posidonia oceanica
Zostera marina
Zostera noltii

CHLOROPHYTA
Caulerpa ollivieri

PHAEOPHYTA
*Cystoseira amentacea (*included var. *stricta* and var. *spicata)*
Cystoseira mediterranea
Cystoseira sedoides
*Cystoseira spinosa (*included *C. adriatica)*
Cystoseira zosteroides
Laminaria rodriguezii

RHODOFITA
Goniolithon byssoides (=L. byssoides)
Lithophyllum lichenoides (=L. byssoides)
Ptilophora mediterranea
Schimmelmannia schousboei

PORIFERA
Asbestopluma hypogea
Aplysina spp.
Axinella cannabina
Axinella polyploides
Geodia cydonium
Ircinia foetida
Ircinia pipetta
Petrobiona massiliana
Tethya spp.

CNIDARIA
Astroides calycularis
Errina aspera
Gerardia savaglia

ECHINODERMATA
Asterina pancerii
Centrostephanus longispinus
Ophidiaster ophidianus

REPTILES
Caretta caretta
Chelonia mydas
Dermochelys coriacea
Eretmochelys imbricata
Lepidochelys kempii
Tryonix triunguis

BRYOZOA
Hornera lichenoides

MOLLUSCA
Patella ferruginea
Patella nigra
Gibbula nivosa
Dendropoma petraeum
Erosaria spurca
Luria lurida (= Cypraea lurida)
Schilderia achatidea
Zonaria pyrum
Tonna galea
Ranella olearia(=Argobuccinum olearium = A. giganteum)
Charonia lampas(= C.rubicunda = C. nodifera)
Charonia tritonis (= C. seguenziae)
Mitra zonata
Lithophaga lithophaga
Pinna nobilis
Pinna rudis (= P. pernula)
Pholas dactylus

CRUSTACEA
Ocypode cursor
Pachylasma giganteum

PISCES
Acipenser naccarii
Acipenser sturio
Aphanius fasciatus
Aphanius iberus
Cetorhinus maximus
Carcharadon carcharias
Hippocampus ramulosus
Hippocampus hippocampus
Huso huso
Lethenteron zanandreai
Mobula mobular
Pomafoschistus canestrinii

Pomatoschistus tortonesei
Valencia hispanica
Valencia letourneuxi

MAMMALIA
Balaenoptera acutorostrata
Balaenoptera borealis
Balaenoptera physalus
Delphinus delphis
Eubalaena glacialis
Globicephala melas
Grampus griseus
Kogia simus
Megaptera novaeangleae
Mesoplodon densirostris
Monachus monachus
Orcinus orca
Phocoena phocoena
Physeter macrocephalus
Pseudorca crassidens
Stenella coeruleoalba
Steno bredanensis
Tursiops truncatus
Ziphius cavirostris

AVES
Pandion haliaetus
Calonectris diomedea
Falco eleonorae
Hydrobates pelagicus
Larus audouinii
Numenius tenuirostris
Phalacrocorax aristotelis
Phalacrocorax pygmaeus
Pelecanus onocrotalus
Pelecanus crispus
Phoenicopterus ruber
Puffinus yelkouan
Sterna albifrons
Sterna bengalensis
Sterna sandvicensis

ANNEX III

LIST OF SPECIES WHOSE EXPLOITATION IS REGULATED

PORIFERA
Hippospongia communis
Spongia agaricina
Spongia officinalis
Spongia zimocca

CNIDARIA
Antipathes sp. plur.
Corallium rubrum

EQUINODERMATA
Paracentrotus lividus

CRUSTACEA
Homarus gammarus
Maja squinado
Palinurus elephas
Scyllarides latus
Scyllarus pigmaeus
Scyllarus arctus

PISCES
Alosa alosa
Alosa fallax
Anguilla anguilla
Epinephelus marginatus
Isurus oxyrinchus
Lamna nasus
Lampetra fluviatilis
Petromyzon marinus
Prionace glauca
Raja alba
Sciaena umbra
Squatina squatina
Thunnus thynnus
Umbrina cirrosa
Xiphias gladius

APPENDIX 2

MARINE PROTECTED AREAS IN THE MEDITERRANEAN (IN 2003)

Europe

France, as the pioneer in conservation of Mediterranean ecosystems, has numerous MPAs. The more important are: Port-Cros (National Park, 1963), Banyuls-Cerbère (Nature Reserve, 1974), Scandola, Corsica (Nature Reserve, 1975), and Lavezzi, Corsica (Nature Reserve, 1982).

Italy has a lot of Marine Reserves, among them we select: Ustica, Sicily (1986), Isole Egadi, Sicily (1991), Miramare Gulf of Trieste (1986), Isole Tremiti, Puglia (1989), Porto Ceseareo, Puglia (1997), Portofino, Liguria (1997), Penisola del Sinis e Isola Mal di Ventre, Sardinia (1997), Tavolara Punta Coda Cavallo, Sardinia (1997), Isole di Ventotene e Santo Stefano, Lazio (1997), and Punta Campanella, Campania (1997).

Spain has now also a lot of MPAs. The more important are. Medas Islands, Catalonia (Marine Park, 1983 and SPAMI =ZEPIM, 2001), Tabarca Island, Valencia (Marine Reserve, 1986), Columbretes Islands (Natural Park and Marine Reserve, 1990, and SPAMI =ZEPIM, 2001), Cabrera Archipelago, in Balearic Islands (National Park, 1991), Cabo de Palos, Murcia (Marine Reserve, 1995), Cabo de Gata-Níjar, Andalusia (Natural Park-1987, Marine Reserve-1995, Biosphere Reserve-1997, and SPAMI =ZEPIM, 2001), Alborán Island, Andalusia (Marine Reserve-1997 and Natural 'Paraje'-2003), Strait of Gibraltar, Andalusia (Natural Park, 2003).

Croatia has three marine National Parks, one in Istra Peninsula (Brijuni Islands), and two in Dalmatia: Kornati Islands (1980), and Islet of Mljet (1961). Greece have a few MPAs, but that of the Alonnisos (Sporades), with 220.000 ha is the largest in the Mediterranean Sea.

Middle east

Turkey has two National Parks with marine environments: Olympus National Park (1972) and Dilek Yarimadasi National Park (1966).

Lebanon has a small marine Nature Reserve on the Rabbit Islands, off El Mina, Tripoli (1973).

Israel has two Marine Protected Areas, one in the limit with Lebanon called Rosh Hanikra, Natural Reserve (1965) and National Park (1972), and other between Haifa and Tel-Aviv, Dor-Habonim, Nature Reserve (1963).

Northern Africa

Egypt has the area of Lake Edku near Alexandria, with a coastal lake, and the Ras El Mekuma protected area near Metruk.

Tunisia has the Marine Reserves of Kneiss Islands (also SPAMI, 2001), Zembra and Zembretta Islands, and Galite Island.

Algeria has the Marine Park of Tipasa (70 km west of Algiers), as part of the Chenoua onshore reserve, covering the central area of the bay of Bon-Ismail.

Morocco has the National Park of Al Hoceima.

Map. 1.- Marine Protected Areas in the Medterranean Sea, cited in text, by 2003

1.- Strait of Gibraltar, Andalusia, Spain (Natural Park, 2003). 2.- Maro-Cerro Gordo, Andalusia, Spain (Natural "Paraje", 1989; SPAMI =ZEPIM, 2003). 3- Alborán Islands, Andalusia, Spain (Marine Reserve, 1997; SPAMI =ZEPIM, 2001; Natural "Paraje", 2003). 4.- Bajos de Roquetas, Andalusia, Spain (Natural Monument, 2001). 5.- Cabo de Gata-Níjar, Andalusia, Spain (Natural Park, 1987; Marine Reserve, 1995; Biosphere Reserve 1997, SPAMI =ZEPIM, 2001. 6.- Eastern Almería Littoral , Andalusia, Spain (SPAMI =ZEPIM, 2001), with inside the Terreros and Negra Islands (Natural Monument, 2001). 7.- Cabo de Palos, Murcia, Spain (Marine Reserve, 1995), and Mar Menor, Murcia, Spain (SPAMI =ZEPIM, 2001). 8.- Tabarca Island, Valencia, Spain (1986). 9.- Cabrera, Balearic Islands, Spain (National Park, 1991). 10.- Columbretes Islands, Valencia, Spain (Natural Park and Marine Reserve, 1990; SPAMI =ZEPIM, 2001). 11.- Medas Islands, Catalonia, Spain (Marine Park, 1983; SPAMI =ZEPIM, 2001). 12.- Cabo de Creus, Catalonia, Spain (SPAMI =ZEPIM, 2001). 13.- Banyuls-Cerbère, France (Nature Reserve, 1974). 14.- Port-Cros, France (National Park, 1963). 15.- Scandola, Corsica, France (Nature Reserve, 1975). 16.- Lavezzi, Corsica, France (Nature Reserve, 1982). 17.- Portofino, Liguria, Italy (Marine Reserve, 1997). 18.- Isole di Ventotene e Santo Stefano, Lazio, Italy (Marine Reserve, 1997). 19.- Punta Campanella, Campania, Italy (Marine Reserve, 1997). 20.- Penisola del Sinis e Isola Mal di Ventre, Sardinia, Italy (Marine Reserve, 1997). 21.- Tavolara Punta Coda Cavallo, Sardinia, Italy (Marine Reserve, 1997). 22.- Egadi Islands, Sicily, Italy (Marine Reserve, 1991). 23.- Ustica Island, Sicily, Italy (Marine Reserve, 1986). 24.- Ciplopi Islands, Sicily, Italy (Marine Reserve, 1991). 25.- Miramare, Gulf of Trieste, Italy (Marine Reserve, 1986). 26.- Isole Tremiti, Puglia, Italy (Marine Reserve, 1989). 27.- Porto Ceseareo, Puglia, Italy (Marine Reserve, 1997). 28.- Brijuni Islands, Istra Peninsula, Croatia (National Park). 29.- Kornati Islands, Dalmatia, Croatia (National Park, 1980). 30.- Islet of Mljet, Dalmatia, Croatia (National Park, 1961). 31.- Alonnisos, Sporades Islands, Greece (National Park, 1992). 32.- Dilek Yarimadasi, Turkey (National Park, 1966). 33.- Olympus, Turkey (National Park, 1972). 34.- Rabbit Islands, off El Mina, Tripoli, Lebanon (Nature Res

2. Planning for a National System of Protected Areas

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1. Introduction

Marine and coastal protected areas are internationally recognised as key elements for the conservation of the Mediterranean natural heritage and ecological functions. This has led the Mediterranean countries to establish Specially Protected Areas (SPA), and since 1998, the SPAMIs, which for the first time, can also be established in the High Seas. In 2002, the World Summit on Sustainable Development set a target date (2012) for the completion of an effectively managed, ecologically representative network of Marine and Coastal Protected Areas within and beyond areas of national jurisdiction, and the application of the ecosystem approach to the marine environment.

The first move towards coastal/marine conservation is by establishing protected areas at the national level, and the most effective approach is by structuring a network of different conservation categories through a national system. A National System plan examines the country as a whole; it provides national-level co-ordination with other planning and between the various different units of a national system; it provides a programme for the several units to achieve the desired characteristics of a coherent system. "*By switching the focus from individual protected areas to looking at the relationships between them, and putting the whole protected area network into its broader context, system planning provides the means for ensuring that the total significance and effectiveness of a national protected areas system is much more than the sum of the parts*" (Davey 1998).

Small marine reserve in Minorca. PHOTO: A. López

A National System of protected areas should build a representative biogeographical system, and ideally be integrated into the wider picture of human development needs, thus be planned and managed as an integral part of the broader land use, resource use, institutional, economic and social systems.

Protected Areas should have the conservation of natural heritage as the central objective and management as a priority, but the legal frameworks, institutional arrangements and management categories may be flexible and adapted to multiple field situations, contexts and opportunities.

This chapter provides technical guidance to plan a national system of Protected Areas. The characteristics of Marine Protected Areas are sumarized in Section 2, and then the different cathegories of PAs and the main International Legal Frameworks that support them (Barcelona Convention and Convention on Biological Diversity) are presented in Section 3. The next Section summarizes the most common threats for MPAs. Section 5 describes the main characteristics of protected area systems, and finally Sections 6 and 7 consider the legal and technical requirements for the successful implementation of a system plan.

We have taken into account possible financial constraints at the country level, so this material intends to be realistic in terms of applicability in the local and national context and capacities, and will avoid being exhaustive to components which may not be affordable or significant as priorities.

Completed with our own experience in the field, many of the materials presented in this paper are based on the basic literature on the subject, as indicated at the beginning of each chapter, of which the main references are:

1. Kelleher, G. (1999) Guidelines for Marine Protected Areas. IUCN, Gland, Switzerland and Cambridge, UK.

2. R.V. Salm, John Clark and Erkii Siirila (2000) Marine and Coastal Protected Areas. A guide por planners and managers. IUCN, Washington DC.

3. Davey, A.G. (1998) National System Planning for Protected Areas. IUCN, Gland, Switzerland and Cambridge, UK.

4. IUCN. 1997. Parks for Biodiversity. Policy Guidance based on experience in ACP countries.

2. Goals and types of Marine Protected Areas

2.1. Definitions

IUCN defines a protected area as:

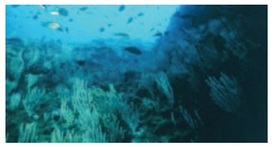
> *"An area of land and/or sea especially dedicated to the protection of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means". (IUCN, 1994)*

IUCN has developed a compatible definition of a Marine Protected Area (MPA):

> ***"Any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment".***

This language essentially means that:

- An MPA always includes the marine environment but may also include coastal and areas islands. It is commonly called an MPA when the total area of sea it encompasses exceeds the area of land within its boundaries, or the marine part of a large protected area is sufficient in size to be classified as an MPA in its own right;
- It has some form of protection, usually legal but not necessarily. For example, in the Pacific, many MPAs are established by customary tradition;
- The degree of protection is not necessarily the same throughout the area; indeed most large MPAs are zoned into sections to allow for different uses;
- The MPA (and so the provisions for its management) should cover not only the seabed but also at least some of the water column above with its flora and fauna;
- MPAs are not just relevant for natural features but also for protecting cultural features such as wrecks, historic lighthouses and jetties.



Most biodiversity occurs at 0-50 m depth. PHOTO: WWF

The definition does not state that an MPA should keep people out. Indeed, marine conservationists are very keen to challenge the frequent perception that the major aim of MPAs is to exclude people. As these guidelines emphasize, MPAs only work if all the users of the marine environment have a stake in their success. And this usually means some form of managed access for each set of stakeholders.

2.2. IUCN Categories for protected areas

Most countries have established protected areas under more than 30 or even 50 different names and categories. The IUCN has proposed standardising these terminology under six management categories, meaning different conservation objectives and management styles:

IUCN CATEGORY	NAME	OBJECTIVES
I	Wilderness Area. Strict Natural Reserve	Managed mainly for science or wilderness protection
II	National Park	Managed mainly for ecosystem protection and recreation
III	Natural Monument	Managed mainly for conservation of specific natural features
IV	Habitat/Species Management Area intervention	Managed mainly for conservation through management
V	Protected Landscape/Seascape recreation	Managed mainly for landscape/seascape conservation and
VI	Managed Resource Protected Area ecosystems	Managed mainly for the sustainable use of natural

2.3. Goals of the MPAs [based in Kelleher 1999]

The goal of MPAs, as seen by IUCN, *is to conserve the biological diversity and productivity (including ecological life support systems) of the oceans*. Both aspects of the goal are equally important for restoring and maintaining ecosystem health.

While marine conservation and sustainable use are sometimes seen as different objectives, they are in fact intimately interrelated. Some MPAs have failed because the only aim of the external sponsor has been biodiversity conservation while that of the local community has been some level of resource use. Both aims can be, and usually are to some extent, reconciled within one MPA, but there needs to be clarity from the outset about how the two sets of objectives relate to each other.

Most MPAs depend on the support of local communities for survival and such support may well depend on recognition of the contribution which the MPA makes to human welfare through maintaining biological productivity.

2.4. Types of MPAs

In practice there is a wide range of types of MPAs. They include MPAs which are run by government agencies; set up and operated under collaborative management systems; set up under customary tenure; managed on a voluntary basis; based and run by a local community.

Transboundary Marine Protected Areas or those set up in the high seas, as Marine Protected areas can meet across international borders, provide important opportunities for collaboration between neighboring countries. MPAs in the high seas are considered comprised by those parts of the world´s oceans that lie beyond the territorial sea and exclusive economic zones (EEZ) and above the continental shelf of coastal nations. The Barcelona Convention, Protocol on Biodiversity (1995), for the first time sets the necessary international framework for the establishment of MPAs in the High Seas.

2.5. The size of MPAs

There are two broad approaches to creating a MPA system: (a) establishing a series of relatively small marine protected areas as part of a broader framework of integrated ecosystem management or (b) establishing a large, multiple zone marine protected area encompassing a large part of a marine ecosystem.

Small marine protected areas have helped raising fishing stocks in surrounding areas provided the species concerned are not migratory or have planktonic stages (Roberts and Hawkins 1997). Most importantly, small marine reserves, either marine or terrestrial, should be easier to manage as they provide opportunities to share conservation interest and responsibilities with local stakeholders (local governments, local fishermen, local tourism services, and NGOs). Small marine reserves also have an important role in research and education.

In the Mediterranean the small MPAs also have a particular interest for visitation and tourism. Marine reserves have demonstrated to be a tourism attraction (e.g. the Islas Medas in Catalonia receive over 50,000 divers a year in only 93 ha). However, the impact from massive visitation has been well documented, mainly: pollution, garbage, and impact on the sea bottom from anchoring of recreation boats, and divers and sport fishing over the fish and over invertebrate communities.

The affluence of visitors is not related to the size of the reserve but to its access facilities (Jimenez 2000). Tourism could be a very important source of funding for Mediterranean marine reserves, provided the carrying capacity has been established and there is a strict control over visitors and their impact on biodiversity. This author proposed the establishment of small marine reserves with easy access for education, tourism and fund-raising purposes, in order to safeguard the real biodiversity reserves from visitation, and to finance their conservation.

MPAs should be designed to simultaneously accomplish as many conservation objectives as possible. When possible, **large Marine Protected Areas** should be a favourite approach for conservation, for obvious biological and ecological reasons on the one side, and because the primary responsibility for management of the whole area is likely to be vested in a single agency. In these circumstances integrated management would be easier to achieve than when primary responsibility is shared between different agencies, often with different, conflicting priorities.

2.6. Management considerations

In the Mediterranean region, the cost of protecting and managing PAs and the financial gap was recently estimated (López Ornat and Jiménez 2006). An approximation of needed budgets per hectare is difficult to obtain, as these strongly fluctuate depending on the specific protection needs of each protected area:

- Size: smaller PAs are relatively more expensive to protect and manage,
- Nature: marine areas are much more costy to protect, and
- Conservation Category: strict protection areas and National Parks (Categories I-IV) require higher financial inputs than multiple-use protected landscapes, forests, or fisheries' reserves (Categories V-VI).

Table 1. Budget for MPA in some Mediterranean EU countries in €x1000

	Annual budget	Protected hectares	(€ / ha)
MARINE NATIONAL PARKS			
Port Cross NP (France)	5,000	2,475	2,020
Miramare PA (Italy)	400	190	2,000
Ses Negres (scientific)	42	78	1,860
MARINE RESERVES (in Spain)			
Masia Blanca	120	340	353
Columbretes Mar.Reserve	1,235	4,400	281
Estrecho Marine Reserve	500	7,000	71,4
La Graciosa (fisheries)	600	70,700	8,5
Alborán (high seas)	800	200,000	4,0

Source: López Ornat & Jiménez (2006)

Marine areas require additional funding, as field teams need be more specialised, and transport, equipments, surveillance and monitoring are more expensive. In addition, some MPAs tend to be much smaller, proportionally raising the costs per ha. Examples of some marine National Parks in **Table 1** illustrate the most intensive management and expensive end of the

gradient: the Port Cross National Park (France), with only 2,475 ha, and the Miramare Marine Reserve (Italy), with just 190 ha, receive approximately the same budget (c.a. 2,000 €/ha/year). Both are very well protected and intensively used for recreation and research. Ses Negres in Spain has strict conservation and scientific objectives (1,860 €/ha/year). While marine reserves, usually larger and not as intensively demanded by recreation, need smaller budgets. In Spain, these range between 71 and 343 €/ha/year, clearly depending on their size.

In summary, marine areas seem to require between € 50 - +1000/ha/year, depending on size, intensity of protection measures, surveillance and visitors' control needs, research activities, and sharing of management responsibilities. The two final examples in the table, broad marine fisheries reserves with no visitors, are patrolled and surveyed with just around 5 to 10 €/ha/year (Ministry of Fisheries, Spain, pers.comm.).

Large MPAs may be very difficult and costy to patrol unless protected in collaboration with interested groups of users, e.g. fishermen, tourism services and academic centers. To achieve this, large MPAs must be zoned, regulated and managed in accordance.

Zoning can accommodate all these different approaches with the general objective of biodiversity conservation, through a gradient or mosaic of smaller zones for strict protection or visitation surrounded by wider zones where fishing is regulated.

The traditional approach to management of marine living resources has been through fisheries legislation. Mechanisms (Kelleher 1999) include:

- Restricting access to a particular stock of fish or invertebrates;
- Specifying restrictions on equipment such as minimum net mesh, to attempt to limit total fishing effort;
- Attempting to limit total fish catch;
- Requiring licences or permits for those entitled to fish a particular stock;
- Declaring closed seasons; and
- Defining areas as closed to fishing permanently or for a number of seasons.

Green turtle *Chelonia mydas*. PHOTO: RAC/SPA

Protected areas can contribute to the replenishment of threatened marine resources through the creation of No-Fishing Zones (No-Take Zones, Sanctuaries). They can safeguard breeding sanctuaries from which individuals can disperse to stock exploited areas. Other MPA protections may be necessary to safeguard recognized nurture areas (nursery areas) for juvenile stages (Clark, 1996).

Such provisions usually focus on target species. The habitat of the non-target co-inhabitants and competitors of such species is considered only when this is seen as affecting the productivity of the target stock.

MPA management can go beyond conventional fisheries management by providing a comprehensive management package, covering all impacts on the marine area concerned.

For example in no-fishing zones, fishing may be regulated in varying intensities or even prohibited. Some Mediterranean countries are moving towards this approach, e.g. in Italy three NFZ have been established, where artificial reefs were sank to avoid trawling. Later studies have documented significant gains in fish and invertebrate biomass (Badalamenti, cit. Werner 1999), it was also demonstrated in Tabarca (Spain) where local captures have improved by 50-80% in only 8 years (Ramos and Mc.Neill 1994) or in the Medas islands (Domenec 2002). In France, where there are numerous "cantonnements" as fishing zones under fishermen responsibility, this fact has also been documented (Bourduresque 1995). The potentiality of these NFZ must be deemed important in countries with very long coastlines, such as Croatia, Greece and Turkey.

3. International Protected Area Networks

Additionally to being technically classified in a given IUCN category, a number of MPAs have international designations, e.g. Biosphere Reserve, Ramsar Site, World Heritage Site, SPA or SPAMI.

3.1. The Convention on Biological Diversity (CBD)

The CBD entered into force in December 1993, providing a framework agreement for the conservation of biodiversity (including biological productivity), sustainable use of biological resources and the sharing of benefits from the use of biodiversity. The Convention supports the need of conservation in the marine environment and the establishment of Marine Protected Areas. Under this Convention, countries are obliged to develop national biodiversity strategies, to identify and monitor important components of biodiversity, to establish a system of protected areas to conserve biodiversity, to promote environmentally sound and sustainable development in areas adjacent to protected areas and to rehabilitate and restore degraded ecosystems.

In 1995, the Parties to the CBD affirmed under the Jakarta Mandate on Marine and Coastal Biological Diversity the importance of marine and coastal biodiversity. Marine and Coastal Protected Areas were identified as one of the five thematic issues for action.

In the recent Vth World Park Congress (IUCN, Durban 2003) one of the messages sent for the CBD is the need to solve the gaps in PA coverage and the need to develop a representative MPA system.

3.2. The Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention)

The Convention was revised in Barcelona in June 1995, including the Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA Protocol). The Contracting Parties commit themselves to establish protected areas that will be managed in a sustainable way. The SPA Protocol is the most specific international tool for conservation purposes in the Mediterranean region. It is particularly focused on coastal and marine areas. Under the SPA Protocol over 140 marine and coastal PAs have been recognised in 19 riverine Mediterranean countries. The action plan for this Protocol is dinamised by the Regional Activity Centre for Specially Protected Areas in Tunisia (RAC/SPA).

Vermetid reef of *Dendropoma*, a fragile habitat protected by the Barcelona Convention. PHOTO: A. López

The number and coverage of SPAs varies greatly from one country to another (29 in Spain, 15 in Italy, 12 in France and in Turkey, 11 in Croatia, 9 in Greece, 7 in Israel, 5 in Tunisia, 4 in Algeria, and 3 or less in most of the countries). A first High Seas SPAMI of 90,000 sq km was established (between France, Italy and Monaco) in the Sea of Liguria in order to protect the main Cetacean populations in the Mediterranean Sea, by regulating fisheries and impact on habitat conditions, and raising awareness about risks of involuntary impacts from passing vessels. Another 16 SPAMI were listed by year 2006.

3.3. The World Heritage Convention

The Convention Concerning the Protection of the World Cultural and Natural Heritage, entered into force in 1975. Sites are nominated by governments and, following acceptance by the World Heritage Committee, are inscribed on the World Heritage List, as Natural, Cultural, or Mixed Natural/Cultural Sites. The Convention has proved a powerful lever in preventing damage to listed sites, which can be added to the List of World Heritage in Danger. Some financial assistance is available from the World Heritage Fund, provided by UNESCO's Member States.

3.4. The UNESCO Biosphere Reserves

The three functions of the Biosphere Reserves are very similar to the concept of large multiple-use MPA: conservation, development which is ecologically and culturally sustainable, and provision of sites and facilities to support research, monitoring, training and education.

Biosphere Reserves are organized into three inter-related zones:

a) A core area, where there is minimal human activity and which should be legally established to ensure long-term protection;

b) A buffer zone where activities must be regulated to protect the core zone. This can be a research area to develop approaches for sustainable use of natural resources in the wider ecosystem in an economically viable way. And

c) An outer transition area or area of cooperation, whose limits may not be fixed. It is here that local communities, nature conservation agencies, scientists, cultural groups, private enterprises and other stakeholders should agree to work together.

The objectives of the biosphere reserve scheme are appropriate for marine environments, but few MPAs have been formally established as biosphere reserves and guidelines for marine biosphere reserves are needed.

3.5. The Natura 2000 Network

Natura 2000 is the EU-wide network of nature protected areas established under the 1992 Habitats Directive, which identifies some 200 habitat types and 700 species of plants and animals of EU importance. Under the Natura 2000, the member States designate Special Areas of Conservation (SAC).

Marine habitats and species are not as well represented in the Annexes of the Habitats Directive as are those of a terrestrial nature (O´Brian & Martin, 2001). Difficulties in establishing Natura 2000 in the marine environments is recognised, especially for wide ranging species, and also due to issues of delimitation of sites. Generally only very few marine (not coastal) sites have been selected so far, many of which are quite small.

3.6. The Ramsar or Wetlands Convention

Although initially focused on wetlands for migratory waterbirds, the Convention now takes into account the full range of wetland functions and values, and the need for an integrated approach to their management.

Some 48% of the designated Ramsar sites include the coast and so may contain marine components. MPA managers may therefore see a Ramsar designation as an additional form of protection that could be added relatively easily to at least part of their sites. The Conference of Parties to the Convention has urged countries to give priority to designating new sites from wetland types that are currently under-represented on the Ramsar List so far, including coral reefs and other invertebrate formations, mangroves and sea-grass beds.

4. Common threats to marine protected areas

Marine and coastal systems area a conservation challenge because of their particular characteristics:

- MPAs are physically open systems, where the water movement determines how materiales are dissolved and dispersed at fast rates, so the physical and chemical dynamics are very diverse in space and time.

- These are biologically open systems, where the living organisms constantly move, their associations are determined by ecological variables and their interactions, their mobility and the use of the habitats, are mostly constant in coastal-marine systems.

- These systems are not subject to traditional patterns of ownership and access, these are "free resources" in which the user, having no limit to the demand and no possibility to claim access rights, makes a maximum exploitation of the resources in order to get the highest profit in the shorter period of time.

The main threats to marine protected areas are related to the ever-increasing demands for resources, much of it to meet basic human needs in poorer countries. Some of the most

important sources of pressure are: physical alteration, pollution, commercial exploitation of resources, climate change and excessive tourism.

According to Salm and Clark (1984) and Borrini (1996), there are 5 important groups of problems to marine and coastal protected areas management:

- Lack of local support because of little information available and participation.
- Insufficient funds.
- Insufficient field staff and poorly trained.
- Inadequate institutional support, competencies not well defined between terrestrial authorities, national and local, and marine authorities.
- Insufficient information about protected areas status and basic ecological issues that allow for an appropriate management.


Pristine beach and dunes in Zouara, Tunisia. PHOTO: A. López

In the Mediterranean, according to RAC/SPA (1997), 41% of SPAs are small (less than 1000 ha), and at least half of the whole are only terrestrial (coastal), while only 15% are mainly marine. In the management of most of these areas, the institutional co-ordination is very weak, being either inadequate, with overlapping roles between land, marine, local, or national authorities. The majority have problems with their social environments, particularly with the resource users, either traditional or not (e.g. fishing, sand extraction, hunting, agriculture or tourism industries). Around half of these areas claim not to have a management plan, and in only 1 out of every 3 SPAs there is staff present in the field. Consequently, only in ? of the SPAs there are education or awareness activities and just in one out of every five SPAs there is control over visitors and tourists. Managers also claim lack of training opportunities, and permanent shortage of equipment and funding for the most basic protection needs.

5. SYSTEM PLANNING?
(Based on Davey, 1998)

5.1. Objectives

System planning is about:

- "Taking a more strategic view of protected areas; to get away from a case by case, *ad hoc*, approach to resource management decision making; to facilitate integration with other relevant planning strategies, such as those for national tourism, national biodiversity conservation or sustainable development;
- Defining the priority of protected areas as a worthwhile national concern; to relate protected areas to national priorities, and to prioritize different aspects of protected area development; to assist in meeting obligations under international treaties; to assist countries to be more proactive in conservation management, and in developing effective protected area systems; to assist protected area agencies to build political support for protected areas as a worthwhile concern;
- Defining the relationships between (a) different units and categories of protected areas; and (b) protected areas and other relevant categories of land; to provide a structured framework for a system of protected areas, ranging from areas managed for strict conservation to areas managed for a range of conservation and appropriate ecologically-sound activities;
- Identifying gaps in protected area coverage (including opportunities and needs for connectivity); to target proposed additions to the protected area estate in a more rational and persuasive manner than ad hoc planning;
- Improving management, identifying deficiencies in management, resources and financing; to facilitate access to international and national funding, by defining priorities for investment in protected areas and increasing the level of confidence in the efficient use of funds and resources; to foster transboundary collaboration (see e.g. Thorsell 1990).


Lighthouse in the Balearic islands. PHOTO: GoB

- Identifying current and potential impacts;
- Defining roles of key players in relation to protected areas and the relationships between these players; to help resolve conflicts, assist in making decisions relating to trade-offs, clarify roles and responsibilities of different stakeholders, and facilitate diverse stakeholder involvement; to define a better process of decentralization and regionalization of protected area activities, resources and responsibilities, including the involvement of NGOs and the private sector" (Davey 1998).

5.2. Contents

The Plan should provide:

- Guidance on mechanisms, institutions and procedures for co-ordinating protected areas with other aspects of land use and social development in the country concerned.
- Identify relevant means of co-ordination between central and decentralized levels, and between different regions and individual protected areas.
- Describe current and proposed protected areas, their condition and the management challenge which they present.
- Identify the mandate for, or argue the legitimacy of, protected areas as a priority concern in the context of the country.
- It should spell out the responsibilities and processes for developing, funding and managing the system and for co-ordinating its components.

5.3. Key considerations

The major threats to conservation in most countries lie outside the protected area system. Unless the linkages between protected area management and external factors are identified

and addressed, fundamental conservation issues are difficult to resolve. Protected area system plans cannot therefore focus solely on protected areas, but must address broader issues of concern to society.

A system approach improves the probability of substantial progress in conservation. It also promotes a truly integrated approach to linking conservation with other human endeavours.

A plan cannot create an effective protected area system overnight, nor can it produce immediate change in factors which may be compromising conservation status or management performance. It is, however, a potentially powerful tool and an essential step in achieving these ends.

Some reasons why national system plans for protected areas fail:

- they are overambitious and ignore budget constraints; they cover too many areas and issues, and cover issues in too much detail;
- they fail to raise political support for protected areas as a worthwhile concern and they are poorly publicised;
- they rely too much on external support and/or funding and experts; they fail to involve stakeholders.

6. Characteristics of a Protected Area System
(based on Davey 1998)

> *"By switching the focus from individual protected areas to looking at the relationships between them, and putting the whole protected area network into its broader context, system planning provides the means for ensuring that the total significance and effectiveness of a national protected areas system is much more than the sum of the parts"* (Davey 1998).

There are four main characteristics of a system of protected areas:

- Representativeness, comprehensiveness and balance;
- Adequacy;
- Coherence and complementarity;
- Cost effectiveness, efficiency and equity.

The balance between these criteria is unavoidably subjective and dependent on the circumstances of each country.

6.1. Representativeness, comprehensiveness and balance

This applies particularly to the biodiversity of the country (at relevant levels, such as genetic, species and habitat), but should also apply to other features such as landform types and to cultural landscapes. Since it is most unlikely that any one protected area could be representative of the full range of biogeographic diversity within a single country, representativeness will nearly always require the development of a network of individual protected areas.

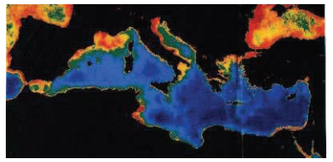
In some parts of the world, existing protected area systems give too much attention to charismatic fauna, or spectacular scenery, and not enough to covering the full suite of plant and animal species which are characteristic of particular ecological zones. Often existing protected areas do not sample biodiversity in any systematic way, having been created in an ad hoc, opportunistic fashion.

The main requirement is that the typologies be appropriate to the scale of planning, and be based on the best available science. It also helps if a typology relates to an established international scheme.

It is then necessary to identify the areas which might be available as examples of each environment type. The candidate areas then need assessment as to their relative qualities, taking account of the extent of each environment type contained within them, their condition and integrity considerations.

Regional and subregional representativeness is important. The SPA Protocol (Art.4) states that Mediterranean SPAs should be "*representative types of coastal and marine ecosystems of adequate size to ensure their long-term viability and to maintain their biological diversity*". The same article states that SPAs should safeguard habitats in danger within the Mediterranean as its natural area of distribution, and those critical for the survival of threatened or endemic species, as well as those with special scientific, cultural or educational values.

6.2. Adequacy



Surface productivity (red end) is higher on the coast and particularly in waters fed by river nutrients. *Source: Nimbus 7, NASA*

A wide range of issues must be considered in selecting between alternative designs of national protected area systems. The final location, size and boundaries of contributing areas will be influenced by factors such as :

Ecological Factors:

- Biodiversity: species richness and uniqueness.
- Size: habitat/area requirements of rare or other species and their minimum viable population sizes.
- Perimeter/area relationships.
- Connectivity between units (corridors) to permit wildlife migration, or occasionally isolation to minimize transfer of disease, predators and the like; connectivity in the oceans is guaranteed by currents, but should also be considered in the coast/ocean system. For examlpe, the Pan-European Ecological Network (PEEN) recommends marine corridors using existing instruments, e.g. the Barcelona Convention, the EU Habitats Directive, the Bern and Bonn Conventions, and national instruments such as ICZM and EIA procedures in river mouths.
- Natural system linkages and boundaries (e.g. watersheds), volcanism, ocean currents, aeolian or other active geomorphic systems.

Management Factors:

- Accessibility to undertake management operations or inaccessibility to deter potentially impacting activity;
- Naturalness: existing degradation or external threats and vulnerability;
- Traditional use, occupancy and sustainability.

6.3. Coherence and complementarity

Each site needs to add value to the national system of protected areas, in quality as well as quantity. There is little point in increasing the extent or number of protected areas unless this brings benefits at least in proportion to the costs.

Complementarity (the extent to which a candidate area adds to achieve the representational objective overall) may be more important than high species diversity.

6.4. Cost effectiveness, efficiency and equity

In establishing a national protected area system, along with ecological, social, and economic criteria there are some pragmatic criteria - in the form of urgency, size, degree of threat, effectiveness, opportunism, availability and restorability – that are crucial to be taken into account for the best success of the system. For example, minimizing the cost of achieving protected area status (most commonly land acquisition, compensation or transfer costs, or costs of establishing co-management mechanisms).

The establishment and management of protected areas is a kind of social contract. They are set up and run for the purpose of realising certain benefits for society. People will therefore need to be assured that they are effective, represent value for money, and are managed in a way which is equitable in terms of their impact on communities.

7. Developing a legal framework
(based on Kelleher 1999)

For many countries, a broad, integrated approach to conservation and management of marine resources is a new endeavour which is not adequately provided for in existing legislation. Thus, before an MPA can be established, it may be necessary to review existing legislation and/or develop new legislation.

7.1. Approaches

There are several different approaches, ranging from new, specific-purpose legislation to continued use of existing legislation with relatively minor modifications. In many cases, MPAs have been established under fisheries legislation and, in others, under forestry legislation. In any country, the right approach requires a detailed understanding of that country's culture, tradition and legal processes. There are, however, several general principles which should be followed.

1. Before legislation is proposed, MPA planners need to decide whether to advocate a large number of small MPAs or a few large multiple-use MPAs. Perhaps the commonest mistake in establishing new MPAs is to make legislation for small MPAs without the complementary controls for the wider environment around them, e.g. fisheries or transportation.

2. A second fundamental question is whether the national law should provide a detailed framework of administrative aspects or only the broad basis for a management regime. Sometimes, powerful local interests in an area favour short-term economic benefits, leading to strong local pressure for over-exploitation of resources. In other cases, the local community will favour the sustainable use and protection of marine resources. Therefore, the law should protect management from unreasonable local pressures by including a sufficiently detailed statement specifying clear objectives and a process for achieving them.

Because the enactment process for a new comprehensive law specifically for marine protected areas may require years, it is important to make use of existing legislation or other instruments (e.g. executive decrees) to begin the process in the short term, even if these approaches are not suitable over the long-term.

Work can begin both on-the-ground to safeguard the conservation integrity of important sites and with the drafting process for a new law simultaneously. If the conservation work proceeds well, the community may become more aware of the long-term benefits, improving the climate for the new law and informing its content along the way. The law is an important means of promoting national policy, but the lack of a new comprehensive law should never be allowed to delay action where irreversible damage to a critical MPA proposed site is at stake.

Conservation managers should therefore be alert to additional, complementary or alternative measures – such as fisheries permits, tourism regulations, commercial licences, or direct inter-governmental negotiations – which might be tapped to minimize long-term harm where a near-term conflict needs attention.

Whatever law is chosen, simple regulations work best. Many national regulations are so complex that they confuse the beneficiaries. In general, the simpler the national rules, the more likely it is that they will be followed at the local level. Specific MPA rules should be as simple and clear as possible.

7.2. Law Contents

In establishing an MPA, the following should be specified, whether in umbrella legislation or in site-specific legislation:

a) Objectives; make sure that the legislation states explicitly that conservation is the primary objective of MPAs; changing the primary objective should be decided only by recourse to the highest body responsible for legislative matters in the country.

b) Delineation of boundaries.

c) Providing adequate statements of authority and procedures; the legislation should create the legal foundation for the institutions that will establish and manage the MPAs, and establish the relationship with other national and local authorities, and procedures for coordination and conflict resolution, specifically in the management of the coast and of fishing rights.

d) Management rules and penalties applied; legislation should include provisions to control activities which occur outside an MPA and which may adversely affect features, natural resources or activities within the MPA

e) Zoning and basic regulations in each Zone, provision for Management plans, monitoring and review of the plans.

f) Advisory and consultation processes, and criteria for decision-making.

g) Compensation.

7.3. Considerations

- If the approach of very large MPAs is chosen, decide whether each MPA will be created by a separate legal instrument or whether to create umbrella legislation for MPAs in general.
- If the approach of a network of small MPAs is chosen, consider establishing them on the basis of community action, supported by legislation.
- Ensure the legal framework is consistent with the nation's traditions.
- The legislation should take an international perspective.

8. Requirements for the successful implantation of a System Plan
(based on Davey 1998)

The integration of the planning in its wider context is of great importance. Protected Areas are not isolated elements, but integrated within a wider political, economic and ecological systems that need to be carefully taken into consideration. Thus protected area planning and management should be linked at the system level with National Conservation Strategies and a National Biodiversity Strategy and Action Plan.

"The system plan examines the country as a whole; it provides national-level co-ordination with other planning and between the various different units of a national system; it provides a programme for the several units to achieve the desired characteristics of a coherent system" (Davey 1998). However, the system plan should also provide guidelines for management planning at the site level, which are sumarized in Annex 1 following Kelleher (1999).

8.1. Commitment and political support

A system of protected areas must respond to a series of objectives and strategies in the political level, and must be covered by the existing legislation.

Without adequate social, political and financial support, protected area systems will fail. Key target groups are:

- Decision makers and politicians at all levels whose support is critical and which will be reflected in financial and institutional assistance. The need is to identify those people who will influence decision making and work with them in the development and implementation of a system plan.
- International conventions can be used to promote political support, linking them to external opportunities such as those provided under the Barcelona Convention, the Convention on Biological Diversity, and the World Heritage and Ramsar Conventions.
- International funding sources.
- Local communities, whose support is essential for the viability of the protected areas.
- The national and local media, who can help shape public opinion and raise public awareness.

Long, exhaustive technical documents rarely promote political or local support. The system plan should also be presented with summary documents or videos in user-friendly language.

8.2. Institutions

Depending on the size of each MPA and its conservation category, different institutions might be involved, not only including national government protected area agencies, but different levels of , agencies exercising a wide range of functions in the government and NGO sectors.

System plans must be capable of being implemented within the resources available to institutions. Unless there are effective institutions there will be no effective protected areas.

8.3. Partnerships

There is a world-wide trend in devolution of natural resource management away from central government towards provincial and local government, community based groups, NGOs, the corporate sector and private individuals. This trend calls for mutually beneficial partnerships to be developed if protected areas are to succeed.

There is a wide range of choices for the management of protected areas that comprise options from the total control by the government agency to the total control of the site by other stakeholders (see next chapter on participation).

In considering the role of partnerships within the national system plan, the following should be noted:

Local people have a range of interests in protected areas. It is desirable to maximize the coincidence of those interests with protection and management. Where communities directly benefit from protected areas there is a greater likelihood of success of the community involvement programme.

Consultation should extend beyond the local community to include all important stakeholders - such as tourism operations, water and energy supply companies, and the media – which

are potentially very influential. Without their co-operation, the effective development of a protected area system may be difficult. Failure to consult with some stakeholders may create obstacles or conflicts, and pass up opportunities for creative and sustainable solutions to problems.

Partners may be found in unexpected places (e.g, local communities, the military, the private sector). The need is to open dialogue and to look for areas of mutual benefit. Partnerships will only work when:

- There is mutual interest;
- There is mutual benefit;
- The partners have something to contribute.

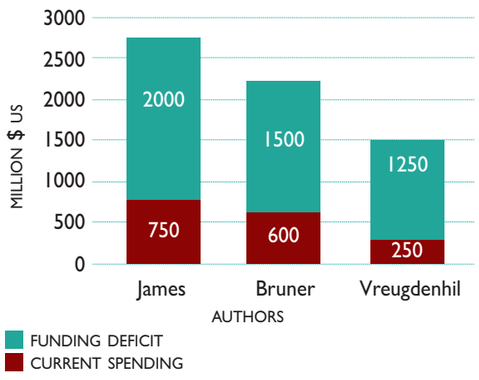
Effective partnership will broaden ownership and commitment, and therefore increase the effectiveness and sustainability of implementation. Partnerships must lead to something; they are not a means on themselves. Realistic expectations need to be established in relation to what a partnership can achieve.

NGOs can often be a valuable partner, sitting - or "buffering" - between communities and government. They also help mobilize and target resources and have a unique capacity to mediate between groups who may not otherwise work together. Involvement of NGOs should as far as possible be seen as a bridging process, developing the capacities of local communities to conduct their own affairs and to interact more effectively with government and donor agencies.

8.4. Financing

The budgets of protected area agencies have fallen sharply in many countries in recent decades. We have already estimated the needs in Section 2.6.

Figure 1. The funding Gap for effective management of existing PAs in developing countries



Different studies have approximated the financing gap of PAs around the world. James et al (1999) estimate that current PA financing in developing countries is around US$ US 800 million, about a 25 % of the total required. Bruner et al (2003), considering the need to expand the PA network in many countries in order to protect a 15% of the world's land area, calculate that a total of $US 25.000 million/year would be necessary along 10 years. According to these and other authors the Convention on Biological Diversity (2005) reports, (Figure 1) that the funding gap in developing countries would be somewhere in between 71% and 83%.

In the non-EU Mediterranean countries, the national allocations to PAs range between $US 10-40 million/year, which added to the annual international contributions ($US 15 million), the current available funds for non-EU PAs would be in the range of $US 25-55 million/year, which results in an annual allocation per/ha of $US 2.5 – 5.5/ha (López Ornat and Jiménez 2006). These authors conclude that the funding gap for PAs in non-EU countries is in anevage of $ US 850 million a year in our region, so just between around a 10% of the needed investment is being covered.

Since limited funds are usually the main constraint in management, the success of the system plan will depend on the development of clear fund-raising and investment strategies.

Whatever their national or international origin, all the public sector resources for funding Protected Areas in the Mediterranean will remain largely insufficient in the short term, and will require PA authorities and managers resort to a much broader spectrum of financing mechanisms:

- Reviewed policies on subsidies, offsets from environmental impact, and particular taxes. Within the EU budgets, PAs are receiving c.a. 3-6 % of the subsidies earmarked as "natural resources" (actually agriculture and fisheries).
- Market-related mechanisms can and must be developed, such as entrance fees to the protected areas, concessions, resource extraction fees, and most importantly, the payment for ecosystem services.
- Partnerships with economic and social sectors, and a range of possibilities to raise contributions from the private companies, should also be considered and developed.

Different tools comprise different types of fees, - entry fees, concession fees, recreational activity permit fees, diving fees, hotel room surcharges etc. carbon sequestration payments, different taxes, - fuel taxes, property-, debt-for-nature swaps and conservation trust funds.

Tourism and recreation are highly valued PA benefits. Considerable income can be generated for PAs through direct charges (gate fees, permits for recreational activities, indirect charges on hotel accommodation, airport departures and others). However, only 8 countries in the Mediterranean region are taking significant advantage of tourism-related potentialities. While more often than seldom, income generated by PAs is transferred to government central accounts and does not revert to the PA system (López Ornat and Jiménez 2006). The common situation is that PAs charge no or very low fees.

A significant potential for coastal MPAs can be drawn from the growing demand for diving activities, as divers pay as much as 120€ a day in Mediterranean marine protected areas. Some marine National Parks are completely self-financed through entrance fees.

However, at the heart of the funding gap is the undervaluing of PAs. PAs produce many goods and services of high economic value, services not fully understood, identified and appreciated, resulting in a lack of incentives to preserve them. Protected areas not only generate tourism revenues, they also provide clean water flowing to downstream farmers and cities, natural-disaster prevention, biodiversity stocks, commercially valuable fish-stocks and other. The best opportunities should arise from water and hydropower production and from the tourism-recreation industries. A recent study (Merlo and Croitoru 2005) estimates that the average

Total Economic Value of forests in 18 Mediterranean countries is about €133/ha per year; forest services alone provide in our region a much higher economic benefit than the investment to protect them.

There is no reason why the public sector should have the sole responsibility for funding or managing PAs, their facilities and services. The cost of PA management could be shared through collaborative agreements. The Mediterranean receives over 150 million tourists every year, most of them into the coast, and PAs are increasingly valuable tourism products. The level of tourism contribution to PAs conservation will depend on the ability of PA managers to set up fruitful relationships with this sector. Other private companies may donate land or pay fees for the use of natural assets in PAs

The system plan itself should identify funding priorities, and encourage funding from prospective sources. Protected Area managers should have business training. It may be helpful to form partnerships for this purpose with other stakeholders with an economic and social interest in biodiversity conservation.

Management Plans should not only identify funding priorities but also funding sources. Planners and managers need to identify all possible and feasible financing tools applicable for the national protected area systems, knowing that the financial viability of the system does not only depend on the government budget allocated for this purpose.

8.5. Training

Protected area management training in the Mediterranean is a priority. However, the need is broader than the traditional focus on resource use aspects, so as to give more emphasis to techniques of community involvement, expertise in negotiating and resolving disputes, and about financial strategies, tools and cost-sharing partnerships.

In most countries there is a need to build the practical experience of people at local and provincial levels, so that there is a much greater pool of well trained, talented and experience people to implement participatory field projects.

Particularly in developing countries, there is a need to build applied research capacity in universities, especially in integrative and multidisciplinary approaches to environmental management. It is desirable to get university and agency personnel working together so that managers better understand the capacities, and constraints, of research processes; and so that researches better understand management priorities and constraints.

PA managers need to acquire new skills to develop business plans for PAs, to fund-raise and to establish partnerships with interested stakeholders. Unfortunately, training for PA finance is still far from being applied in the existing specialist and post-graduate courses available in the Mediterranean countries.

In this context, the role of the national system plan is to identify the training needs for the country and to put forward a strategy for meeting those, using national and regional institutions, with international assistance when appropriate.

8.6. Monitoring and Evaluation

The national system plan should put in place the monitoring and evaluation arrangements required to ensure that there is a close fit between plan and reality.

The monitoring arrangements required will need to include those at the level of individual protected areas, so as to facilitate the gathering and evaluation of appropriate data which will allow evaluating the performance of the system as a whole. Chapter 5 in this book is devoted to this important topic.

The plan will develop the capacity - too often missing in the past - to demonstrate whether long-established protected areas have achieved their purposes. Incorporation of effective mechanisms for promoting and co-ordinating research, monitoring and evaluation are therefore important in:

- building and maintaining support for protected areas;
- devising and refining effective management strategies and practices;
- identifying and/or reforming institutions to enhance management performance;
- making trade-offs between optimal arrangements for protected areas and the needs and interests of other stakeholders who may have or claim an interest in the same areas; and
- making informed choices among strategic options for disposition or management of the network of protected areas.

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ANNEX I.

PLANNING AND MANAGEMENT OF MARINE PROTECTED AREAS

(Taken from Kelleher 1999)

There is a clear distinction between national system planning and management planning at the site level. The system plan examines the country as a whole; it provides national-level co-ordination with other planning and between the various different units of a national system. However, the system plan should also provide guidelines for management planning at the site level. Thus, while management planning for individual system units should not form part of the national system plan per se, the system plan should provide a broad framework for management plans.

THE PRINCIPLES OF PROTECTED AREA PLANNING AND MANAGEMENT

Plan and Manage Protected Areas in their Wider Context

Protected areas are not isolated from surrounding territory. They are inserted in a wider landscape interconnected with other political, economic and ecological systems.

Integrate protected area systems into larger frameworks for sustainable development

Protected area systems should be part of a larger conservation strategy, documented in National Environmental Action Plans, National Conservation Strategies or National Strategies for Sustainability

Plan and Manage protected areas as part of the surrounding landscape

It is important to adopt an effective land-use planning system, controlling, construction, building, agriculture, forestry, and other activities around the protected areas. Also maintaining the ecosystem connectivity through corridors of semi-natural or natural habitat between protected areas and the creation of buffer zones.

Assess, quantify and explain the benefits of protected areas to society

Efforts are needed to assess the economic benefits of conservation of natural resources and protected areas, so that specific arguments can be given to society in support of the in situ conservation measures.

Valuable approaches to this assessment include:

- Developing methodologies for economic valuation of protected areas.
- Commissioning and assembling studies on particular benefits, including those which are difficult to quantify in monetary terms.
- Preparing comprehensive inventories of the assets of each protected area.

Involve and empower local communities

In the long term only those participatory management approaches that involve local communities are to succeed, are more cost-efficient, and avoid conflict.

- Involve local communities in the planning of the protected area
- Involve local communities in the management of protected areas
- Stimulate informed advocacy so as to expand the constituency for protected areas

SOME CONSIDERATIONS IN PLANNING AND MANAGING MPAS

- Make sure the objectives are absolutely clear before starting the planning process
- Time and money spent in the planning and development phase will be saved many times over in management later
- Build management capacity, especially in the planning phase
- Take a long-term view but be adaptive, review management and do not over-plan
- Adopt a Systems Approach to planning and management
- Bring together an inter-disciplinary project team with clear accountability and defined responsibilities
- Use the well-established principles of project management
- Establish a clear sequence of decision-making and follow it
- Remember that nearly all of the management of an MPA consists of managing human activities
- Avoid unnecessary conflicts and resolve conflicts which arise
- Establish mechanisms for community and sector self-enforcement, but reinforce these with formal legal procedures
- Do not over-emphasize the need for new data. Generally the information required for planning already exists and only needs to be brought together.

THE SITE MANAGEMENT PLAN

The *Management Plan* for a particular site is a working document that is updated periodically. Because its arrangement and complexity must be tailored to the needs of the site, generic models may be suggestive but not prescriptive. Each site needs its own customized plan.

There are many practical considerations in designing MPAs that are to be addressed during the planning phase:

- the types of habitats to include;
- the size of the protected area and its different zones;
- consideration of external impacts on the site and procedures to minimize these effects.
- conflict resolution and cooperative arrangements with local communities and industries;
- zoning of activities to separate incompatible uses where necessary;
- boundary demarcations;
- recruiting and training of staff;
- analysis of visitor use compatibility and safety considerations;
- location of MPA facilities;
- types of boats and motors for surveillance and transport;

Site Planning Guidelines

1. The Management Plan for the site is the operational guide for the MPA and identifies actions to resolve specific management issues. It is thus a guiding tool for management.

2. The principal goal of the Management Plan is generally to maintain the natural resource values (seascapes, species habitats, ecological processes) of an area, and to ensure that all uses are compatible with that aim.

3. The Management Plan should aim to conserve natural values, optimize economic uses, and integrate traditional uses. Through zoning, it should attempt to separate incompatible activities, ensuring that particular uses are permitted only in suitable areas and sustainable levels of use are specified.

4. The Management Plan should function to achieve interagency coordination and cooperation among stakeholders (management authority, concerned departments of government, neighboring communities and other user groups) and to facilitate communication between MPA administration and management.

5. Initiation of site management need not be delayed until a MPA plan is completed. In countries where lengthy bureaucratic procedures or other factors delay the completion of the plan, an interim management document (operational plan) can be formulated and implemented.

6. Management plans may be required to function as interpretive documents, beings designed for the public as well as for management. Planning workshops should be conducted to garner interest from the nearby community as well as certain of the public.

7. Planning should examine the effects that MPAs have on local people and find ways to avoid negative effects or compensate for these. Public consultation is important both to identify current uses and to avoid conflict with local traditions and to encourage participation in planning.

Source: Salm et-al. 2000. Marine and Coastal Protected Areas. A Guide for Planners and Managers. IUCN.

It is important that the plan sets realistic objectives for available management resources. Otherwise, it encourages false expectations and begs failure.

Plans should be flexible enough for managers to modify certain activities based on their experience and on new data received during the implantation phase. Each Management Plan should include a mechanism for evaluating effectiveness and a schedule for its own revision. As a general rule, plans should have a life span of three to five years.

3. Involvement of stakeholders in Marine Protected Area planning and management

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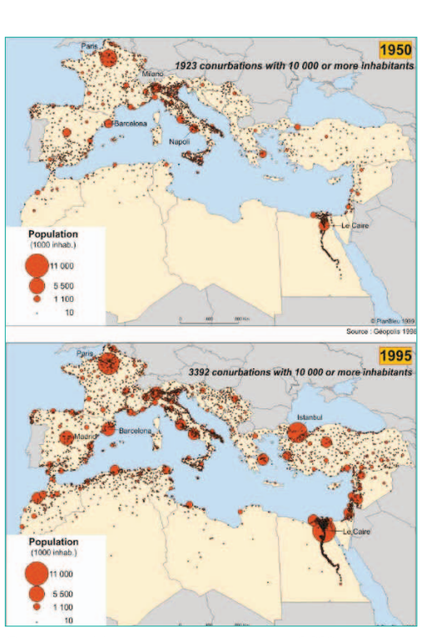
1. Intoduction

One of the most common problems in Protected Areas (PAs) management, and most particularly in developing countries, has been the opposition of local communities because of the costs of opportunity of PAs when the use of natural resources is restricted. Particularly in the Mediterranean it is hard to find a coastal area in which there is no competition for resources and interest from different sectors of human activity.

This chapter analyses why the involvement of affected groups is desirable -and in most cases a necessary condition- for the effective protection of coastal and marine parks. It also introduces to the risks and costs of participation, to the different phases of a participatory process, and to the most common field techniques, trying to synthesize the experience gained in the past two decades around the world. Participatory planning and managing of Marine Protected Areas (MPAs) is being more and more an extended practice and recommended both by technical bodies and by international agreements.



Growth in Mediterranean cities over 10,000 inhabitants (period 1950-1995). Source: Plan Bleu 1999 (Geopolis 1998)

1.1. The importance of stakeholder involvement

The term "stakeholders" refers to those individuals and organisations that have an active role or interest in an area, those likely to have a legitimate interest or be affected by the outcomes.

This section summarises why participation of stakeholders in a MPA is essential to achieve its long-term objective.

It is commonly assumed that nature conservation causes conflicts with the rights and traditions of stakeholders, especially local communities. In reality, protected areas cannot be separated from the

need of local people to meet their aspirations for economic development and better quality of life. Many MPA conflicts are based on fundamental differences between the ways in which resource users and conservation-oriented actors perceive the issues. For example, Management Plans may be a legal document, but must also be understood and assumed by those whose actions its seeks to control.

Participation is commonly defined as a social process through which people are able to influence and share control over the decisions that affect them. It allows the diversity of perspectives and complex interaction between authorities, local population and NGOs to be recognised from the outset, so conflicts may be avoided or addressed early in the process before positions may harden. In the long term, only planning and management that encourages participation is likely to succeed, even though it may be more complex than approaches that do not.

The involvement of stakeholders is particularly important in the marine environment where the interconnected nature of the sea causes that actions in one area influence on another. Partnership with local communities is also justified in terms of legitimacy of many community interests in management, such as the use of traditional fishing grounds.

In reality, protected areas cannot be separated from the need of local people to meet their aspirations for economic development and better quality of life. Participation builds trust and confidence between the affected parties, and helps building consensus.

Participation enables local perspectives be understood, their concerns valued and local knowledge employed. As stakeholders are involved, local capacities are mobilised and strengthened, conflicts are prevented, and a collaborative social climate is generated, making conservation efforts more efficient, effective, and long lasting.

In protected areas, it will help building a common vision about conservation and sustainable development with the local stakeholders, and promote local collaboration to protect the area, together with a sense of local pride and ownership about the Park. Participation can mean the difference between the strict protection of a Park behind its boundaries, or its integration to local culture, uses and regulations, promoting a sustainable society around it.

The role of Authorities

Participation does not substitute the decision-making process, but helps making it, and contributes to its success. Planning and management need to consider which issues can only be addressed at a national and central level, and which can be addressed more locally.

Participation implies full involvement of relevant groups (both government and non-governmental) in appropriate tasks including strategy design, exchanging information, decision-making, implementation etc.

The involvement of stakeholders does not mean that the Park Authorities delegate or loose decision-making or responsibilities. The main risk of stakeholder involvement in an MPA is that conservation objectives can become compromised by stakeholders priorities, and that without governmental involvement the MPA could be unprotected to face up to powerful interests.

In participation, particular interests must be considered and respected, but the final aim is to identify a superior objective of common interest.

The involvement of stakeholders does not mean that the Park Authorities delegate or loose decision-making or responsibilities.

It is hard to find a coastal area in which there is no competition for resources from different areas of human activity. PHOTO: A. López

The role of central government is crucial as it provides leadership, incentive structures, and allocates financial resources. But the central government can be part of a multi-stakeholder participatory process that involves local authorities, the private sector and civil society, as well as marginalized groups, as young or old inhabitants, or women.

1.2. International legal context

The involvement of stakeholders is considered a key component for long-term success of natural resource and biodiversity conservation, especially where the capacity and potential for statutory enforcement is limited. As such it is recognised in most international frameworks dealing with nature conservation, especially those related with PAs.

The Declaration of Principles at the United Nations Conference on Environment and Development (UNCED 1992) in Rio de Janeiro, affirms in its Principle 10 that: Environmental issues are best handled with the participation of all concerned citizens, at the relevant level…

The preamble of the Convention on Biological Diversity (1992) includes the following considerations:

"Recognizing the close and traditional dependence of many indigenous and local communities embodying traditional lifestyles on biological resources, and the desirability of sharing equitably benefits arising from the use of traditional knowledge, innovations and practices relevant to the conservation of biological diversity and the sustainable use of its components".

"Recognizing also the vital role that women play in the conservation and sustainable use of biological diversity and affirming the need for the full participation of women at all levels of policy-making and implementation for biological diversity conservation".

Systems of governance are affected by a complex interweaving of nature, cultural and socio-economic elements, and legal elements. The interactions among these elements is a source of unique properties of the Mediterranean region: humans have been around in the Mediterranean for a long time and civilisations had the time of developing in a tight connec-

tion with the environment, largely modifying it. In addition, there are marked N-S and W-E gradients within the Mediterranean in terms if political, legal, socio-economical and values systems.

However this diversity, the common historical and cultural background provides a tangible unifying thread. Within the framework of the Barcelona Convention, a system of Specially Protected Areas of Mediterranean Importance (SPAMIs) was introduced that provides for a collective, region-wide effort for reaching effective governance of marine and coastal protected areas. Article 7 in the Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean, refers to it when specifying the measures that each specially protected area (SPA) should include "*The active involvement of local communities and population, as appropriate, in the management of specially protected areas, including assistance to local inhabitants who might be affected by the establishment of such areas*".

However, field surveys in the Mediterranean point out that local populations have been, in general, barely integrated into MPA planning and management

2. Participation and stakeholder involvement: Benefits, risks, key considerations and challenges

Governance is defined as the complex interaction between different structures, processes and traditions that determine how the power is exercised, how decisions are taken, and how the citizens or other stakeholders have their say. This same term has also been described as "about power, relationship and accountability: who has influence, who decides, and how decision makers are held accountable" (WCP: World Parks Congress, IUCN 2003).

In any case, the WPC resolves that pushing to change the governance of Protected Areas cannot be done in abstraction of the existing governance structures of individual countries and regions.

A remarkable difference may exist about what should participation be in different countries and regions of the world, differences not as evident in the concepts, but in the practice. In many countries it is common to say that public consultation processes are "participation". New land-planning schemes or rules are submitted to a period of public information before being approved. Such are important democratic practices but cannot be considered as participation.

2.1. Consultation and participation

The advantages and disadvantages of consultation and participation can be summarized as follows, and can be compared to those of Participation which are presented ahead in the text:

METHOD	ADVANTAGES	DISADVANTAGES
CONSULTATION	Local knowledge can be captured Allows local communities to express their opinions on the materials presented by the authorities It facilitates dialog between communities and governmental administrators	Communities are passive receivers of information and plans and will not consider the proposals their own Positive discussion can turn into confrontation as proposals are presented as finalised products The changes proposed by communities will mean going backwards in advanced planning processes
PARTICIPATION	See BOX 1 in 2.3.	See 2.4.

Source: Windevoxhel 2001

Rice growers are common users of coastal wetlands; in the Ebro Delta they recuperated some traditional practices to avoid using pesticides in a protected area. PHOTO: SEO/Birdlife

The main difference between consultation and participation is that the latter allows the different organizations of civil society to contribute directly in the identification, planning, and solution to activities modifying their conducts or their environment, that is, they will have a say in the decision making. Participation cannot be used to legitimate an action plan or any isolated decisions in concrete moments when institutional or professional managers may need it. In these cases, participation becomes consultation, which, being better than nothing, may create within the stakeholders a feeling of having been used.

Participation is a technique but is also an ability. It will take different forms in different cultural, social, legal, administrative or political contexts; what is common between all of them is that societies will make part of the definitions about what and how should be done and as such share the responsibility for their implementation.

> Participation cannot be used to legitimate decisions in concrete moments when institutional or professional managers may need it. In these cases, we speak about consultation,

2.2. Top-down / bottom-up approaches to decision making

Top-down

In this process, government agencies decide, consult and announce the decision.

- "Top down" processes (OECD 2001) are usually driven by:
- Statutory regulations and international agreements,
- Conceived by some authority,

- Developed by professional staff, with limited involvement of stakeholders likely to have a legitimate interest or be affected by the outcomes,
- It implies goals and approaches set by that authority - but which are not necessarily those of stakeholders.
- Implementation is also typically the responsibility of those authorities.

Such top-down approaches can be found at national governments but also at decentralized levels. It may happen that top-down decision making causes a fierce opposition from stakeholders, for example fishermen, which could be inclined to see the MPA planners and managers as not interested in their sector, trying to disadvantage their interests.

Top-down strategies persist for many reasons (OECD 2001), e.g.

- There is often weak capacity in governments, the private sector and civil society to articulate interests, build alliances, seek compromises, accept different perspectives, formulate and implement long-term goals and strategies and manage participatory and pluralistic processes.
- Civil servants and others in positions of authority (often those in the middle ranks) have behaved as if they know best and have seen such moves as a threat to their status and power.
- Mechanisms and methodologies for organising appropriate participation at different levels and at different stages of the planning cycle exist but are unclear to those usually involved, or the transaction costs and time requirements are excessive.
- It is difficult to achieve effective participation (e.g. poor people are forced to emphasise their immediate priorities, and also lack resources, capacity and power to engage in decision-making for the longer term).
- It is also difficult to ensure the continued commitment and effective engagement of those outside government when their past involvement in participatory processes has been shown to be mainly cosmetic and their opinions have not been taken into account.

Bottom-up

'Bottom-up' approaches are characterized by the opposite approach and involve the active participation of stakeholders, and are often initiated by them. It is important to note that top-down approaches are not always synonymous with failure, nor are bottom-up approaches always successful.

Planning and management need to consider which issues can only be addressed at a national and central level, and which can be addressed more locally. It is often only at the local level that a people-centred approach to conservation becomes truly evident. Individuals and communities are best placed to identify local trends, challenges, problems and needs, and to agree their own priorities and preferences and determine what skills and capacities are lacking.

In MPA management, central government will be involved, to deliver leadership, provide incentive structures and distribute financial resources. Participation is a mechanism to distribute and share responsibilities. In this sense, the involvement of stakeholders helps to relieve the management weight by the institutional authorities.

In summary, "*a balance between "top-down" and "bottom-up" approaches is the best option. "It is thus not a question of which approach is most appropriate, but one of how the two approaches can be combined in order to provide more symmetrical management approach*" (Jones 2001).

2.3. Participation benefits

BOX 1. PARTICIPATION BENEFITS

- Allows building a shared vision and commitment for a common objective
- Allows the identification of shared priorities and realistic actions
- Builds trust and confidence between different groups and prevents conflicts
- Gives legitimacy to conservation processes
- Allows understanding and incorporating local visions
- Uses local knowledge and provides new sources of information
- Uses and dinamizes the existing local capacities
- It creates positive synergies
- It strengthens local capacities and creates social capital
- Improves the efficiency of the activities agreed
- Strengthens the stability, continuity and sustainabilty of the process

In general terms, participation increases commitment to sustainable development by building trust and confidence between the affected parties, and helping consensus. It gives legitimacy to many different interests, mostly to governmental objectives.

Participation helps addressing conservation objectives. In MPA, it will promote local collaboration in the areas protection, resource use and education, together with sense of local pride and ownership of the protected area. Thus, it prevents conflicts and contributes to presenting and achieving solutions.

Experience shows that broad participation may fill gaps in information and management capacities and avoid duplicating efforts. It makes conservation processes more efficient, because it mobilises resources, it strengthens institutions and community structures, and creates positive synergies making management needs easier and less expensive to MPA authorities.

2.4. Participation difficulties and risks

Participation processes have many benefits, as mentioned before, but there are difficulties and risks of which every protected area manager should be aware. Some of the main risks are:

- Weak governmental leadership of the process.
- Institutional differences about participation process, for example its deepness and the type of stakeholders involved.
- Wrong representative stakeholders. It is critical to select the appropriate representation to avoid conflicts in each stakeholder group. It may also happen that "representatives" from local groups do not really represent their groups, or may use participatory bodies as a personal platform.
- Protagonism of institutions or representatives, individualism or hidden agendas may poison participatory processes.
- An excess of consultation and assemblies may cause the process to get stuck and loose the interest of stakeholders.
- An excess of analysis without agreement and action will slow down the process. Insufficient actions and results could affect the willingness of stakeholders to collaborate.

- On the other side, urgency for results can produce the failure of the participation process.
- Over expectation for results is a serious risk. Expected results must be very realistic.
- Short and medium term funding is needed.
- There are no incentives to participate: decisions are not binding, field results delay, or logistic costs must be covered by participants.

2.5. Key challenges

A general characteristic is that stakeholder involvement is a long-term process, and not pushing it too fast is crucial. Consequently a balance between meeting deadlines and keeping participation process moving forward is needed.

Enthusiastic teams should not forget that participation needs time and some extra finance, both scarce resources in PA context. When using participatory methods, decision-making takes more time than expected. A challenge for the leading organisations and teams is the importance of respecting the priorities and timing of participants: be aware that consultants, technical bodies and some organisations are usually "in a hurry" as compared to the local timing for decision making. Participation delays and makes decision making more complex in times when "executivity" is demanded.

> Stakeholder involvement is a long-term process, and not pushing it too fast is crucial. Participation needs time and some extra finance. When using participatory methods, decision-making takes more time than expected.

Some challenges to involve stakeholders, either general or specifically to MPAs, are here summarized based on Jones (2001) and Jimenez (2003):

CHALLENGE	RECOMMENDATION
Under resourced relevant authorities	Devolve many of the responsibilities to stakeholder groups
Lack of vertical integration between regional and national policies	Do not create false expectations, like reflection of local policies in national policies. Do not formulate policies that require translation into national policies.
Lack of integration between sectoral agencies	Participation process could be an opportunity to strengthen the links between them
Stakeholders are not formally organised into groups/associations	The participation process may lead to the formalisation of networks, for example through the selection of a representative
Different stakeholder groups are not aware of each others concerns and priorities	Stakeholder groups can outline their concerns and priorities, and discuss them with other groups, thus building consensus and moving towards resolution of conflicts

(continued)

CHALLENGE	RECOMMENDATION
The roles of stakeholders and not well defined, causing expectations, frustration or duplication of efforts	Reach of participation, sharing responsibilities, delegation of power and decision making should be made clear form the outset
Potential for certain issues to dominate discussion	The most constructive mean of addressing such issues is to discuss them at beginning and then try to move on, keeping the discussion impartial and focus on MPA priorities
Geographical dispersion: wide areas with communication and transportation difficulties make meetings and exchange of information very difficult to reach communities	Consider funds and time to cover costs of participants from far communities, and efforts to communicate results and share information in the main milestones of the process
Lack of knowledge and experience of marine issues	Awareness raising initiatives to increase people's knowledge of marine issues
Over-expectations of fishermen about short-term benefits of closures	This can be minimised by avoiding over-selling such benefits, for example stressing the long term and uncertain nature of such benefits
Fishermen generally want closures in other nearby grounds rather than in theirs	Stress the likely localised nature of such spill-over benefits, and the need for the local fishermen to invest through closures in order to obtain such benefits
Fishermen often think that stock depletion is caused by other fishermen	Make them be aware of their own potential role in stock depletion

2.6. Key requirements: *Adequate resources, skills and time*

Participation usually needs extra funding in the short term. However these costs are highly compensated with the results of the process and in the lower costs in the mid and long term. Effective participation tends to start slowly and requires early investment; it becomes more cost-effective with time.

The costs of participation depend on various factors (OECD 2001):

- *The type and number of participants, their location, and the opportunity costs of their participation*. Many stakeholders will be able to engage through their existing jobs and roles. Others will need to take time from their livelihood activities (e.g. those in civil society and particularly those from local communities where involvement can mean, for example, time lost for fishing). Women can find it particularly hard to leave domestic responsibilities. So ways of compensating for this or for providing assistance may need to be found if they are to participate effectively.
- *Time requirements* - it takes time to establish trust, especially at some local levels; and a framework within which people may be encouraged to collaborate with outsiders. It has often taken between 18 months and five years to set up and undertake comprehensive participation exercises.

- *Communication requirements*. The many institutions and individuals engaging in debate will need to have access to and understand key information important to the issue(s) being discussed. Use the media effectively both to create a forum for debate as well as for awareness raising. If managed well, the media can play a useful role in enhancing participation of the public in the conservation process (Egiju 2001).

> Participation usually needs extra funding in the short term. However these costs are highly compensated with the results. Effective participation tends to start slowly and requires early investment; it becomes more cost-effective with time.

There are some important preconditions before starting a participatory process. These are detailed in section 4.2.

3. Who particiates and to what extent?

3.1. Stakeholders

In a PA the typical stakeholders[1] are governmental agencies, administrative authorities, resource users, local residents, research institutions, and non-governmental organisations. In an MPA the local residents include the communities who live within or close the PA and people who use or derive an income from their natural resources, such as fishermen, operators of commercial port facilities, boat-building and marine industries, tourism operators, and marine recreational interest such as sailing and diving.

Each stakeholder perceives the MPA in a different way. As an example, fisheries may fear that their interests will be harmed by the establishment of a MPA, and do not perceive the beneficial effect on fishing that has been demonstrated, while tourism is often the sector that first benefits from the protection of an area.

Following WWF (2000) and Windevoxhel (2001), four kinds of stakeholders can be identified:

Handicrafts in Sidi Mechreg, northern Tunisia. PHOTO: WWF

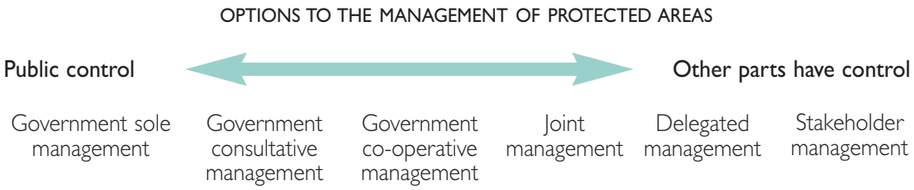
- Primary or responsible stakeholders: include those organizations empowered by law with authority and responsibility to manage or administrate resources or processes related to the protected area. E.g. Environmental or Land Use Agencies, Park Administrators, authorities for the Sea and Ports, governmental fisheries agencies... This group also includes those who may claim over the resources, having the capacity to influence collaboration outcomes, and are central to any conservation initiative, e.g. fishermen.
- Secondary or beneficiary stakeholders: are those with an indirect interest in the outcome or who may in one way or another benefit from the protected area, although sometimes they may not be aware of it. These stakeholders may need to be involved, but their role is peripheral to that of primary stakeholders, so they may need to be involved periodically. E.g. tourism sector, NGOs, research institutions.
- Opposition or affected stakeholders may have the capacity to adversely influence the outcomes through the resources and influence they command. These are people or institutions that in some way have seen restricted their use rights over the protected area. E.g. commercial fishermen, local businesses, marine industries, tourism investors. While they may negatively influence different aspects of conservation planning, particularly at early stages, it is crucial to engage them in the open dialogue.
- Marginalized stakeholders, such as women, indigenous people, and other impoverished and disenfranchised groups, may in fact be primary, secondary or opposition stakeholders, but may lack the recognition or capacity to participate on equal bases. Particular effort must always be made to ensure their participation. Strategic foresight is needed to determine the time and support required enabling them to organize themselves and to participate.

> The success of the process is much more the establishment of solid partnerships capable of responding to challenges in a flexible way, than resolving present conflicts or approving a concrete management plan.

3.2. Different options and levels of participation

Bringing stakeholders into acceptance of and collaboration in the MPA, range from simple information, to consultation and up to shared responsibilities. So there are consecutive levels of participation.

Next diagram (WPC 2003) shows different approaches to PA management



a) *Government sole management*: Agency usually informs the community e.g. No nets allowed in the park. Community is required to comply with agency requirement.

b) *Consultative management*: Agency consults stakeholders seeking input into decision making process e.g. accepting ideas and concerns into a management plan.

c) *Governmental co-operative management*: Community agrees to support decisions and becomes involved in programs and activities. e.g. an NGO agrees to undertake education or monitoring program on park in accordance with agency requirements.

d) *Joint management*: Agency invites stakeholders to have a formal role in the decision making process, e.g. zoning, regulations, protection or monitoring activities.

[1] The term "stakeholders" refers to those individuals and organisations that have an active role or interest in an area, those likely to have a legitimate or be affected by the outcomes

e) *Delegated management*: The agency hands over parts of, or complete, control and decision making to the community or other stakeholders. Community/stakeholder has autonomy in decision-making in one or several, or in all management activities and responsibilities, and may seek agency management input. e.g. Landowner wishes to contribute important privately owned land to national reserve system; fishermen voluntarily resolve protecting an area and guard it from external impacts, seeking legal or administrative support from governmental agencies. The agency may facilitate management through the provision of resources and expertise.

Jones (2001) summarizes these same options and levels of participation in a 4-stage dynamic classification:

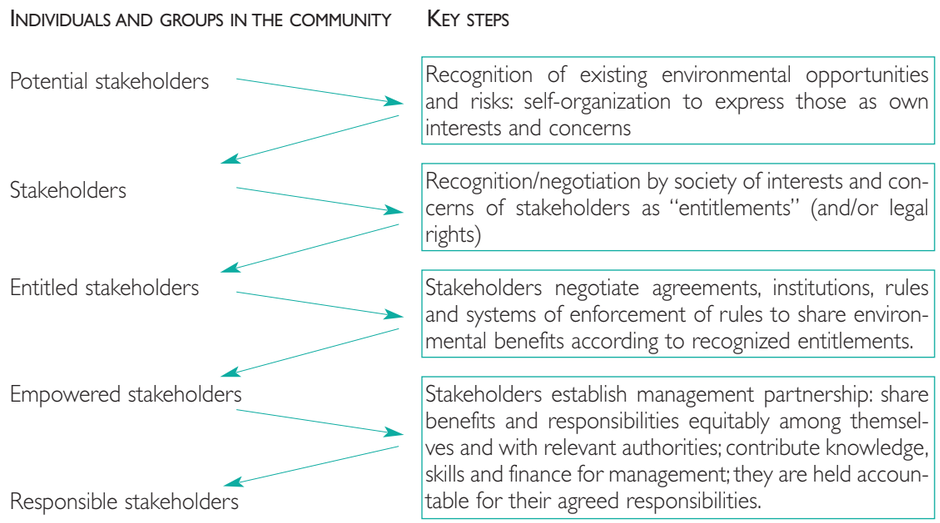
Level of participatory activity	Objective	Examples of techniques
1. Information sharing activities	To place information in the public domain	Newsletters; web sites; leaflets; videos; public displays; slide presentation; media briefings
2. Consultative activities	To encourage a two-way exchange of information	Management group of relevant authorities consults stakeholders through questionnaire surveys; focus groups; public meetings; face-to-face briefings with key individuals/organisations, etc.
3. Collaborative activities	To engage the knowledge's and resources of stakeholders	Creating hierarchical management groups whereby relevant authorities collaborate with stakeholders through topic groups to scope a problem and discuss solutions, mounting ecological surveys; running sites-based events, etc
4. Empowerment activities (Delegated or joint managment)	Share responsibility and power for the decisions made, and their outcomes, through a partnership approach	Creating "flat" management groups combining relevant authorities and stakeholders; co-opting individuals from relevant authorities and stakeholder groups; devolving budgets and resources, etc

Source: Jones (2001)

Local forest stakeholders. El Feidja, Tunisia. PHOTO: WWF

As in all social process, building partnership requires time in order to gain confidence and trust. It is critically important no to press for quick results. In fact, the success of the process is much more the establishment of solid partnerships capable of responding to challenges in a flexible way, than resolving present conflicts or approving a concrete management plan.

Participatory roles from governmental agencies, as indicated before. But participatory processes are very dynamic. As communication, understanding of the common objectives and growing responsibilities increase, the level of participation also does. The next diagram shows ideal graduate steps of stakeholders' empowerment (Kelleher 1999).



3.3. Who sould participate?

Participation may be as flexible as needed. It is not necessary or even recommendable, to achieve always the maximum grade of participation. Sometimes informing interest groups is enough to achieve a concrete objective. For example, once a common vision and shared objectives have been agreed, some subjects should only be discussed with governmental agencies (e.g. new policies, regulations, investments..). Many times it is enough to inform the stakeholders about the decisions taken.

It is not necessary or even recommendable, to achieve always the maximum grade of participation. Sometimes informing interest groups is enough to achieve a concrete objective.

As a very extensive participation is neither possible nor necessarily desirable, and would be extremely costly, a stakeholder analysis (see ahead and in Section 5) is necessary to obtain a good balance between visions and the roles of the potential participants. Not only sectors of society should be considered (governmental, non-governmental, private) but levels of specialization within their representatives (national and local level public servants and administrators, resource users, specialised technicians). Marginalized sectors of society should also be considered, such as immigrants, young and women. It is not uncommon that external analyses ignore multiple forms of formal and informal local organisations, for health, water, sports, culture, housing.... organisations, which efficiently help, communicate and represent local communities.

At the beginning not all stakeholders may be interested, until they find their representatives respected and with a say in the significant decisions. PHOTO: A. López

Be aware that a weak design of participation may favor well organised sectors that will capitalise their defence of particular interests even against a general public interest. In meetings with project managers it is not unusual to hear that those participating "are always the same". This eventuality is a threat to the process; we should be able to incorporate new participants, or else, the time and costs incurred may not yield any additional benefits and be worth the effort.

How many participants?

In complex situations, e.g. wide coastal marine areas with demand for resources, the four types of stakeholders mentioned before should be involved in one level or another. Small areas in remote places, on the other side, may be established and managed only by one governmental agency, with support, if necessary, from a specialised research institution or a conservation NGO.

A balance needs to be struck between:

- Involving as wide a range of participants as possible to forge a broad-based and durable consensus; and
- Overloading the facilitating and managerial capacities of the Park authorities.

If managerial capacities are weak and participatory mechanisms are poor, the number of participants can be limited at first - but this should be increased with the development and reiteration of specific strategy tasks (OECD 2001).

As a general rule the number of key participants should be kept into a realistic minimum, while their quality to a maximum.

The quality of representatives

Stakeholders should participate being responsible on behalf of their organizations and communities, working towards collective agreements and actions. Good leaders are essential.

Stakeholder representatives must be selected by the stakeholder groups themselves, and should be recognised and respected by the majority. If allowed by the stakeholder groups, you may try to influence this selection, but always respect the representatives selected by the stakeholders. Other representatives, which may be positive to the protected area but have not been selected in first instance, could be incorporated into the process later.

> At the beginning, not all the stakeholders are interested in the process. Their interest grows as they find that the representatives are respected and have a say in the important decisions.

It is critical to have the appropriate representatives to avoid conflicts in each stakeholder group. On the contrary, you may find after a while that "representatives" from local groups do not really represent or inform their groups, or may use participatory bodies as a personal platform. Be aware that protagonism of institutions or representatives, individualism or hidden agendas may be a strong obstacle to participatory processes.

Additional to the work done by the representatives, it is a good idea to maintain a direct basic communication between the park authorities and the represented groups, especially with local communities and resource users.

> As a general rule the number of key participants should be kept into a realistic minimum, while their quality to a maximum.

4. Phases for a participation program

4.1. Introduction

When possible, the participation process should start from the outset, and will become a common practice in all the phases of the Park planning and management.

The usual 5 Phases of PA management planning are:

1. Diagnosis: the basic studies and identification of key issues. Both research and identification of issues can be done in participation. The usual techniques are participatory workshops and SWOT analyses.

2. Planning: involving the zoning of the area, the regulations affecting each zone, and the priority actions.

3. Approval: the Park authorities with support from the participatory body will formally submit, through the existing structures, a synthetic report, clear and easy to read by decision makers, which should be approved and financed.

4. Implementation: Will focus on PA management routines, local projects, institutional strengthening and financial mechanisms. In all of them, PA stakeholders can support and assume their part of responsibility.

5. Evaluation: It is important to establish biological, ecological, management, social and economical indicators, from the outset of the process, and thereafter be monitored by the Park authorities and the stakeholders, and discussed every year in the participatory bodies. After evaluation, a new cycle of diagnosis-planning-approval-implementation may proceed.

These phases may start simple and with few participants, and become more complete in future iterations of the cycle. It is not necessary, and experience shows that it is not even possible, to achieve complete participation from the beginning. The typical cycle has several iterative turns and looks rather like a spiral than like a circle.

> *Adapt to local situations. Do not trust in blueprints*
>
> Experience shows that participatory experiences are processes, and depend on the many changing variables and contexts of reality; it is a practice and an ability, which can be helped by some basic considerations, included in this document, and useful techniques. But there is no magic blueprint; a standardised approach has to be avoided. Instead, there is need to use and restructure existing processes, institutional arrangements and procedures, according to individual countries' own needs, priorities and resources.

4.2. Preconditions for a participatory process

There are a series of pre-conditions to prevent and resolve conflicts, e.g. those proposed by Ostrom (1990), which can be also applied to the successful involvement of stakeholders in the management of a protected area. Before starting up the process, the driving institutions should analyse the following:

1. The objectives must be clear from the start. All participants in the driving institutions should decide which area(s) will be managed and with what purposes.

2. Participants should have a substantive and significant role; establish the extent to which this roles can be shared and on which areas or subjects.

3. Adequate resources, skills and time need to be established, as effective participation requires early investment and tends to start slowly.

4. Flexibility: mechanisms should allow flexibility and adaptability in light of unforeseen ecological, social, institutional or financial changes.

5. Be ready to use procedures and mechanisms following the local culture and structures. Wide scale or international schemes can not be imposed; rules and procedures should be designed or adapted to local conditions.

6. Recognition of the right to associate: if external authorities defy or overpass the institutional arrangements and rules of the game, the participatory effort will not last.

7. Recognition of the right to error and the wealth of learning.

8. Design the participation programme before starting (see next section):

4.3. Program design

There must be a clear strategy for participation, agreed, and simply set out. When establishing it, be aware that very extensive participation is neither possible nor necessarily desirable as it would be inefficient in time and resources and not necessarily more effective.

1. Clearly define aims and objectives of program, including the project scope, the expected results for environmental/conservation and public participation.

2. Develop a participation strategy: how the program will be conducted, e.g. setting the broadness and level of consultation/participation required, the working principles, rules and organization, the techniques to be used, the main stakeholders involved, resource requirements, project budget.

3. Stakeholder analysis: (see Section 5): identify target audience and stakeholders, who are the main people the project aims to reach; decide whether the project applies to a segment of the community or to a wider audience, or if the project is applicable only to a specific geographic area or more broadly.

4. Determine how stakeholders want to be consulted, how much involvement do stakeholders expect to have, and the specific requirements such as venues or times. You may have one or two different organs of participation, one with executive responsibilities, the other for consultation and with an opened character (see ahead in 4.5.).

5. Identify project time-frame, at what moment should public participation occur, how long should it last, should it be provided in stages.

6. Identify milestones: project milestones should recognise key steps in program implementation, milestones can be used as a means of measuring program success.

7. Identify funding requirements, resources and sources: what are the costs involved, is the funding available, who may contribute.

8. Review basic documents or conduct research, including identification of the likely issues and concerns, reviewing policy documents / previous decisions, researching the history of the project etc.

4.4. Launching the program

1. Steering Committee: A small group (3-7) of primary stakeholders should start the work, e.g. the relevant authorities together with other groups with responsibilities in the protected area or resource users, and some other interested groups (e.g. NGOs). Representatives from these groups could create an operative Steering Committee (or Council of Representatives) to organise the work and share responsibilities. Depending on the importance of the MPA, this group could be coordinated with the central authorities or with the Park authorities.

2. Basic diagnosis: The relevant authorities and Steering Committee should prepare a first diagnosis of the area, which can be done with the existing information and technical inputs organising a SWOT analysis, that is, identifying the internal strengths and weaknesses, and the external opportunities and threats. Working on scenarios helps visualizing the external factors and the internal weaknesses. Introducing information into maps is a very effective way to communicate inside the Committee, and thereafter with the stakeholders.

Opening the process

3. Promote the participation process so all potential stakeholders know of its existence and how it is organized. Sometimes there are catalysts for participation, e.g. NGOs and local authorities, to start participation and to link decisions that need to be taken centrally with those appropriate to more local levels. This might be the moment to contract a professional Facilitator (see Section 5). At this stage you select key people to inform and interview them; one by one, bilaterally, you get more information about the perceptions, needs and ideas of the stakeholders, and they get information about the plans for the MPA. Techniques are interviews, public hearings and other (See Section 5).

4. A common vision: the agreement for the protection and sustainable use of natural resources, and the willingness to collaborate, will only happen after a common vision for the future of the area has been developed in a general meeting with all the relevant stakeholders. Building a common vision is the single most important step in the whole participatory process. Participants should commit themselves to a long term vision for the sustainability of the area, recognising their diversity of interests and working together in a process of shared learning. In participation, particular interests must be considered and respected, but the aim is to identify a superior interest of common interest. This stage can be faced through a 1-2 day workshop, with 20-25 participants, where a skilled facilitator is needed (see Section 5).

5. Identify root problems which are common to most sectors, and focus thereafter in the less contentious issues within these problems. This identification and selection of issues can be done in the same workshop or meeting as the vision.

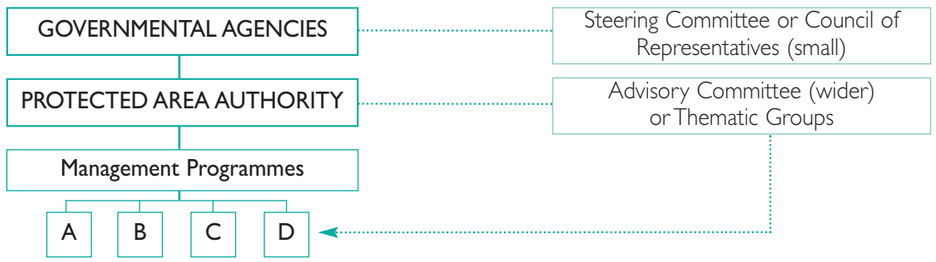
> Building a common vision is the single most important step in the whole participatory process.

4.5. Participation bodies and structures

Participatory structures and responsibilities may be established from the outset, so as to gain confidence from stakeholders and avoid creating false expectations. However they could be changed during the process if the evaluation of participation results recommends it.

Advisory Committee: After this common vision has been built and the idea of a protected area has been generally accepted and launched, representatives from the different groups of stakeholders should be selected in order to follow up the process and, eventually, incorporating and enlarging the Steering Committee or creating a possible new Advisory Committee, if the Steering Committee needs to be small or linked to higher governmental levels. Another possibility is to create thematic groups linked to the specific management programmes.

A possible organic arrangement could be the following:



This wider Advisory Committee, including many other secondary or affected stakeholders, can be considered an extension of the Steering Committee. The Park Authority may wish the individual members of this Committee to contribute sectorally into the appropriate management programmes. This Advisory Committee requires:

- Some basic operative resources, such as some support to organise meetings, copy and distribute reports and information and so on, which could be delivered by the responsible agencies.
- Mechanisms to communicate to their sectors what has been decided by their representatives and by the Committee, and
- As possible, a formal recognition from the competent authority.

The main advantage of Advisory Groups is that members are usually educated, so their recommendations often are more informed than general comments from the public. This group can serve a number of purposes:

- Help anticipate public reaction to proposed decisions
- Provide communication to key constituencies
- Educate you to the continuing concerns of interest groups and inform them about the issues and consequences of alternative actions.
- Provide continuity so that you receive the advice of interested parties who understand the technical aspects of the decision
- Provide a forum for building consensus

However there are many requirements for the establishment of these groups. First of all, they must be perceived as truly representative. Second, it is essential to define the limits of the group's authority. Third, establishing and maintaining an advisory group requires a significant commitment of time and staff resources.

Formal recognition?

Participation can be an informal process, but it is more effective when a structure is formalised and receives a mandate and responsibilities.

Experience shows that these advisory or participatory committees are not always, but rather very seldom, made official by the Authorities. Official status is desirable, but its absence should not be considered an obstacle. When these groups are convinced of their important roles in the planning and management of the area, they develop a strong power to call for meetings and a local recognition that sooner or later will be formally or informally recognised by the authorities.

The law in some countries admits participatory management bodies not only for advise and consultation but with a binding mandate over some management decisions, e.g., adopt the regulations for the area and contribute to its protection, to research, education and public awareness. This body proposes its own internal regime and regulations, formally meets the Director of the area (e.g. twice a year) to propose improvement in management, and is informed of any management decisions and plans, including annual plans and budgets. This body discusses and approves these plans in support of the Park Authority, and considers its own coordinated participation in their implementation.

> Experience shows that these advisory or participatory committees are not always, but rather very seldom, made official by the Authorities. Participation can be an informal process, but it is more effective when a structure is formalised and receives a mandate and responsibilities.

4.6. Programme development

The process should be open and transparent, conducted in a fair and impartial manner on the basis of sharing information, data, and knowledge. Increasing trust and confidence between stakeholders and responsible authorities results in a greater commitment to achieve consensus.

Once the participatory bodies have been set in place, their first tasks are:

1. To establish the general rules by which the Advisory Committee will work in coordination with the authorities and the technical teams. Assigning responsibilities early in the process helps to generate partnership. Present the expected milestones, chronogram and the expected results, e.g. diagnosis, final objectives of the PA, zoning, regulations, management programmes.

2. To collaborate in the basic research and diagnosis of the present situation

   - It is a good idea to take the representatives to the field and explain the situation that needs to be planned and resolved by the protected area.
   - Stakeholder groups can provide, and should provide, field information which has not been captured by researchers, fill information gaps, underline resources which are threatened, indicate threats and opportunities, and help to select priorities for the field activities[2].
   - It is important to work with these groups over maps of the area, including the present situation and future scenarios. Maps could be a result of the information gathered by all the stakeholder groups.

Always facilitate relevant information. Ensure that documents are sensitive to stakeholders' culture, avoid using scientific terms; and promote positive and constructive approach. These actions will show respect for the knowledge and aspirations of stakeholders and will minimise possible tensions.

Be open to new information. It is important to apply skills of adaptive management and be ready to adjust the program as new issues arise and new stakeholders are identified during the program implementation.

> Always facilitate relevant information. Ensure that documents are sensitive to stakeholders' culture, avoid using too many scientific terms.

Presenting the legal and institutional framework

The Park Authority must at some moment present itself to all stakeholders, making clear:

- How they got this responsibility,
- Which are the laws behind their mandate and which are the "rules of the game".
- Present the legal frame in which the protected area will be established, and the legal provisions and options for an administrative arrangement for its management.
- Present the main objectives of the Protected Area.

[2] Participative Action-Research is a method of study and action which yields accurate and usefull data to help improve collective situations. It is based on the idea that the stakeholders themselves can collaborate in gathering and analysing data, and producing scenarios, particularly in their own sectors.

Remember that legal aspects are not subject to negotiation. It is not desirable that the facilitator (see Section 5) makes this presentation. It must be the authority itself to presents these subjects.

Zoning proposal

Once basic information has been gathered and analysed, the next phase includes producing maps to compare the present uses, the expected scenarios, and the desirable future uses. This information allows the identification of critical areas where priority actions should be taken.

A series of maps will clearly show to all participants which are the most important areas for biological, ecological or cultural reasons, which other areas may admit different uses of natural resources, and which areas are over-exploited and should be protected or recuperated. The latter can be called "critical areas" and will receive the priorities for action in the future Action Plan.

This exercise could first be done by the Park authority together with the technical team in order to identify threats and discuss their own preferences. The same exercise will then be done in the Advisory Committee, local assembly or participatory body, without presenting the previous exercise. If this second exercise does not produce any contrary results or decisions, this should be the one adopted.

This analysis and open discussion will allow the technical team to produce the final zoning proposal for the area. Arriving to an agreement at this stage should not be difficult after having a consensus on the basic objectives and institutional arrangements.

The consensus needs respect for all particular interests and mutual confidence in the shared objectives. Consensus does not mean complete identity from the stakeholders, but a temporal alliance to solve common problems. Consensus is the only possible basis for each part to assume its responsibilities and to establish rules which will not be changed by unilateral pressures. If the zoning and the basic regulations for each zone are accepted by consensus, and participatory bodies remain open while information is shared, the whole process is likely to move smoothly into the future.

Action Planning

Once there is a general agreement in objectives, zoning, regulations and institutional arrangements, the next step is to agree on the basic action priorities.

Maintain responsiveness, be flexible: new issues may arise during the implementation phase that were previously not considered, or what was thought were trivial issues may actually be quite big. It is important to maintain flexibility so that stakeholders and issues are given a fair hearing.

The root problems which are common to most sectors should be identified and shared in the Advisory Committee. Focus thereafter in the less contentious issues, those in consensus. The hard decisions should be kept for later phases of the process, once confidence between participants and the Park has been built.

Win-win solutions are strategies that contribute to generate a positive atmosphere as they search for actions in which as much as possible all the stakeholders win something. At the outset, it is recommended using this kind of strategies because trying to resolve a big conflict at that time is almost an impossible challenge.

Participation must make the process easier for everybody, not burden it. Remember to start with modest objectives, to use the existing capacity and try to match with the local agendas and priorities. At the beginning, it is best to focus on obvious things which benefit the majority, e.g., recuperate local fishing stocks.

Experience shows that in coastal and marine PA planning, local communities and stakeholders are usually interested in the following:

- Establish "sanctuary" areas, and other areas for local fisheries
- Establish fishing areas where the local traditional fishermen have an exclusivity
- Recuperation of degraded areas
- Support for basic social needs
- Local employment in the park management
- Education and training

At the beginning, focus the less contentious issues, those in consensus, ,perhaps things which seem obvious but benefit the majority. The hard decisions should be kept for later phases. Participation must make the process easier for everybody, not burden it.

Concrete actions agreed in participatory bodies must be simple and realistic. The excess of expectations and the lack of concrete results is one of the strongest enemies to participatory processes. What is more useful and lasts long are simple things of "common sense" that everybody can understand and communicate.

In order to maintain participation and commitment of stakeholders in the long term it is necessary to see results on the ground. Compromise and collaboration of responsible administrations and stakeholders will continue in the long-term as long as initiatives from their partnership are happening in reality.

It should be made clear that sometimes decision making needs to be made under some degree of uncertainty, as there are gaps on scientific knowledge.

Concrete actions agreed in participatory bodies must be simple and realistic. The excess of expectations and the lack of concrete results is one of the strongest enemies to participatory processes. Remember to start with modest objectives, to use the existing capacity and try to match with the local agendas and priorities.

To foster participation there must be credibility on governmental responsibilities and enforcement of agreed regulations. One good idea is to establish gradual sanctions and make the beneficiaries be involved in imposing sanctions to those violating the rules. Sanctions should be gradual and respond to each type of infraction.

The main needs for the Park's management should be made public and discussed in groups, workshops or public hearings. An interesting tool is to display the main actions, ordered by zones, and categorised in priorities. The time classes should not detail the years, but priority periods, as this may create expectations and frustrations if they were not achieved.

Action	Responsable organization	Zone 1	Zone 2	Zone 3
Signal zones in land and sea	Park and marine authorities	A	B	C
Protect from external fisheries	Park and local fishermen	A	A	A
Drinking water supply to communities	Park and Municipalities			A
Organise local tourism service	Park, community A and local sector		B	
Research/monitor endangered spp	Research centre, fishermen and NGO	B	B	C
Etc....				

Priority classes, example: A (first two years): B (years 3 to 5); C: second priority

It is very important to establish who are responsible for each action. Participants must receive a substantive, significant role to play. And always remember to use and mobilise the existing capacities, not trying to push for any new structures.

Whatever the results, they should be written down in a simple layout and formally handled to the authorities.

Monitoring

The last, but not least, phase for an integral participatory cycle is monitoring and evaluation. Maintain the information flow. It is important to keep people informed of the progress of the program, including both agency staff and stakeholders. For large programs this may include developing a newsletter or email list to provide updates of the program's progress.

Evaluate periodically, and through an indicator system, the efficiency of participation process and how it contributes to achieve the MPA objectives. This will assist in developing future programs. Things to consider include reviewing the milestones (were milestones met?), and evaluating the stakeholder satisfaction (were they happy with the participatory process?). It is very important to provide feedback to participants, because in the end, the community needs to know how their input has affected the outcome of the project. It is important to ensure that an accurate record of the participation process is kept and a record of how final decisions were made.

Ideally, monitoring should include the beneficiaries, participating in the identification of the main indicators which are relevant to the Park conservation and which are significant for the stakeholders. They can collaborate in the collection of data in their own sectors or fields of speciality. Provide support, recognition and encouragement to those participating. Participatory monitoring helps keeping coherence for a long term objective between all the stakeholders, and strengthens their responsibility. It allows to evaluate the situation and to take

decisions to correct undesirable trends. The data collected can be displayed once a year in the general meeting of the Advisory Committee, and could be made public through local newspapers, radio or other local media.

It is very important to establish who are responsible for each action. Participants must receive a substantive, significant role to play. And always remember to use and mobilise the existing capacities, not trying to push for any new structures.

5. Techniques

5.1. Introduction

Suitable techniques should be tailored to the existing context, needs of all participants and participation objectives. There are many means and tools that provide opportunities for participation in the diagnosis of the area, the planning process, collaborative research and monitoring, and advisory bodies or decision-making. This document can only present a short description of the most common techniques which are well known to professional facilitators, conflict managers, negotiators and field sociologists.

There are other useful means providing indirect benefit through for example public awareness, formal or informal education, training opportunities, local employment, concession of services, and in general, building on what already works.

Particular techniques should be designed with specific groups of stakeholder in mind, and targeted to encourage their involvement. They should be affordable and reliable, and at the same time encourage consensus.

Necessary skills and capacities are usually in short supply in developing countries and those existing are often heavily committed and over stretched.

In a complex stakeholder situation, the help from a professional in participatory techniques is advised as an effective investment. A good professional will facilitate the process trying not to substitute any of the existing local capacities and trying to invigorate the local society through its own structures and leaders.

5.2. Facilitator

An external facilitator is not a need. Participation processes can be invigorated by the technical team itself. However, experience has shown that in the first stages of the process a common factor in successful cases has been the presence of an external facilitator. The professional quality of this person is important, its credibility and his/her ability to manage the meetings and events in a fair and objective way. He/She should comply with the following characteristics:

- Not having any personal interests in the area or with any of the groups involved
- Experience in participatory and conflict resolution tools.
- Capacity to manage groups and to solve conflicts and experience in project planning
- Knowledge about planning for Protected Areas or in land use conflicts
- Ability to make well structured and easy to hear public presentations and diffusion documents
- Capacity to systematize information and to prepare reports

The main responsibilities for a facilitator are:

- To visit the field area and to know the main technical reports;
- To assist the Steering Committee and the relevant authorities in preparing the agendas for the meetings and for the workshops and in selecting the participants;
- To moderate the meetings and workshops, and prepare meeting and workshop reports, the latter in a non-technical language which can be communicated to all stakeholders.
- To help prevent and solve conflicts, promoting dialog and facilitating ad-hoc meetings between contentious groups.

5.3. Stakeholder analysis

List the potential interested groups and display them in a gradient from full conservation interest to strong economic development or short term interests.

Issues of representativeness, sampling and appropriate degrees of participation become important. A balance needs to be struck between:

- Involving as wide a range of participants as possible to forge a broad-based and durable consensus; and
- Overloading the facilitating and managerial capacities of the Park authorities.

Use existing structures: some involve traditional fora in which communities and local groups are able to express concerns and agree actions to support the Park. User groups have assumed responsibility from government and may play an important role in remote villages.

It appears rather wise to invite stakeholders (a group of maximum 10 persons, including a chairman) to take part in a brainstorming session, in which as many stakeholders and perspectives or angles linked to the selected stages are mentioned. Keep it rather general, name groups or organisations, not yet concrete names or people; every suggestion is written down without judgement.

The brainstorming session can be continued to identify relationships between stakeholders, their interests and factors that influence the process. Check the result though these questions: Did we check all stages process? Do we have the ones that benefit and the victims? Did we identify the people behind the umbrella organisations?

Once the stakeholders are identified, the long list can be ordered by identifying the degree of involvement of each actor at each stage. Communicate concerned stakeholders. Be clear with each stakeholder about his expected role and involvement in the process.

5.4. Information

Effective information should be provided to stakeholders to make them able to decide between different options. It is important that documents are sensible to local culture, avoiding the abuse of scientific or legal terminology.

Some of the techniques are:

Active listening

The objective of the interviews: "getting to know as much as possible on how the interviewed person thinks about an issue", seems easy. However, it appears hard for the interviewers not to enter into the discussion themselves. This can be prevented when the interviewers are aware of their own behaviour during these discussions. Some practical tips on listening skills can be taken, in order to get the best benefit from the interviews.

Interviews

People will often provide much more information in a one-on-one interview or discussion that they will in a public forum. Although interviewing everyone in a community is not possible, two or three days may allow enough time to talk with those representing all the key groups.

You may want to conduct a round of interviews near the beginning of the process to get information about the issues to anticipate, and one or two rounds at key junctures in the process.

The target of the interview is getting to know as much as possible on how the interviewed person thinks about the issue. However besides this it is a good way to make personal acquaintance with the concerned parties. The right line of questioning can help to achieve this:

- A number of very open key questions form the backbone of the conversation. The emphasis lies in the identification of problems and causes. Some questions could be the following- What kind of development do you see?; What kind of problems do you foresee?; In you opinion, what are the causes of these problems?; In your opinion, what is the desirable situation?
- The situation can arise that the questions are too open or that the lecturer has little to stimulate. In a situation like this it would be best to rephrase the question, by which however always the essence needs to be maintained.

Presentation meeting are a good way to communicate information. PHOTO: GoB

Presentations

One effective way to communicate with influential people in the community is to arrange a presentation meeting with civic groups, business associations, environmental groups, neighbourhood groups… If you will be making a number of presentations, it is often advisable to prepare a slide show, maps, or other visual aides. A visual presentation is not only more interesting to the audience, you can communicate more information in a shorter period of time.

Public Hearings:

These are rather formal meetings in which people present official statement of position and assertions of fact. Regrettably, public hearings are not particular effective for public participation. They do a good job of meeting legal requirement in that a formal record is prepared. But they do particularly poor job of bringing people together to resolve problems, because positions taken by speakers during hearings are often more rigid and extreme than those expressed in less formal meetings.

Community forum:

This is a public and open meeting in which the members of the community openly discuss about their needs. It can be used to discuss concrete sectorial problems, e.g., overexploitation of a particular fishery, but should only be used with care if facing new proposals, such as the establishment of an MPA. A multisectorial issue such as a MPA management should not be brought into an open and unstructured community forum if looking for concrete results.

5.5. Participation techniques

A format that might be effective for communicating information to the public may be ineffective at resolving issues or getting information back from the stakeholders.

Likes/dislikes, hopes/fears

This technique (Jones 2001) draws out key issues and demonstrates that stakeholders concerns and priorities are relevant. Ask a group of stakeholders to write down three things they like and dislike from the area, and hopes and fears they have related with the MPA, or with an specific management plan. Then the groups discuss the answers and some of them are transcript into a list and distributed.

Workshops:

It differs from other formats primarily in that it has stated purpose of completing a specific assignment. For example, a workshop might be designed to achieve agreement on the criteria that will be used to evaluate alternative sites for a major facility. Because they are very interactive, they do not work well with large groups. When the number of participants exceed 20 to 25 people, it is difficult to achieve the kind of interaction needed, although it is possible using some form of large groups /small groups format.

Workshop to create scenarios and a common vision about the future

The agreement for the protection and sustainable use of natural resources, and the willingness to collaborate, will only happen after a common vision for the future of the area has been developed. *Building a common vision is the single most important step in the whole participatory process*. In participation, particular interests must be considered and respected, but the aim is to identify a superior vision of common interest.

Creating a common vision is an exercise that consists in achieving a consensus on how all imagine the MPA area in the future, just by asking them simple questions and concreting the answers.

Scenario planning techniques can help to identify options for debate. A scenario is a picture of a possible future. The scenario-workshop is a two day meeting among 24-30 participants from all stakeholder groups. They are put together to exchange views and experiences and to discuss visions, obstacles and initiatives on the road towards sustainability of the MPA. In this process all participants have the role of the expert, because as local actors:

- they know the local possibilities and obstacles to change
- the changes depend on them, on their activity now and in the future.

For example you may establish groups of 6 people each and ask to each group ¿how would you like this area to be within 15-30 years from now? The different groups may consider the question from different points of view, e.g., ecologically, socially, economically, culturally. The same exercise can be done in a plenary, but then you need that each participant will get one card and write down just one or two considerations in each card. This gives everybody the same chance to reflect on the future and give their thoughts without needing to speak in public, which many people, even with good ideas, would not like to do. The whole exercise does not only contribute to create a positive and collaborative atmosphere, but will produce a positive vision for the future.

A good way to organise the discussion within the groups is, in summary, to ask each member to write down on a paper the question (one question) he/she would like to make. Then, each member will have 3-5 minutes to explain his reflection and the reasons for his/her question to the rest of the group. When all the members have done this, the group will choose one person to moderate the discussion, and will discuss over 20 minutes one single question that the group wants to be answered. This exercise allows for personal reflection, group discussion, and an agreement on one principal subject. Then, the moderator of each group will present its question to the plenary.

During the second day you may ask the groups: which are the main problems that do not allow this future vision to happen?. Here, you will have a whole set of problems perceived as root causes of unsustainability. Identify root problems which are common to most sectors, and focus thereafter in the less contentious issues within these problems. This identification and selection of issues can be done in the same workshop or meeting as the vision. Having identified the common problems, it is easy to propose common general objectives. A well developed workshop may take two days.

The most important outcome to be expected from the scenario-workshop perhaps is that many different people are involved in the formulation of goals and demands regarding the planning and development of the MPA future.

BOX 2 - Phases in the scenario workshop

1. Introduction and inspiration
Short presentation of the scenarios by the technical team or main stakeholders. Relation to the local situation by the local authorities, who present the current state and plans for the future.

2. Visionmaking in role groups
The participants develop their own visions on a sustainable MPA in 15 or 30 years. They do this by using the scenarios and other input as inspiration, point of criticism and frame of reference.

3. Debate on visions, plenary session
Presentation, clarification and discussion of the visions of the role groups. Main elements will be presented as point of departure for next day's work.

4. Theme groups: What has to be done?
The main task of the second day is to figure out, how the visions can be realised. The participants now are put into theme groups to develop ideas on "what has to be done" to realise the visions.

5. Selection and assessment of ideas
The ideas from the group work now are ranked and presented at a plenary meeting. This presentation also includes an assessment of the feasibility of the ideas.

6. Evaluation
The participants fill in an evaluation scheme on the outcomes and the working methods of the scenario-workshop.

7. Press meeting
Ideas and outcomes of the workshop are presented to local and regional authorities, the public and the press.

Source: Bilderbeek, R. & Andersen (1998)

Participative Workshops based on the Logical Framework

This is an intensive thematical forum, lasting from one to three days. It allows direct contact with interesting citizens, independently of their representativeness or organisations. It can be used to solve an important sectorial problem which has been identified in other more general meetings or workshops. Participants can include external technicians, either independent or from government or other associations, who will feed the debate with their sectorial knowledge and arguments. These workshops should not have more than 20-25 participants.

The usual situation is that the stakeholders might have a tendency to magnify problems, opposing the motivations and solutions proposed by "the other" in order to legitimise their own.

A card is written up by each participant. Soon the group has information about the main problems affecting the participants. Gradually, and following the general agreement, the cards can be set in a tree os causes and effects. Focus then on the main causes, and plan the first actions through the less contentious issues. PHOTO: A. López

During the conflicts, the parts seem to be more interested in that "the other" does not receive any benefits, than in achieving its own objectives. Thus, groups may play to "all or nothing", leading negotiations to collapse in where "everybody" has got "nothing".

Each participant is given one (maximum two) cards, in which they will take 5 or 10 minutes to write down the one (or two) main problems they consider in that particular sector. All in all, you will receive 25 or 50 problems, enough to start a discussion. These cards are gathered by the facilitator and shown one by one to the public; if a majority considers that the problem is real, the facilitator will pin the card on a board at the front of the room. You will soon notice that many problems are repeated, so the cards will be grouped in "clusters". The exercise is based in ordering the cards (problems) by cause-effect, building a "problem tree" in which everybody agrees.

The root problems which are common to most part of the sector are identified, allowing to focus in solving the root problems, and not the peripheral problems. Once the "tree of problems" is agreed (one session, or perhaps a full day), the next session focuses on the objectives needed to solve these problems. These main objectives, solving the root problems, should be the targets for your action plan.

Technicians can then work in a team to formulate an action plan or a project which would target the principal objectives agreed at the workshop. The formulation of such a project may follow the "Logical Framework" technique, which is widespread in cooperation agencies and within sociologists, and not a matter for this publication; the Logical Framework or any other project development technique is just the technical development of the main objectives. It is the main objectives, and not the details, what we need to be sure have been identified and agreed in a participatory workshop.

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ANNEX I - KEY PRINCIPLES FOR GUIDING PARTICIPATION

The following key principles are general recommendations for conducting a satisfactory participation process in an MPA:

- There must be a clear strategy for participation, agreed, and simply set out, as an integral part of the overall planning and decision-making process. When establishing it be aware that very extensive participation is neither possible nor necessarily desirable as it would be unefficient in time and resources and not necessarily more effective
- Adequate resources, skills and time need to be established, as effective participation tends to start slowly and requires early investment, it becomes more cost-effective with time.
- Promote participation process so all potential stakeholders know of its existence and how it is organized. All administrative levels should promote participative approach. Sometimes there are Catalysts for participation, e.g. NGOs and local authorities, to start participation and to link decisions that need to be taken centrally with those appropriate to more local levels
- Some initial research on marine traditional practices is recommended same as on existing and potential threats to resources, and existing or potential opportunities. Integrating the identification of opportunities for compatible development and regeneration opportunities promotes stakeholder participation
- Stakeholder analysis should be employed at an early stage of the process.
- Participation process should provide adequate opportunity for the active involvement of all stakeholders, direct and indirect. At the outset, many channels of communication can be tried out. Experiments can also be attempted with the size of management units. Working with different levels of agreement can also be very revealing.
- The process should be open and transparent, conducted in a fair and impartial manner on the basis of sharing information, data, and knowledge. Increasing trust and confidence between stakeholders and responsible authorities results in a greater commitment to achieve consensus.
- Management structures should be defined and adopted in the beginning of the process. Sometimes is recommended having two different organs of participation, one with executive responsibilities, the other for consultation and with an opened character.
- Assigning responsibilities early in the process helps generate partnership.
- Wherever possible, stakeholders should participate responsible in proceeding on behalf of their organizations and communities, working towards collective agreements and actions. Good leaders are essential.
- Facilitate relevant information for participation process. Ensure that documents are sensitive to stakeholders' culture, avoid using scientific terms and promote positive and constructive approach. These actions will show respect for the knowledge and aspirations of stakeholders and will minimise possible tensions.
- To maintain participation and commitment of stakeholders and responsible administration in the long term is necessary to see results on the ground.
- It must be made clear that sometimes decission making needs to be made under some degree of uncertainty, as there are gaps on scientific knowledge.
- Participants should commit themselves to a long term vision for the sustainability of the area, recognising their diversity of interests and working together in a process of shared learning. Creating a common vision is an exercise that consist in achieving a consensus of how all imagine the MPA in the future, just by asking them simple questions and concreting the answers. This exercise will contribute to create a positive and collaborative atmosphere.
- Win-win solutions are strategies that contribute to generate a positive atmosphere as they search for actions in which as much as possible stakeholders win something. At the outset, it is recommended using this kind of strategies because trying to resolve a big conflict at that tempo is almost an impossible challenge.
- It is recommended forming on participation MPA employees and representatives persons of the stakeholders.
- Promote and improve environmental voluntary groups in the MPA.
- Evaluate periodically, and through an indicator system the efficiency of participation process and how it contributes to achieve the MPA objectives.
- There is a diversity of participatory techniques that can be used in the overall process. In general terms, it is recommended to promote as many face-to-face meetings as possible, and from the beginning of the process.

ANNEX II

The following table identifies best practices and better techniques at each different level of participation ("Public participation in protected area management . Best practices". The Committee on National Parks and Protected Area Management from Australia).

Level of Participation	Best /Good Practices	Participation Techniques	Performance indicators
Inform/ Comply Agency informs community e.g. No dogs allowed in park Community is required to comply with agency requirement	• Be proactive • Apply a bottom up approach • Research the ways people get their information • Ensure people are aware of reasons for decisions • Establish feed-back loop to enable the community opportunity to have their say	• Public meetings • Presentations • Internet and mass media • Communication plans • Press releases • Standard operating procedures • Signs • Internet • Education campaigns • Printed brochures and newsletters	• Level of participation in agency education programs • Number of requests for information • Number of informed people (survey results) • Number of infringement notices issued • Number of complaints • Number of Ministerials • Number of internet hits
Consult/ Cooperate Agency seeks input into decision making process e.g. In developing a plan of management for a park, the community is encouraged to provide input into the planning process Community agrees to support decisions and becomes involved in programs and activities e.g. "Friends of the park" group agrees to undertake planting program on park in accordance with agency requirements	• Consultation takes time and resources – successful outcomes may be undermined where these are insufficient • Be clear about the basis for involvement • Value people's contributions • Promote the inclusion of a diverse range of people and interest groups • Use language that is inclusive of the community • Ensure community is fully aware of issues and what they are asked to do • Acknowledge stakeholder/community input/cooperation • Be very clear if there is no opportunity for people to have a say in the program	• Workshops • Stakeholder meetings • Surveys • Plans of Management • Letters to stakeholders • Advertisements in the media • Public displays • Internet	• Quality of submissions • Number of issues raised • Number of stakeholders reached • Diversity of stakeholder input • Level of customer/client satisfaction (measured through surveys/customer feedback) • Number of staff trained in consultation techniques (eg facilitation, conflict resolution) • Number of volunteer days and quality of conservation outcomes • Number of volunteers hours • Number of people attending community education programs
Collaborate Agency invites community to share in decision making process e.g. Nomination of new marine and terrestrial parks by the community Community has a formal role in decision making process **Partner** The agency and community (stakeholders) share responsibility for decision making e.g. Aboriginal owned land leased to Government for management as national park.	• Maintain integrity/honesty • Be open to new ideas • Respect cultural diversity • Identify areas of common interest • Don't make commitments that can't be kept • Provide opportunities for real involvement • Be clear about the powers and functions of advisory groups • Maintain dialogue - ensure that all issues are open to discussion • Provide legislative framework for participation • Ensure ongoing management of participation • Set clear outcomes/outputs	• Advisory groups • Task forces • Stakeholder feedback • Conservation partnerships with the community, landholders and industry • Joint management • Statutory Boards of Management	• Level and type of participation • Level of integration of regional planning decisions with agency management activities • Number of resolutions • Number of people nominating for advisory consultative groups. • Support for decisions • Number of partnership agreements • Quality of relationships • Number of jointly managed protected areas
Hand Over/ Self Directed Action The agency hands over control and decision making to the community. The agency may facilitate management by the community through the provision of resources and expertise. Community/stakeholder has autonomy in decision making and may seek agency management input. e.g. Landowner wishes to contribute important privately owned land to national reserve system.	• Establish mutual benefits, trust and support • Establish transparent process • Support projects that have good conservation outcomes	• Where government agencies sit on community boards • Provide advice and other resources that result in conservation outcomes • Indigenous Protected Areas • Voluntary Conservation Agreements • Review mechanisms	• Number of private conservation reserves and quality of conservation outcomes • Numbers of conservation agreements and quality of conservation outcomes • Number and quality of covenants • Area of private land added to the NRS

4. Promotion, planning and monitoring of visitors to Coastal Protected Areas

Alicia Portillo Navarro (EGMASA)

1. Context of visitor management for Protected Areas in the Mediterranean

The Mediterranean context and the coastal Protected Areas (PAs). Protected Areas make a contribution to sustainable development

The Mediterranean region is recognizable by its history and common culture, its geography, its ecological features and its shared closed sea. It allows us to appreciate the interaction of systems, nature and human beings.

The Analysis of the Situation in the Region (IUCN) has led to a clear diagnosis. The fact that the Mediterranean Sea is closed, and the high rate of urbanization and industrialization along its shores and watercourses, have long made it sensitive to profound environmental change.

Also, there are obvious major territorial and social disbalances; North Africa, the Middle East and the Balkans are the most disadvantaged regions. Moreover, the reduction of poverty over the long term and sustainable economic growth are at present being hampered by the ongoing degradation of the soil, the increasing scarcity of fresh water, the over-exploitation of coastal ecosystems and fishing resources, the loss of forestry cover and the disappearance of biological diversity at the level of genes, species and the ecosystem. The poor and poorish residents of the region are disproportionally affected by these bad environmental conditions, and are particularly vulnerable to the impacts resulting from environmental changes and natural disasters.

Environmental change can worsen poverty in that it endangers health, means of existence and measures of protection against natural disasters. Economic growth can create new constraints on the environment, for the demand for environmental resources increases and increasingly more products with harmful effects are derived from economic activity. But environmental resources are needed to encourage economic growth and reduce poverty, and growth itself creates the means and demand for a better environment.

Some states bordering on the Sea have noticed these facts, and have been thereby encouraged to take steps to work together in the field of protecting their values, their natural resources and their biodiversity. Thus, a host of marine and coastal Protected Areas appeared, at the instigation of the Protocol of the Barcelona Convention on Specially Protected Areas (1995), and the Natura 2000 network, and with backing of the Global Environmental Facility (GEF).

A series of conservation measures were introduced on the shores of the Mediterranean as a partial (at least) response to the growing urbanization of the coastal areas (table); in three countries, about 30% of the coastal strip enjoys some form of protection. According to the Plan Bleu, from 1985 to 1995 the surface area of protected coasts tripled, to cover almost 1,200,000 hectares.

Extent of protected coastal areas (ha) in 1995

Country	Surface area	Country	Surface area
Albania	3,550	Lebanon	500
Algeria	85,750	Libya	50,000
Bosnia	?	Malta	260
Cyprus	3,319	Monaco	51
Croatia	45,026	Morocco	51,050
Egypt	128,200	Slovenia	?
France	129,568	Spain	196,111
Gaza	?	Syria	?
Greece	33,695	Tunisia	20,770
Israel	3,094	Turkey	320,060
Italy	68,105	Yugoslavia	12,550

Source: Plan Bleu

Tourism and visitors to Protected Areas; growing demand. Tourism as a threat and an ally as regards conservation of biodiversity in the Mediterranean

The Mediterranean countries as a whole constitute the world's most touristic region; at present, almost 200 million international tourists go there (UNEP-Plan Bleu). We must add to the demographic growth of the residents of the Mediterranean coast those tourists who visit it every year. This human concentration in turn gives rise to consumption of land, consumption of natural resources and pollution, as well as the occupation of the territory by infrastructure, industry, services and ports.

At the same time there has been a change of demand over the past few decades concerning leisure for tourists. Currently, there is a trend towards a country tourism that is increasingly demanding as regards environmental quality. In this context, Protected Areas (hereafter referred to as PAs) hold a special place.

Mass tourism has destroyed landscapes, encouraged soil erosion, increased the discharge of rubbish at sea, led to the loss of many natural habitats, increased pressure on endangered species and made forests more vulnerable to fire. It has threatened water resources and often led to a decline in crops. The Mediterranean coastal areas that receive 30% of international tourist arrivals are already seriously harmed. (Lopez & Correas, 2003)

The Council of Europe has also noticed that the movements of tourists could have negative effects on the environment, both natural and cultural. From the 1970s on, studies or meetings warned of this danger and came up with solutions. In much of the work done by the Council

of Europe for the European heritage, the tourist issue as related to the environment was gradually mentioned and then dealt with in specific works, both in intergovernmental programmes and in the context of programmes that were specifically geared to central and eastern Europe, launched after 1991.

Developing a balanced, quality-based tourism is vital. Stress should be laid on the preventive development of the territory, rehabilitating sites, restoring monuments and diversifying the tourist offer.

Also, the demand for nature for recreational, educational and tourist ends has become one of the most dynamic aspects of change of use to have taken place in the Protected Areas, mainly in those which include among their objectives attention to visitors, as is the case for the National Parks and Natural Parks. Developing such activities as part of managing the PAs has recently become a challenge and is now one of the main tasks of the people in charge of these Areas. Among the tasks regarding the administration of the space, which formerly usually focused on environmental interpretation and education as clearer skills, recreational and tourist activities must now be included.

These changes have taken place insofar as the tourism sector has turned sports activities and knowledge of the natural environment into new products, respectful of these activities' need for diversification and change. In its turn, this conversion was made possible by the changes in demand and by the need to introduce new visitor management formulae for managing the PAs in a more participatory way.

There exists vast, extremely interesting potential for PA contribution to models of sustainable tourism. These territories can be used to introduce sustainable development policies that reconcile social, economic, political, cultural and ecological aspects. The PAs' environment can be considered not only in its physical aspect but also as a social, economic and cultural environment. The people living in the human establishments inside the PAs can be integrated, as well as those who are directly linked to these in the management, conservation and sustainable use of the protected space.

Thus, though tourism is likely to have a negative impact on PAs, particularly when these are not managed suitably, it can also bring great benefits. Tourism services often run counter to conservation aims and spoil natural landscapes. But if the management and planning of the PAs is done according to criteria of sustainability, tourism can be a positive force and bring advantages to the PAs and the local communities. Tourism can even justify setting up PAs in outlying regions and help the local economy and the traditional culture revive.

Defining the field of action: visitor management

The term visitor management to PAs is used here for the package of activities, service and equipment that the PA administration must provide with the aim of making visitors familiar with the natural and cultural values of the said place, in a orderly, safe way that guarantees the conservation and circulation of these values via information, environmental education and heritage interpretation. It includes visitor management, information and recreation, and environmental education and heritage interpretation. This, then, is the context of the topic that will

be dealt with from the angle of its application to coastal and maritime PAs in the Mediterranean region.

The design for visitor management in the PAs is based on:

• Heritage conservation

Given that this is the purpose of the PA where the heritage is integrated, visitor management is a tool for managing the PA

• Environmental education

Environmental education and awareness is one of the approaches that allows people to acquire the necessary knowledge to gradually change their behaviour and play a responsible, effective part in protecting the environment.

The PA's actions must help educate society, given that knowledge of something leads to making best use of it, and that this favourable opinion and social determination is vital for the conservation of PAs

• Sustainable tourism/ecotourism

Tourism satisfying the demands of tourists and host regions in the present, while protecting and optimizing future opportunities. It is envisaged that all the resources will be managed in a way that allows economic, social and aesthetic needs to be satisfied, while maintaining cultural integrity, the main ecological processes, biodiversity and life systems (WTO).

The demand for 'nature' is growing in the advanced societies. Visitors to a PA not only ask to see their basic food, accommodation and safety needs satisfied but also, even if this is not explicitly stated, want 'heritage', i.e. they want to get a pleasant, recreational experience of this heritage, whether it is natural or cultural.

The functions that visitor management must carry out are:

- Popularization; so that the PA's values become better known
- Information and guidance; so that visitors' safety, basic necessities, well-being and guidance needs are satisfied. Visitors must be aware of the possibilities the PA is offering. This aspect also includes the necessary signposting to guide visitors around the protected natural space
- Recreation; so that visitors can practice leisure-linked activities
- Heritage interpretation; communication strategy aiming at reaching a certain level of knowledge, appreciation and respect for the PA's values
- Environmental education; communication strategy aimed at specific groups in order to make people more aware
- Environmental education and specific popularization for local people living inside and around the PA
- Safety; in order to guarantee safety when activities are being practiced
- Support for tourist and ecotourist activities

2. Planning visitor Management in the Protected Areas in the context of Management plans

2.1. Managing PAs and visitors

The PAs' contribution to the conservation of the territory as a whole requires integrated planning. Protected areas designed as little islands for conservation have proved to be ineffective. Being able to guarantee that PAs act as useful tools for developing natural and cultural resources thus implies a challenge of great complexity: successfully integrating them into the planning for the territory as a whole.

Thus, tourist activity has to be integrated in the development of PAs as, in more concrete terms, the PA has to integrate visitor management.

We can mention Spain's experience as an example of PA policy in the Mediterranean countries of the European Union. For example, in the case of Spain, since the 1970s there has been a drive to plan PAs through management plans, particularly the PRUG (Master Plan for the Use and Management of Natural Protected Spaces), which appears explicitly in basic national law (Law 4/1989). This very Law contains an innovative planning instrument, confronted by the need to integrate natural resource planning within a large, functionally coherent territorial framework, the PORN (Natural Resource Development Plan).

PORNs should be applied, and have in certain exceptional cases been applied, to vast territories defined by natural resource criteria (hydrographic basins, islands, mountain systems and even regions). By means of these criteria, the need for, and the defining of, PAs are determined. But in practice they have almost only been applied to justify the declaring of PAs that have already been decided on. Further, there was a lack of political will to make sure they could hold their own against other land planning instruments for urban areas or water basins that were better established in the public administration. The lack of inter-administrative coordination was a serious problem, especially in coastal or marine areas where the spheres of many local, regional, national or international administrations converged; jointly carried out sector-based action would have solved many conflicts, using the existing tools.

The PORN allowa for a more concrete planning instrument (called PRUG) to set standards for use and management of PAs, with relatively homogeneous contents and structure. It includes:

- General space management directives helping to attain the objectives for which it has been declared
- Standards serving to regulate the activities that are being, or are likely to be, put into effect inside the space in question
- Directives developing the concrete aims of the space in question and which, if necessary, allow specific action programmes to be elaborated
- Technical and economic aid to offset the restrictions imposed

In a 'top down' planning system, a mechanism that guarantees coherence and optimizes human and material resources, there will be another, lower, level at which the concrete aspects of PA management are developed, as is the case for visitor management or ecotourism management.

2.2. Planning visitor Management

Visitor management is one of the main areas of PA action but in most PAs demand outruns planning. Planning must be based on certain key points:

- Fragility of APs' resources
- Coordination with the rest of the PA programming
- Quality attention to visitors, whether these are local people or people from outside
- Citizens' participation in the planning process
- Dovetailing with programming in the PA neighbourhood in the wider sense.

Planning may be based on two types of instrument:

- The visitor management plan analyses the original situation and makes a diagnosis of the key points on which the model and the suggested actions depend. The Plan defines the management model, formulae for managing activities and facilities, and directives that govern the activities programmes, respecting the zoning of the PA Management Plan and the carrying capacity.
- The Visitor Management Programme, like the prescribed activities, facilities and services project, includes a progress schedule, agents involved, necessary budgets, particular directives and application standards, plus a monitoring and assessment system, with concrete indicators for the various actions.

This programme may be divided up into as many programmes as there are spheres of action.

Elements that should be addressed in the PA visitor management plans (as per Spain's PA Action Plan):

1. Introduction

- Past history and justification. Definitions

2. Planning objectives

- General aims
- Particular aims. Objectives will be developed for visitors, resources and management of facilities

3. Diagnosis of original situation

- Legislative framework applicable to visitor management, administration and distribution by sphere
- Zone affected
- Diagnosis mapping
- Deciding on the resources available for visitor management
- Analysing visitor management supply
- Analysing demand
  - -Quantification
  - -Type of visitor
- Analysing agents involved and the web of funding mechanisms
- Making best use of carrying capacity and defining scenes for visitor management
- Detecting and anticipating impacts and associated corrective measures
- Zoning capacity according to activity and fragility of the environment
- Analysing elements on which things depend and key points of the planning model (agents involved, model of infrastructure management, transaction of services, services from outside the area)
- Directives of visitor management programmes

4. Design of visitor management planning. Programming and regulation of activities

- Reception programme
  - -Subprogramme for regulating activities
  - -Subprogramme for correcting and preventing impacts
- Environmental education programme
  - -Subprogramme of information and communication
    - Information: signposting, publications, use of images, promotion
    - Interpretation
  - -Subprogramme for training
- Safety programme
- Volunteer programme
- Degree of advance of programming. Funding forecast and schedule

5. Visitor management administration

- Formulae for provision of public services
- Elaboration of models for conditions of contract and formulae for provision of services
- Ways of communication for coordination and cooperation with other administrations

6. Assessment and follow-up of planning

The main aspects of these suggested contents that may interest PA managers appear below.

3. Diagnosis of original Situation

a) Reference framework and area affected

It is preferable to clearly define beforehand the legislative framework, administrative framework and distribution of spheres that will apply. It may also be a good idea to define the levels of areas of intervention (PA, immediate environment, regional environment).

b) Deciding what resources shall be offered to visitors

Inventory and establish the features of the centres of interest and the natural and cultural resources, and as well as the human resources, underlying what is being offered to visitors to the PA, especially as regards promotion and interpretation of the heritage and environmental education.

Example of an inventory of resources. Visitor Management Programme of the Grazalema Nature Park (Andalusia, Spain) 1999

- Interesting landscapes
- Interesting forestry (or coastal-marine) formations
- Interesting geomorphological elements
- Interesting historic/cultural elements
- Processes and interactions: karstic modelling, use of plants, traditional vegetable growing, urban process, socio-economic development, etc.

c) Analysis of supply

Diagnosis of what activities and equipment are on offer to visitors to the PA, taking into account their suitability and their contribution to the objectives.

Aspects suggested for analysis

- Infrastructure, especially access roads leading to the PA
- Signposting
- Equipment and services for visitors
- Recreational and tourist activities
- Other equipment and infrastructure in the PA's area of influence
- Visitor management infrastructure

d) Analysis of demand

For this the different characteristics of the visitors have to be quantified and established according to existing data, by establishing the number of visitors per stretch of time, their profile (where from, kind of group, level of study, etc.), distribution within the PA area, and activity. An analysis can also be made of potential visitor demand by extrapolating from data provided by other sectors (tourism, traffic, sport) or by other PAs with similar features.

It is also a good idea to grasp the expectations visitors have of a PA, the relative valorization of ecosystems, landscapes and elements, equipment and activities. To do this, surveys based on quests are used.

e) Analysis of social and economic factors on which the activities depend

This especially means identifying aspects of the socio-economic neighbourhood with significant influence for developing activities for visitors to PAs. For example, fisheries, the existence or absence of a strong tourist sector, the existence of sports clubs or school centres nearby and using the PA must be correctly assessed.

f) Analysis of factors in the environment on which the activity depends

It is necessary to understand the factors in the environment on which the visitors' activity depends, that are likely to restrict or strengthen tourist activity, and the fragility of the PA ecosystems confronted with the intensity of the visiting.

g) Making best use of carrying capacity

Lastly, an overall valuing should be done of both how suitable the geographical situation is for the activities intended for visitors to the various areas, and the side effects, in the context of the PA and of the Management Plan.

Thus the social and ecological carrying capacity of the various areas and resources of the PA can be defined, while taking into consideration the human and material resources available for managing them.

Management zones in Protected Areas

Defining areas for use by visitors to Protected Areas is part of an integral development process during which zones suited to each type of use are established. These management zones are defined according to their value for conservation, the type of activity to be developed and the intensity of use allowed. Visitor management must be incorporated right from the start, both when defining objectives and zones and when defining management activities. Generally speaking, the following types of zone can be made out.

ZONE	NATURAL VALUE	MAIN OBJECTIVE	INTENSITY OF PUBLIC USE	EXAMPLE OF FACILITY
Intangible	High	Protection	Nil	None
Primitive	High	Conservation	Very Low	Tracks
Recuperation	Average	Conservation	Low/Average	Tracks
Handling of resources	Average	Conservation	Low/average	Tracks
Extensive use	Average	Public use	High	Tracks, paths
Intensive use	Low	Public use	Very high	Camping areas
Special	Low	Building	Very high	Buildings

Tacon, A., Firmani, C. 2003. Guía Técnica de Senderos. CIPMA-FMAM project

4. Choice of Management model

Lastly, a decision must be taken on which model is best suited to visitor management development. Preferably, the model will provide for the participation of the various actors involved (public administrations, entrepreneurs, local people, etc.) in order to obtain the most efficient and realistic model possible. At this stage, the directives that must develop the various programmes may be decided on.

The three bases on which the visitor management model rests, and which will later enable the model to be correctly applied, are: services, facilities, and signposting.

The visitor management model must include:

- Directives for specific programmes
- Zoning of PAs for visitors' use (carrying capacity)

- Specific programmes (reception, environmental education, safety)
- Administration:
  - human and material resources
  - training
  - budget and funding
  - inter-administration cooperation
  - formulae for provision of services and quality standards
- Circulation
- Schedule and budget (according to planning model)
- Assessment and follow-up of the Plan

Specific programmes will be designed that correspond to the area's interesting aspects, grouping actions together in a consistent way to carry them out. Thus, programmes can vary between different areas, although we suggest that they take into account at least the aspects of reception to the place and information, and environmental education, including communications and visitor safety. It is important that these programmes regulate the PA's recreational activities.

According to the type of instrument being elaborated (plan or programme), an action schedule and accompanying budget can be projected, mentioning possible funding sources. However, it is important to state that the fact of including such planning implies a greater commitment and greater realism on the part of the administration elaborating it. Also, it may be interesting to carry out a programme phase by phase, so that the achieving of actions and costs is seen in detail for the first phase, whether the rest of the actions depend on this development or on later actions that the plan anticipates developing.

It is necessary to decide on staff needs for managing the chosen model, both for the administration of the place itself and for the staff of enterprises or other administrations that are participating; also on the training needed to carry out the required tasks. It is vital that direct communication with visitors be handled carefully, since (fortunately or unfortunately) the image of the PA and the attitude towards it depend to a great extent on this contact. One of the main shortcomings currently detected in the PAs that already manage visitors is that they have failed to define the profiles or training of PA guides or information providers.

Also, in order to strengthen this field of PA management, it is necessary to make an effort and record the necessary allocation of budgets, making use of all the funding models and mechanisms possible. It is essential in the Mediterranean coastal region to combine the efforts of tourism and the environment, since the former sector generally has more public and private funds than the latter. Other sectors should not be forgotten, but here we point out once again the importance of inter-administrative cooperation as the fundamental element in optimizing resources.

As regards public services for visitors, it is necessary to establish management models in a way that will aim at continuous quality improvement and, where necessary, boost PAs as destinations for environment-friendly tourism.

At present, a variety of formulae are used to supply visitors with public services. The following table offers a brief guide:

Summary of formulae for managing public services and equipment for visitors to PAs

- Permission for activities for users and enterprises
- Direct management by the administration
- Interested management with the administration sharing the profits from operating services rendered by individuals
- Administrative to private concession, with factors determining the operating and possibly payment of a deposit
- Conventions as part of a collaborative relationship
- Transfer of use from the administration to some other entity

In the selected model, the various management strategies available will be used to handle visitors in their activities and areas where these are carried on. Briefly, these strategies are:

- Restricting the number of visitors, size of visiting groups or office hours
- Dispersing visitors into less vulnerable areas
- Concentrating visitors in accessible, controlled places
- Protecting the place against impacts
- Carrying on activities in a way that causes the least possible impact
- Introducing educational measures to make sure visitors understand what behaviour is expected of them and why.

Finally, mention that it is necessary (though this aspect is frequently forgotten in PA administration actions) to circulate the planning that has been done and the visitor management model of the PA. This management is part of the integral management of the PA, and that, like other instruments, it must be able to count on social collaboration and participation. We must publicize the main conclusions and significant aspects appropriately both for the general public and for the people living in the neighbourhood of the PA.

5. Visitor Management programmes

Now let us address the most important aspects of visitor management without, as was indicated above, the naming or grouping of the programmes used being more a way of presenting them than a universal model.

a) Reception, information, recreation

The services and information must offer information and guidance intended to satisfy the visitors' need for safety, basic elements of their well-being, various services and facilities for visitors, and other further requests related to the natural area visited. This programme must also include the information needs of possible visitors, people who intend to go to a place and want to know what they will find there, how to go there, and how they can satisfy their on-the-spot requirements (meals, accommodation, other).

The recreation programme will facilitate the provision of free or organised activities, allowing visitors to spend their free time fairly actively and spontaneously, in contact with the natural environment.

Managing these functions mainly focuses on facilities.

- Usual Facilities for visitors
- Lodgings
- Recreational area
- Nature office
- Cycle touring track
- Visitors' centre
- Ecomuseum
- Botanical garden
- Raised hide
- Observatory
- Sylvan wildlife park
- Information point
- Shelter
- Footpath
- Area for free/organised camping

Among the facilities of a PA is the Visitors' Centre. It is the focus for promotion for visitors, based on an interpreting of the site's values, and handling visitor demand and the kinds of activity that are helpful when organising the visit. The Centre can also be a focus for educational programmes and activities about the PA environment and special programmes for people with special needs (the blind, the handicapped, etc.)

Footpaths are another important part of the facilities. As well as walking as a sport, the fact of providing interpretative paths in the PA, designed and fitted out to give visitors a chance to become familiar with those heritage values of the PA that led to its being declared as such, and to help visitor awareness, offers a fine opportunity for environmental education in its wider sense. We mean short footpaths that are easily accessible, easy or slightly difficult, going through particularly unusual places, intended for the general public, and specially directed towards heritage interpretation.

The PA's signposting is a key factor of the visit, since it provides guidance and basic information for visitors. It is very useful to create standards for PA or PA network signposting, plus a periodical plan for revising requirements, for maintenance and for repositioning.

The information and messages on the notices can be of three different kinds: purely informational, giving directions, or interpretive. Furthermore, when visitor behaviour standards are established, the messages will be dissuasive and constructive.
Priorities for signposting about the PA are the following:

- The PA: approach, entrance to the area
- Reception and information equipment: Visitors' Centre, Information Point, and Recreational Area: directions for location and entrance
- Footpaths and other facilities: location, entrance and continuity.

The most frequent recreational activities in PAs are the following:

- Walking
- Camping, usually forbidden except in certain spots
- Mountain biking
- Horse riding paths
- Four-wheel drive roads
- Picnics
- Bathing
- Water sports
- Snorkelling
- Specialist sports: diving with breathing equipment, climbing, paragliding, potholing.

These activities have varied effects and must therefore be regulated and ordered. For example, there are activities that require 'low ecological quality' (picnic areas) and that tolerate a relatively high concentration of users. These are places for this public that are safe, with easy access from main roads or means of transport, with signposting, parking areas, tables and benches. They can be dissuasive, tempting this type of user away from more fragile areas; at the same time, concentrating visitors enables them to be monitored and rubbish to be collected. It is also easier to design information, educational or interpretation campaigns for such a concentrated number of visitors.

Also, some activities (mainly specialist sports) are usually organised through associations and federations, thus allowing the PA administration to approach the group, and thus facilitates two-way communication for regulating activities.

b) Environmental education and communication

The aim of environmental education is to form a population that is aware and concerned about the environment and associated problems, a population with the knowledge, skills, inclination, motivation and sense of compromise enabling them to work as individuals and collectively to solve current problems, and prevent them recurring (UNESCO, Belgrade Conference, 1975).

Communication, in the context of PA management and environmental education, is part of a strategy to improve relations between the population and the PA, its values and its issues. One of the most important aspects is heritage interpretation, as a basic strategy of attention to visitors, enabling features of the PA's natural and cultural heritage to be presented in an attractive, evocative way via varied means and techniques, so that the public learn something and come to appreciate and respect the values of that heritage.

The promotion and organisation of environmental education activities must be elaborated with the public they are aimed at in mind. At the very least, there should be actions intended for groups of pupils of differing levels, i.e. formal environmental education in schools, and for other groups informal education. The two approaches target publics that have completely dissimilar aims, attitudes and freedom of behaviour.

The fact of envisaging different strategies for local people and for visitors from outside is also a good idea since their prior knowledge of and initial attitudes to the PA usually differ.

The educational and interpretive strategy must also analyse the interpretive potential of the various resources of the PA's heritage, the potential ability of these resources to represent a process and pass on a message to visitors. The communication with tourists enriches and rounds off their visits and can thus help us in our conservation effort.

Publications are a major back-up for the communication strategy. It is advisable to provide:

- sets of leaflets (informative and interpretive) on the PA
- booklets (informative) by the regional or national Nature Areas Network
- booklets (interpretive) about every track (for pedestrians, horses and bicycles) in the PA, thus making up a set with the various leaflets concerning the paths in the PA in question
- books with an educational approach for secondary school and college teachers.

This back-up material can, more easily than in other cases, benefit from financial support from other administrations and private bodies.

c) Safety

It is necessary, working hand in hand with existing civil defence bodies, to elaborate for PAs safety procedures that lay down basic standards for action and coordination in emergencies and natural disasters (fire, torrential rain, etc.). Given the specific nature of this aspect, with standards existing in almost every country, and the need for specialist professionals, a specific programme is usually established for visitor management. This programme may describe actions at a number of levels from the PAs as a united whole to others of a higher rank, for specific places or equipment.

Two levels must be contemplated to guarantee visitors' safety. The first level has a preventive character: establishing standards of conduct and recommendations for use of the facilities and the natural environment. The second is corrective or emergency: it acts though emergency and protective procedures.

At any time, visitors to a PA need to feel safe. To satisfy them, it is necessary to receive and guide visitors while supervising them through information and recommendations about the new situations they are facing, instilling confidence in them as to the professional means provided and warning them of dangers, or providing services and facilities that limit the risks.

To cover the above-mentioned needs it is necessary to prepare facilities and services according to a few minimum safety measures, and to train visitor management service providers so that they can handle any possible accidents.

Additionally, standards and recommendations should appear on all the facilities, with special stress laid on those points that concern high risks. Where necessary, one might even envisage restricting access to the area. Signposting is an essential tool for this task.

It is important to keep safety in mind when managing services intended for PA visitors through a third party. A special chapter on this subject must exist in the agreement or contract that has been established.

d) Participation and Voluntary work (Castro, 1998)

The social side must be integrated in PA management actions. Merely applying technical or legal measures is absolutely not enough, and often leads to undesired results. The visible, active participation of people representing society is needed. Incorporating strategies of community involvement and participation helps to provide an answer to our society's environmental issue.

The most common factors, for managers and citizens, that make social participation in environmental matters difficult, are usually the lack of specialist staff and material resources, the need to train managers and technicians in participatory strategies and social intervention, the marked diversity of the social sectors involved in the field of the environment, with often opposed interests that attempts should be made to reconcile, the role of certain social bodies that prevent community participation, the existence of prejudice among the people, and, in many cases, the managers' fear of participatory processes.

As our society's cultural and socio-economic development progresses, there are increasingly places for the community to voluntarily participate in preventing and solving its own problems. That is why management institutions and social bodies must confront the challenge of facilitating and boosting the active participation of individuals and groups. One of the tasks is changing the perception of the less active people, who are supposed to lack concrete knowledge about the problem of the environment and how to effectively participate, with additionally some doubts as to whether their actions can have an influence on others or a positive effect. Planning PA visitor management must establish actions to boost social participation and concrete steps to intervene on certain subjects or at certain decisive times.

One of the most significant participatory strategies for environment protection is promoting voluntary action. Environmental voluntary service means those initiatives that develop altruistically, freely and without any lucrative purpose from the direct tasks of environmental improvement and natural resource conservation. These activities, when put into effect in well-structured projects and supported by capable social bodies, can produce a positive social and environmental impact. One of the main fields of action for environmental voluntary work are the PAs.

Volunteers can have a triple effect:

- Directly improving the environment by their actions
- Adopting environment-friendly attitudes and behaviour
- Having a positive influence on people belonging to the environment.

The most frequent fields of voluntary activity in the PAs are:

- Conservation of ecosystems
- Restoring and maintaining elements of historical, artistic and ethnographical interest
- Cleaning up litter in areas designed for intensive recreation or in fragile places
- Watching and monitoring impact

- Keeping users informed and aware, building informative infrastructure, maintenance of facilities, etc.

As in any other programme, the first questions are strategic: are there sufficient trained human resources? Volunteers work altruistically and need to feel supported and supervised. It is therefore necessary to provide sufficient economic and material resources for the organisation, and that the social body accept the voluntary service aims, without the activity being seen as a one-off, or purely promotional, activity.

Three forms of voluntary work for the environment can be established:

- A network of volunteers: in PAs that have stable, well fitted-out environmental education and visitor management facilities, forms of personal volunteer participation can be launched
- Local environmental voluntary work projects: activities elaborated by local groups, often coming from social bodies in the neighbourhood. The institutions focus on back-up, funding and supervision for implementing the activity. The group participates in elaborating, carrying out and assessing the project. This model allows more comprehensive tasks to be developed over a fixed period
- Field of voluntary work: this means concrete, well-defined activities that are short-term (less than one month) and that a mixed-origin but coexisting group participates in. These fields can include training and games activities, with the risk that leisure activities will take precedence over less regular voluntary work.

6. Carrying capacity, limits of acceptable change and impact monitoring

6.1. Impacts on the natural environment and socio-economic impacts

Impacts caused by visitors to PAs are due as much to the infrastructure they use as to their own presence and concentration.

Here follows a summary of the main impacts on the natural and social environment resulting from the activities of visitors to PAs.

Impacts on the physical environment and landscape

- Direct occupation through infrastructures or activities
- Destruction of the upper organic layer. Deterioration of edaphic horizons and soil properties
- Compression of the soil
- Increase in erosion
- Change in the drainage network
- Disturbance of canals
- Drop in water quality (fresh or salt) because of the arrival of nutrients, sediment and pollutants
- Deterioration of aquatic communities
- Drop in the availability of fresh water
- Emissions of gas and increase of dust in the atmosphere due to vehicle traffic

- Risk of fire
- Loss of landscape's visual quality
- Loss of acoustic quality
- Deterioration of geomorphological dynamics

Impacts on vegetation

- Direct destruction of plants by trampling, friction from vehicles, being picked
- Lowering of growth and percentage of plant cover and its productive capacity
- Deterioration of age structures and plant formation
- Damage caused to trees, scars, roots being uncovered
- Changes in the plant communities. Abundance of species that are resistant to trampling, or nitrogen-loving plants. Introduction of exotic species
- Temporary or spatial displacement of habitats that are vital for a species
- Direct persecution and capture
- Disturbance that may affect successful reproduction
- Change in normal diet and behaviour. Toleration of human beings
- Change in population structure. Distribution in place and abundance
- Introduction of exotic species

Social and economic impacts

These aspects are usually harder for the administration of the place to assess and require major analytical ability to be able to measure the impact visitors to the area have on these factors, using the PA's skills. Further, impacts in this case are either positive or negative.

Some possible **positive effects** of tourist use of PAs might be:

- Creating local jobs
- Diversifying the local economy
- Stimulating the improvement of local services
- Generating funds for developing surrounding areas
- Improving understanding and communication between different cultures
- Bringing in funds for protected area programmes
- Motivating the development of infrastructure designed for the use of visitors from local communities and elsewhere

Some possible **negative effects** might be:

- Mediocre quality of the recreational experience due to:
  - too many visitors in specific sector
  - conflicts of interest and expectations of different groups of visitors
  - discontent of visitors, becoming uninterested in the place's PAs
- Impact on local communities
  - conflict of use
  - loss of tradition, customs, folklore and language by being devalued
  - accelerated change (food, production)

- deterioration of heritage resources
- contempt for local communities

6.2. Impact assessment

Impacts caused by visitors or tourism in PAs can be assessed for already existing uses or for potential uses that one wishes to assess. Naturally, the second type involves making hypotheses based on prior experience or experiences in similar places.

This assessment is based on the following stages (Benayas, 2002):

Features of the PA's tourist products and activities. Information on users, facilities, period of use, size of group, sociology if this can be established, form of provision of services, etc.
Approximate impact of activities on infrastructures, facilities and services provided. Once the PA's resources are known, they will be placed against the anticipated actions in order to assess the real and potential impacts of the latter, as a function of the PA areas.

Fields of impact assessment of recreational areas:

- Distribution of activities
- Level of use and quantification of users by activity
- Type of visitor
- Visitor demand
- Type of recreational area
- Basic tourist facilities and resources
- Area's physical and natural features
- Vulnerability/fragility of the various areas
- PA's accessibility
- Ease of penetration
- Centres of interest
- Valorization of activities in centres of interest
- Impacts on traditional activities and legislation
- Environmental impact assessment

Depending on the first approximation, variables acting as indicators will be defined and sampling methods and parameters chosen to collect quantitative results on damage caused by visitors

- Identification of impact correction measures to check, mitigate or repair impacts

6.3. Carrying capacity: concepts and methodology

The idea of carrying capacity is starting to be used mainly as regards fauna, especially the management of hunting, as the maximum number of animals a given area can support continuously without provoking a major deterioration of the basic resources which sustain it, mainly food. The idea is easy to apply, given that a direct relationship exists between the animal activity and the boundaries of the environment, which makes it easy to measure and restrict.

With growing tourist activity in the PAs, a need has arisen to set limits or establish criteria to order and manage visits to the PAs. We talk about recreational or tourist receptive capacity as the maximum quantity of users who can come to visit a place above which the enclave's environmental and recreational quality starts to decline irreversibly. The WTO's definition (1992) is that of "the upper limit of visits an area can support, while maintaining a high degree of visitor satisfaction and a weak impact on resources, with the physical, psychological and environmental variables involved". Another definition exists (McIntyre, 1993) that "measures the maximum level of visitor use and corresponding infrastructure that an area can support without negative effects being produced on resources, or without visitor satisfaction quality declining or without an adverse impact being felt by an area's society, economy or culture".

Tourist carrying capacity is a useful concept but one that is hard to apply in practice. The idea makes use of four elements or types of capacity, enabling us to establish overall receptive capacity:

- **Physical receptive capacity:** the number of visitors a given place can receive according to its physical characteristics (size, accessibility). This depends on the conditions of that place, its physical features (slopes/substratum, etc.) and the safety conditions that have been laid down for the visit. It will always be the greatest of the capacities
- **Service carrying capacity:** the capacity of the products and facilities created to provide services to visitors (recreational areas, visitors' centre, information point, guided visits, parking spots etc.)
- **Social and psychological carrying capacity:** the maximum number of visitors an area or a facility can receive while allowing each visitor to have a satisfactory experience. When a certain level of mass attendance is reached, users tend to see the recreational experience as negative. This capacity depends on the types of visitor (profile and behaviour) and recreational activity. It is hard to establish objective, effective standards for assessment. It is usually assessed through quests to visitors, on the quality of the visiting experience. This capacity can undergo major variations. It can in fact go from one hectare per lone camper to 100 sq. m. for a very crowded camping ground, or 20 sq. m. per person in the case of a scenic raised hide and 1 sq. m. per person on the ramp of the raised hide.
- **Ecological receptive capacity:** the number of visitors an enclave can support without the area's ecological balance being harmed, some impacts being accepted if they can be corrected or absorbed by the environment.
  It is vital to identify the aspects or resources that are subject to restrictive or critical impacts (erosion, species of fauna and flora, ecological processes) and establish a monitoring programme.

The tourist carrying capacity will anyway depend on the specific weight given to each of the elements that were assessed during the planning.

Given the purpose of the PAs, the sustainable conservation of natural resources, the key to managing visits lies in the ecological receptive capacity, i.e. being able to identify the moment at which the impacts start to be too serious, in fact irreversible.

To do this, and for people in charge of planning to be able to manage the areas in the best possible way, mention has been made over the past few years of a new concept, one that

refers to an Limit of Acceptable Change (LAC) that a given enclave can accept without that environment's capacity for natural regeneration being affected. To do this, we shall select the ecological variables that must be borne in mind, which will allow us to define a certain ecological capacity. The indices chosen will depend on the type of ecosystem or use anticipated for that area. The indicators used to define the LAC will not be the same for a recreational area (e.g. lost plant cover, compression of the soil or diversity of grass species) as for a restricted access reserve area (e.g. successful reproduction for an important species, the turtle).

6.3.1. Restricting the application of carrying capacity

The factors that restrict the efficacity of tourist carrying capacity as a key to visitor regulation in PAs are:

- Different ecosystems do not respond in the same way to the pressure of visitors
- Impacts caused by visitors to a PA are diverse, heterogeneous and often hard to measure
- There is no direct relationship between the number of visitors and the level of damage or the volume of impacts provoked. The level of impacts caused by visitors depends on a large range of variables
- Does not take into account the differing desires and requirements of the different visitors

The effect visitors have on an area depends greatly on:

- The visitors' attitudes and sociological features
- The length of the visit and how stationary it is
- Visitors' use of space
- PA heads' management ability
- How environmentally fragile the area is
- The ecosystems' response capacity

However, fixing a maximum number of visitors who can have access to a given place is only useful in certain cases, when PA managers have sizeable control over access to the PA, or over the visitors' behaviour, and when the ecological capacity indicators are relatively easy to measure and monitor. It can be applied to concrete areas within the PAs such as pathways, reserves or infrastructure.

The general conclusion is that when managing a PA that is subject to recreational pressure, the important thing is not deciding on the maximum number of visitors but planning how to handle these visitors, closely attuned to a tourist development strategy of a field that is wider than the PA itself. To do this, it is necessary to define the management aims desired and to carry out efficient monitoring of impacts considered critical.

6.3.2. Methodology for calculating recreational visitor carrying capacity

According to Manuel Cifuentes (1992)

This author mentions the fact that carrying capacity can neither be an aim in itself nor a solution to problems of the pressure of visitors to the PA. It is merely a tool that helps us plan and involves our making management decisions, these in their turn depending on social, economic and political conditions.

He also states that carrying capacity is relative and dynamic, given that it depends on variables that are estimates and are likely to change. The fact that the same circumstances for two visitors can be judged very distinctly (separate degree of satisfaction) is a clear example of this.

Since carrying capacity depends on its special characteristics it will be separately determined for each place the public visits (that place will be broken down in its turn for the calculation). Then overall carrying capacity will be established, though this is not just the simple sum of all the places together.

In some cases there are "critical conditioning or restricting elements" that alone determine a place's receptive capacity. A difficult passage on a pathway restricts access to other areas and thus becomes a critical limit for other visiting spots associated with it, without this depending on the receptive capacity of other enclaves.

Stages:

Analysis of policies on tourism and PA management

Identifying the lacks, potential and contradictions that may exist between the PAs' policies and tourism at national, regional and local level.

Analysis of PA's objectives

Analysing the suitability of the protection, and the handling class ascribed, bearing in mind permitted uses and visitors' use of places.

Analysis of the situation in the visiting areas

We start with the zoning of space related to visitor use, established by the Management Plan or done for this precise case. This zoning usually establishes permitted use intensity (zones of extensive and intensive use). The zones used by visitors are analysed to see if they suit the area management needs and the needs of the visitors themselves, as well as existing clashes.

Defining, strengthening and changing policies and decisions regarding handling class and zoning

Previously done analyses must enable a clear summary to be made of potential and of the (present and future) clashes that have been identified regarding recreational use and management. This summary will enable new decisions and policies to be suggested, or current policies and decisions to be strengthened and changed.

Identifying the factors/characteristics that can influence each place used by visitors

This means precisely determining the characteristics of each visiting spot since receptive capacity must be determined separately for each spot. The physical condition and supply of particular resources, as well as their fragility and vulnerability, must be defined.

Deciding on carrying capacity for each visiting spot

Three levels of carrying capacity are considered. Each of these three levels in the above order is a correction, or a restriction, of the level immediately preceding it.

Physical carrying capacity (PCC) is the maximum limit for visiting a place in a defined area in a given period of time. The general formula is: PCC = V/a x SA x T

V/a= visitors/area that is occupied
SA= surface area available for visits
T=time needed for the visit

For this, certain basic hypotheses are used:

- Usually, a person is considered to need one square metre to move freely
- Available surface area will be limited by physical features or factors and by the restrictions imposed by safety or fragility
- The time factor is a function of visiting hours and of the real time needed for the visit.

Real carrying capacity (RCC) is the limit on visiting after the PCC has been corrected according to the place's particular characteristics. The correction factors are obtained from physical, environmental, ecological, social and handling variables.

The general formula is: RCC = (CCF1-CF1) - …CFn

CF is the correction factor expressed as a percentage, closely linked to the specific characteristics and conditions of each place. To calculate CF, we use:

CF=ML/TM x 100
CF=correction factor
ML=magnitude limiting the variable
TM= total magnitude of the variable

For example, the annual hours of high temperature that prevents a normal visit can be a limiting element.

ML= very hot days x number of hours of extreme heat/day
CFT=ML/TM x 100, with TM being the number of hours available for visits per year.

Effective carrying capacity (ECC) is the maximum limit of visits that can be permitted, according to the capacity to order and handle them. The general formula is: ECC=RCC x MC/100

MC is the percentage of the PA administration's minimum handling capacity.

It is not easy to measure this capacity since a host of factors intervene (legal support, real skills, facilities, staff allocation, staff training, funding, etc.).

6.3.3. Methodology for the Limits of Acceptable Change (LAC)

The Limit of Acceptable Change is a process that determines the natural and social conditions that are acceptable in the Protected Area. Starting from these conditions, a set of PA handling actions is defined so that the conditions which had before this been acceptable in that place can prevail and be maintained.

Stages:

a) Identifying the problem

Managers and citizens will work together to define which aspects of the PA require most attention, what are the existing managing aspects or problems and those which must be solved, what one is hoping to protect, and on which systems or species one is claiming to limit change or impacts.

b) Defining the recreational levels that can be provided for the public

On the basis of the nature area's characteristics, possible recreational levels assigned to separate zones are defined, zoning the intensity of the recreational use.

c) Choice of indicators

These denote the PA's and the various identified areas' natural and social state.

d) Inventorying resources inherent in an area and existing social conditions

On the basis of the preceding indicators, a list of existing resources is obtained. Included therein will be the infrastructure, natural resources and social conditions.

e) Assigning to each zone a level or a condition regarding natural resources and social conditions (acceptable condition)

Thus, parameters will be established stating just how far modifications or changes to a zone are acceptable. This is the very heart of LAC, since only a certain degree of change will be permitted and gradual, continuous deterioration of the acceptable conditions will not.

f) Identifying management alternatives and alternative recreational levels for each zone

Possible recreational uses are identified for each zone according to the recreational experience one wishes to provide for visitors (b) and the acceptable condition for the zone (e).

g) Identifying management actions for each alternative suggested

Here one must analyse what each alternative implies: ease of putting into effect, cost/profit relationship, necessary infrastructure, available budget, etc. This analysis will determine the feasibility of each alternative.

h) Assessing and choosing the recreational model

Lastly, the chosen alternative for each zone, and the action programme to put it into effect, will be decided on.

i) Carrying out actions and monitoring conditions

After choosing the model, the anticipated actions will be carried out and a programme will be established to monitor conditions in the PA and its zones. This programme is established on the basis of indicators (point c) and a comparison of results on the basis of the conditions laid down (point e). If necessary, stages (g) and (i) must be followed through.

One of the biggest difficulties in this method lies in the choice of indicators. These must be useful for applying LAC. The qualities required in a good indicator are that it must be:

- quantifiable
- sure; it must be able to be measured precisely and with the least possible margin of error
- economical; easy and cheap to get and process information
- significant; reflecting the condition of the PA in question
- ongoing; reflecting changes within an area, especially as regards recreational activity
- sensitive; registering the spoiling of resources and acting as a preventive system
- efficacious; not only reflecting its own conditions but others too
- responsive; explaining the reasons for on-the-spot change and being able to identify factors that influence the indicator.

Example of indicators in an assessment study on carrying capacity for paths (Criteria for Visitor Management Development and Management of the Torcal de Antequera Site (Regional Ministry of the Environment-Autonomous Government of Andalusia)

Physical capacity:

- length
- width (every 6-8 m)
- services and facilities (rubbish bins, fountains…)
- type of path (establish class of stretch according to width)
- real rest areas (in the shade of trees, accumulation of bins, trampling)
- secondary paths

Ecological capacity:

- colouring of rocks (impact)
- excessive, confusing signposting
- graffiti
- disturbance of wildlife
- bin
- acoustic impact
- erosion, bare (plantless) ground
- compression (direct measurement with measurement at reference points)

Social capacity:

- survey of visitor perception (too many people, environmental deterioration, cleaning up, signposting and information, identification of the layout, safety). Also preferences (rocks and their shapes, landscape and nature) and negative reactions (lack of cleanliness, signposting, behaviour of other visitors)
- observed behaviour (stopping in front of a notice at the starting point, suitability of shoes and clothing, shouting, eating lunch, standing in queues).

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5. Monitoring in Marine Protected Areas.
Basic concepts and importance

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1. Introduction

Protected areas must be managed, and management should be monitored to ensure the achievement of the conservation objectives. "If you can measure it, you can manage it". The results of monitoring allow to know in which direction we are moving, and will feed the management decisions, and the regular revision of the Management Plans.

Management Plans should provide for surveillance of use and changes in order:

- To determine the condition of the managed ecosystem and its resources, for scientific research purposes,
- To know the extent to which users adhere to the provisions of management, and
- To assist in the evaluation of management and the eventual correction of management programmes and tools.

Ideally, monitoring should be a regular activity and begin with the implementation of the Management Plan. Any important measure on the management of natural resources should be accompanied by monitoring of the responses of the ecosystem and the social sector to such measures. The contrary is a loss of a great opportunity for research, learning, improving management and involving local people in the aims of the protected area.

Monitoring in the broad sense refers to repeated measurements taken at the same site, on the same subject, over a specified period of time (Nobel & Norton, 1991). Monitoring must rely on data series of quantifiable indicators. The list of possible indicators to monitor is long, so each area should select the set of indicators that are significant to their objectives, management and evaluation. Two or three indicators should respond to each of the MPA objectives. Indicators should, as possible, be synthetic, reliable, comparable, and easily obtained.

Finally, monitoring results could be distributed to all participants and stakeholders, and even displayed in offices or in public media in order to inform about the trends and needs of the protection of the marine resources. A monitoring system should not only ask ¿what to monitor? (indicators) but ¿Who? could also participate in the monitoring activities. Participatory monitoring is a tool to promote sharing responsibility with other institutions and stakeholders, and to keep coherence and coordination for a long-term objective (the conservation of the Park). To this end, collaboration with local Universities and NGOs should be fostered.

Fishermen and tourist sector services could also contribute with indicators related to their own activities.

2. Why Monitoring?

MPA have had a short but intense history as Protected Areas have spread, in the mid XX Century, from land to the sea. The management of MPA, beyond legal provisions, is still an emerging issue, with many MPAs still in the "paper park" group, but with rapid increase in expertise around the Mediterranean.

The challenge now is monitoring MPAs. Kelleher *et al.* (1995) in their assessment of management effectiveness of worldwide MPAs found that 925 out of 1,303 (71%) had no available management effectiveness information. Protected areas must be managed, and management should be monitored to ensure the achievement of the conservation objectives (Fig. 1).

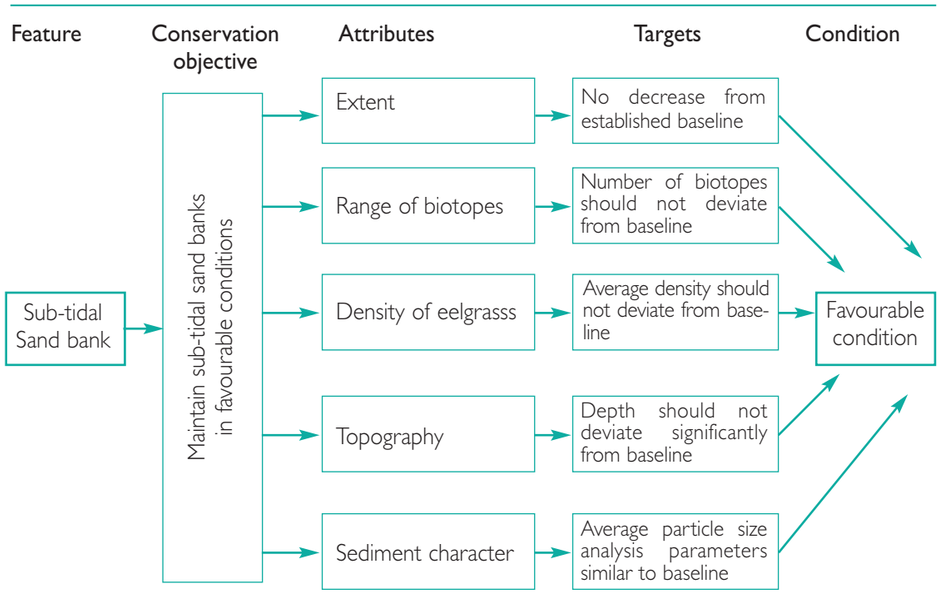


Fig. 1. UK approach to setting a conservation objective for a marine area feature (after Davey, et al., 2001)

As stated in Baker (2000) "Monitoring in MPAs is conducted to investigate patterns of activity by user groups, to monitor impact of activities, and to assess the effectiveness of the managements aims, such as maintenance of habitat quality, species replenishment, and biodiversity conservation. The results of monitoring are used to assess the effectiveness of the MPA, and to predict the likely impact of changes of the management and use of that MPA. Monitoring results can therefore have significant political, socio-economic, scientific and other repercussions".

Monitoring will also allow us to know the extent to which users adhere to the provisions of management, and to assist in the eventual correction of management programmes and tools. The monitoring results will help us know in which direction we are moving, inform the management scheme and allow for effective revision of the management measures.

The importance of monitoring has led to the inclusion of specific articles in the protected areas legislation, both at national and international level, being now a mandatory requirement (see box).

Barcelona Convention, Protocol on Biodiversity

Art. 3 (General obligations) .5: "*The Parties shall monitor the component of biological diversity referred to in paragraph 3 of this article and shall identify processes and categories of activities of activities which have or are likely to have a significant adverse impact on the conservation and sustainable use of biological diversity, and monitor their effects*".

Annex I-D8: the Parties agree: "*To be included in the SPAMI List, an area will have to be endowed with a monitoring programme. This programme should include the identification and monitoring of a certain number of significant parameters for the area in question, in order to allow the assessment of the state and evolution of the area, as well as the effectiveness and protection and management measures implemented, so that they may be adapted if need be*".

Habitats Directive 92/43/EEC

States that: "*A programme of monitoring will be undertaken at each site, to monitor the conditions of conservation features of the site and to assess the effectiveness of management measures undertaken*". There is a requirement under Article 17 to report on the conservation status of habitats and species which SPA aim to conserve.

Finally, monitoring is not just a tool for managers to control changes or a legal requirement. Monitoring data is one of the ways in which managers can present results to authorities, stakeholders or the general public, but also to self-evaluate their work.

3. PLANNING A MONITORING PROGRAMME

3.1. What do we have to monitor?

(and see "Indicators, in Section 4.)

Monitoring must rely on data series of quantifiable indicators. The list of possible indicators to monitor is long, so each area should select the set of indicators that are significant to their objectives, management and evaluation. Two or three indicators should respond to each of the MPA objectives. These indicators usually deal with biotic communities, species, and ecological processes, together with public use and management parameters.

Species & Habitats. Being MPA essentially proposed to protect natural assets, monitoring of evolution and changes in taxa and communities must be a priority. These may include demo-

MPAs have a key role in the protection of habitat.
PHOTO: Universidad de Alicante

graphic items (population, density, growing, breeding, mortality), inter-specific relationships (predation, competence) or habitat characteristics (surface, diversity, stability). In any case, it is important to bear in mind that the monitoring programme should work towards distinguishing changes that are brought about by human activities from natural changes, as the former can be modified by management. An introduction to biological monitoring in Mediterranean MPA can be consulted in Boero *et al.* (1999). Examples are presented in the next Section 4.

Public use. Management rules usually allow limited or controlled public use, establishing limits either for numbers (quotas) or for areas (zoning). Controlling these limitations is useful not only to test the accomplishment of regulations, but also to check if they are well designed or suitable to present demands. Some examples of monitoring visitors flows are reviewed by Arnberger *et al.* (2002). A case is presented in the next Section 4.

Response of visitors and stakeholders. One of the best ways to check if the usual objectives of recreation or sustainable development are achieved, is simply asking the users about their opinion on the MPA regulation and implementation. Certainly a poor, weak or bad response to management should be taken into account for long-term protection. Besides, consulting the social sectors is the first step to involve local people in the aims of the protected area. The next Section in this Chapter presents a couple of cases on this topic, and Chapter 3. in this book also goes into more detail. Jones et al. (2001) present several techniques to approach managers to stakeholders.

Socio-economics. A good way to measure the impact of a MPA in local communities is through changes in earnings, investment or demographic trends. Certainly, proving the positive contribution of MPA to local welfare is an excellent argument to defend sustainable development generated by the protection regime. An excellent review of evidence of benefits of marine reserves is offered by Ward et al. (2001)

Items to be monitored can be defined by conservation objectives, managers point of view or scientific advisors, but also the stakeholders proposals must be taken into account. The desirable involvement of local communities in MPA requires not only giving them data and figures that sometimes are difficult to understand or unimportant to them (f. e. average density of fishes), but also to provide understandable answers to questions and indicators relevant to them (f. e. fish catch). As it is stated by Badalamenti et al. (2000): "*While many might regard the conservation of nature as the fundamental starting point, neglecting socio cultural and socio-economic aspects can lead to only a partial comprehension of MPAs as a whole and often to a poor local consensus, if not hostility*".

3.2. When do we have to monitor?

Monitoring should be a continuous task, but it is important to establish certain steps and a schedule that allows to give results in a regular way:

Prior to management: Gathering information on the status of the area prior to the establishment of the protection regime is essential to test the effectiveness of the management. It is very useful to have a "zero point" or baseline, i.e.: knowing the situation of the area before the protection measures were implemented. This baseline, even being obvious, is often forgotten because the initial efforts in MPA are concentrated in solving conflicts and building up the infrastructure and financial support to the area, delaying to a later stage the start of monitoring.

Continuously: Some data should be obtained on a day by day basis, essentially by the staff in the area. A daily routine to registering data (number of visitors, weather) and to record infrequent or unpredictable events (rain, storms, appearance of rare migrant species, unexpected visitors). Continuous trace of such daily events can only be achieved by field staff, and has to be incorporated into routine surveillance of the MPA.

Yearly: Many natural events happen in an annual basis, often concentrated in a predictable season (e.g. breeding). On the other hand, variables recorded continuously (e.g. visitors) need the establishment of a sample unit for comparisons. The need of showing results in a regular way, recommends to have a minimum amount of indicators than can be reported annually. To this end, it is advisable to have a monitoring scheme that allows the preparation of an annual management report.

Episodically: some environmental changes can be better checked through a several year basis. This is especially suitable in relation to communities that show slow evolution (Posidonia meadows, coralligenous, terrestrial plan assemblages). In this sense, the Habitats Directive of the EU require Members States to report on the status of the habitat and species of Community interest every six year.

Oportunistic: when it is feasible!!!!

3.3. Who should be in charge of monitoring?

Monitoring must be considered just another duty of the MPA manager, being one of the best ways to check if the objectives of the declaration are being achieved. While considering monitoring just as an extra input, dependent of other external interests, finances and aims, will leave the manager with weak arguments and subject to controversy.

Monitoring is a duty of the MPA, but the question is, who will carry it out?

MPA staff. Even in the least developed MPA, we can count with wardens or field personnel, with a medium to large commitment with the area. It is essential to train them so they may record daily information as proposed in point 4. The field staff should assume the registration of field data in order to reduce costs and ensure long-term monitoring.

Researchers: Usually their role is crucial in the first stage of the MPA, specially to determine the baseline "zero-point" of the area. It is important to gradually include them in the monitoring program, basically to carry out specialised research requiring advanced devices and techniques and, in a further stage, to set up protocols of field data that may be recorded by MPA

field staff. The involvement of local researchers (f. e. close universities) is desirable not just to reduce costs, but also to create new partners for the MPA. The relationship can be mutually beneficial, as MPA can offer excellent experimental conditions for research and education along with logistic opportunities.

Experts: External advice is frequently useful, as it can contribute with expertise, external experiences and new approaches. Nevertheless, outsiders may not be sensible to local concerns, situations and limitations, and usually have a low commitment with the area.

Stakeholders: The ideal is to achieve conservation through local co-operation. With this objective, an effort must be made to integrate stakeholders in the monitoring system, not only because it can be very cost-effective, but also because a participatory approach requires people being able to influence and share control over the decisions which affect them. If monitoring can suggest changes in the management scheme, data offered by stakeholders can be a good point for agreement. In this sense tour-operators and fishermen can offer the best available data on income, number of visitors or fish catches.

Volunteers: Birders, divers, and environmental awareness associations can be of great help for routine non specialized monitoring, building up also a sense of stewardship to the MPA (Baker, 2000).

3.4. Costs

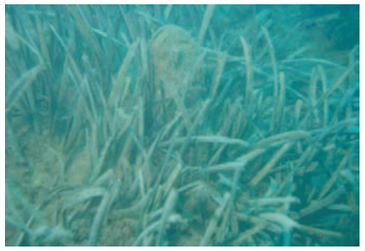
Certainly, this is one of the central questions. In a recent study about MPA income requirements, made through questionnaires among managers worldwide, Research & Monitoring ranked the third position (after "Staff" and "Enforcement"), adding up a 17% of total income (Gravestock, 2002).

It is not easy to establish a minimum expenditure; anyway, probably it will always exceed normal budget. An easy way to reduce costs is internalizing monitoring with the support provided by field and technical staff. Another way is offering training opportunities for students from local universities. Finally, the economic benefits generated in many MPA (Dixon, 1993), mostly associated with recreational activities inside the area, should partly return funds to monitor if the sustainability of the recreational activity concerned.

In any case, the best way to get financial support for monitoring is proving its utility for management and communication.

4. Type of indicators

Primarily, monitoring must rely on data series of countable indicators. The list of possible indicators to monitor is long, and each area should select the set of indicators that are significant to their objectives, management and evaluation. Indicators should, as possible, be synthetic, reliable, comparable, and easily obtained. Indicators usually deal with biotic communities, species, and ecological processes, together with public use and management parameters. A practical overview on MPA indicators is offered by Pomeroy et al.(2004).



The density and coverage of *Posidonia oceánica* and the population density and shell damage of *Pinna nobilis*, both protected through the Barcelona Convention, are very good conservation indicators. PHOTO: Universidad de Alicante

A nearby sewage effluent causes growth of *Ulva* weed over the fragile *Dendropoma* vermetid reef. Ulva coverage is a good "negative" indicator and easy to sample. PHOTO: A. López

Caulerpa taxifolia and other aggressive alien species in the Mediterranean should be monitored. PHOTO: GoB

4.1. Natural indicators

Habitat and species of conservation interest: One of the requirements and objectives of any MPA is the protection of habitat or species of conservation concern. Usually they are identified in the declaration of the protected area, so it is easy to choose them as indicators. A practical guide to identify Mediterranean relevant species and habitats is the Reference List of Habitats and Species of the Barcelona Convention.

Habitat and species of local concern: A MPA may hold species or communities than do not deserve international recognition, but are of local interest. This can be the case of rare species at a national level, with ethnological values, and specially those with an economic value.

Sensitive species or habitats: Specially those sensitive to regulated activities, or directly related with human induced impacts.

In the recent years a good deal of literature is becoming available with the aim to establish comparable methods for biological monitoring in MPA, and a great effort has been made to standardise techniques allowing comparisons among different MPA (see bibliographic references in the Annex). An interesting initiative ("Sistema Afrodite") has been launched by the Italian Central Institute for Applied Marine Research (ICRAM), to establish common criteria and methods for monitoring a Mediterranean MPA network.

4.2. Public use indicators

Frequentation: Items to be monitored are number of visitors, origin, sex, age and means of arrival. Information must also be recorded about distribution in time and space inside the MPA.

Activities: Multiple zone MPA require accounting thef type of activities developed by visitors, specially considering the risk of impact of any of them.

Attitudes: As important as numbers and descriptions is gathering information from users about why they arrive to the MPA, what expectations they had and their general opinion of the visit.

This information allows to establish the carrying capacity of visitors in the most accurate way.

4.3. Social indicators

Approval: Stakeholders opinion, specially from locals, is essential to the long term functioning of the MPA, a basic mean for participation and the first step to build up social capital.

Economics: Development of activities in and around the MPA is important not only to unveil its actual social impact, but also to foreseen trends. Stakeholders income, investment, employment and coastal development are magnitudes that can be comparable with other possible alternatives of the protected area.

Press: Media releases are excellent indicators of wider public opinion, acceptance and conflicts.

5. Methods and comparisons

The ability of a monitoring programme to meet its aims successfully hinges on the selection of an appropriate method or technique. Some of the desirable characteristics of these methods are (Davies, 2001):

The technique used is sensitive enough (accurate & precise) to record information to compare with the target value.

- The method is unlikely to damage the species or environment.
- The method can be used for the entire duration of the programme.
- The method conforms the requirements of common standard monitoring, so data can be compared with those from other areas.
- The method is cost-effective and can be afforded with the annual budget.

In Fig. 2 a decision tree for the selection of monitoring methods is suggested.

Another item to be taken into account is the possibility to establish comparison within the MPA, both in time and space to determine changes and trends. Essentially three types of approaches can be performed:

- *BACI (Before-After Control-Impact)*: checking changes after a management decision has been adopted.
- *SFT (Space For Time)*: comparing at the same time different areas suffering different levels of use or impact.
- *LTS (Long Term Studies)*: comparing the same site in the long term to detect trends.

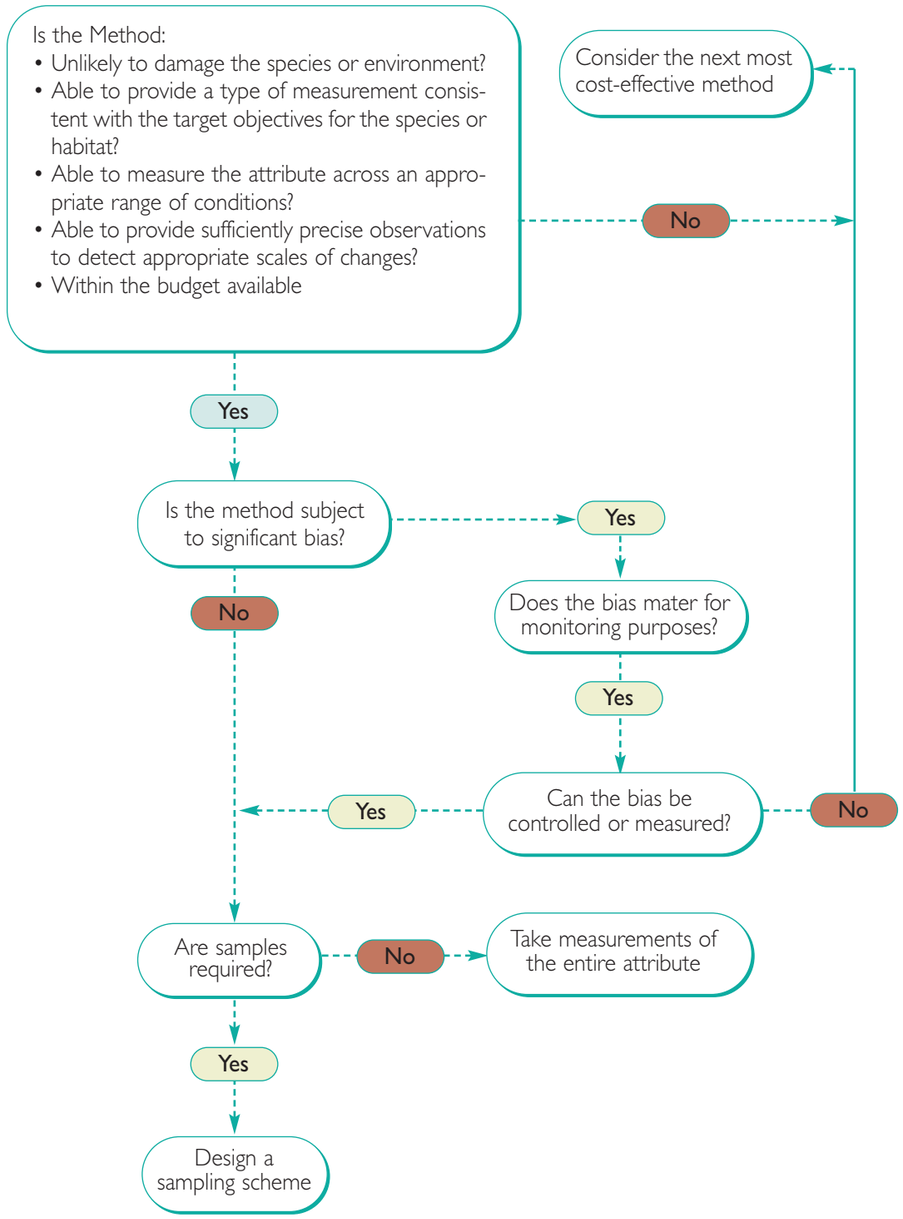


Fig. 2. Suggested decision tree for the selection of methods (ECOSCOPE, 2000)

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6. Monitoring in Marine Protected Areas.
MANAGEMENT OF MONITORING DATA

Juan Jiménez Pérez (PANGEA Consultores S.L.)

Introduction to the case studies

To date, most marine protected areas have not yet developed a monitoring programme. There seems to be a good data base for the terrestrial areas in most protected areas but again, the knowledge of changes in the marine environments is relatively poor.

Monitoring needs a data base of all relevant information as a basis for all phases of planning and management and subsequent implementation and monitoring. On the vast amount of information available (scattered throughout numerous governmental agencies, institutions, NGOs, and private industries) the relevant parts must be assembled into a useful database.

Here we are presenting a number of practical experiences in monitoring Mediterranean MPAs, on the main basic issues: Posidonia meadows, pollution, indicator species such as fan mussel (Pinna nibilis), fishes, seabirds, cetaceans; and indicators on common human uses such as visitors flow, impact from visitors, and participation of stakeholders.

CASE STUDY 1.: Monitoring Posidonia meadows

Why?: Because of its ecological role, *Posidonia oceanica* meadows are one of the most important marine habitats in the Mediterranean, and generally considered as a conservation priority. Posidonia is very sensitive to human induced alterations, either fishing (trawling), nautical recreation (anchoring), pollution or coastal development.

What to monitor?: Posidonia meadows conforms a clearly defined habitat, so the first data to register are mapping and an estimation of coverage. The conservation status of certain samples can be determined both estimating the density or the percentage of coverage.

Methods:

Posidonia mapping: Small Posidonia patches can be mapped through scuba diving or line video record transects, bearing in mind the exact positioning of samples. Large meadows are quickly registered with side scan sonar devices, positioning sonographs through a GPS and navigation software.

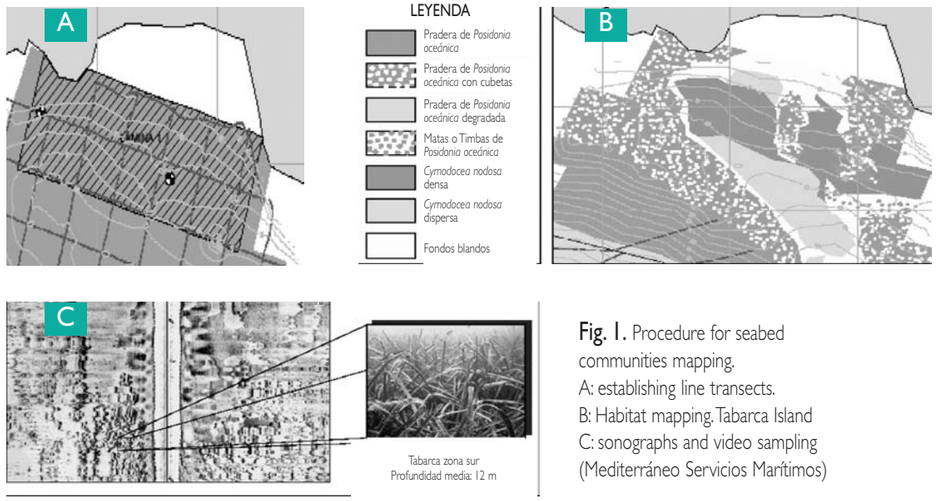


Fig. 1. Procedure for seabed communities mapping.
A: establishing line transects.
B: Habitat mapping. Tabarca Island
C: sonographs and video sampling (Mediterráneo Servicios Marítimos)

Density and coverage: The conservation status of a Posidonia patch must be assessed with data on the density and coverage of leaves. Density is expressed as the number of leaves/m2, and coverage as percentage of seabed covered by Posidonia. Both measurements can be obtained by scuba diving, and developed through sampling design, considering stratified sampling for different depths. A conservation index can be obtained combing both measurements.

Fig. 2. Sampling Posidonia beds for density and coverage (Institut d'Ecología Litoral, Alicante)

Advantages:

Underwater habitat mapping (as terrestrial) is an essential tool for management, as it is a basic requirement for zoning. Quantitative data on Posidonia allows continuous monitoring designed to detect changes. A great deal of literature is available for methodology and comparisons among different areas in the Mediterranean.

Disadvantages:

Robust and comparable results require a good sampling design.

Costs:

Methods are expensive, either in man-effort (scuba diving) or in budget (side scan sonar) when considering large areas. Estimated cost for 100 has of Posidonia meadow assessment using both methods is c.a. 500 €.

Expertise:

Requires well trained divers, expensive gear and specific software for GIS treatment of sonographs.

Example: Effects of recreational mooring in Posidonia.

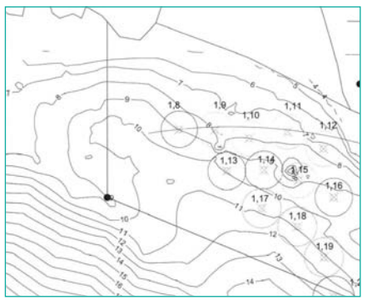
Situation: In a proposed marine protected area in Altea (Alicante, Spain), sport boats selected protected holds for anchoring. In an area of c. 2000 has, 25% of the boats concentrated in a hold of < 10 ha, over seabed covered by Posidonia. A study was designed to detect anchor damage and propose solutions.

Analysis: The study area was compared with a nearby one with few boats. Side scan sonar was used to map underwater communities. Divers measured density and coverage of Posidonia. The number of anchoring boats was determined and all the information was introduced in a GIS.

Table 1.- Density and coverage of Posidonia at different depths in two close coastal sites: Cala La Mina (high) and Bahía Altea (low) density of anchoring. (Institut d'Ecología Litoral, Alicante).

Depth	0-5 m		5-10 m	
	Density (leaves/m2)	Coverage(%)	Density (leaves/m2)	Coverage (%)
Cala La Mina	342	58	196	47
Bahía Altea	470	85	410	80

Posidonia beds were severely affected by anchors in the high frequentation site, specially in selected depths (> 5 m). At these sites, the percentage of dead Posidonia raised up to 17% over total seabed.



Results: A mooring plan has been designed to facilitate mooring away from Posidonia beds, establishing low impact mooring devices (Harmony) over Posidonia.

Fig. 3. Mooring Plan in Tabarca Island MR, designed to prevent anchor damage to Posidonia (TRAGSA, Spain)

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CASE STUDY 2.: Monitoring pollution through bioindicators

Why?: Pollution (from land based sources) is one of the main threats to biodiversity in coastal waters. Many species of conservation concern have been selected because they are sensible to pollution (Fig. 4).

What to monitor?: Presence, density or population dynamics of sensible species (reduced with pollution). Species diversity (decreasing) or changes in communities.

Methods:

Sensible species: It is advisable to choose those of conservation concern and which are easy to find and identify.

Populations: can be measured in terms of n. of individuals, % coverage or % of presence.

Communities: Changes in communities can be measured either using diversity indexes or species composition.

Advantages:

Bioindicators offer several advantages over physic-chemical parameters in order to detect pollution impact. Water analyses reflect only limited and variable data, in time and space, on pollutants, and do not offer a prompt approach to direct influence on biological communities. Indicator species measure the effects of pollution.

Disadvantages:

The use of bioindicators in marine waters is less developed than in freshwaters (i.e. macroinvertebrates), and not yet standardized for many species or communities. Identification of species requires certain taxonomic expertise.

Example: Impact of sewage on littoral benthic algae.

Situation: In the above mentioned area, there are two urban sewage effluent points. Because of their sensitivity to pollution and ease of sampling, littoral benthic macroalgae in shallow waters (supralitoral, midlitoral an upper infralitoral) were selected in order to estimate the impact on the rocky shore nearby and to establish a permanent system to detect changes in coastal habitats.

Analysis: Samples of macroalgae were obtained from points located at different distances of the sewage effluents, plus in a control sample in nearby unpolluted waters. Percentage of cover for each species in every sample was calculated and samples were grouped through statistical analysis (Cluster and PCA).

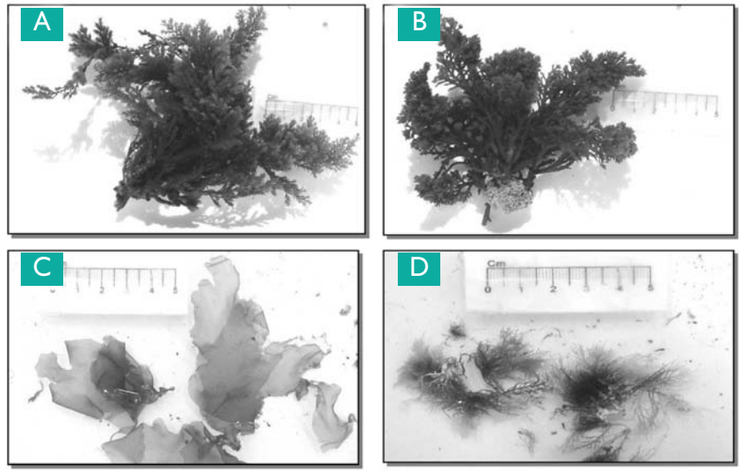

Fig. 4. Indicator coastal macroalgae. Clean waters: A = Cystoseira amentacea; B = Cystosiera compressa; Polluted waters: C = Ulva rigida; D = Pterocladia capillacea. (Institut d'Ecología Litoral, Alicante, Spain).

Results: A map of coastal pollution impact was depicted. Changes in communities were detected in c. 75% of coastal length. Pollution was detected up to 5 km of sewage effluent (Fig. 5).

Fig. 5. A: Principal Components Analysis (PCA) of macroalgae samples and quality, V1 & V2 sewage effluents; IB: Control station. B: Impact map of pollution through macroalgae indicators. (Institut d'Ecología Litoral, Alicante).

CASE STUDY 3: Monitoring fan mussel (*Pinna nobilis*) populations

Why?: Fun mussel is a giant bivalve mollusc endemic of the Mediterranean, being protected by both the EU Habitat Directive and the Barcelona Convention. It is sensitive to pollution, extraction by illegal divers, trawling, anchoring (shell breakage) and, in general to Posidonia meadows degradation.

What: Population density and structure. Shell damage.

Methods:

Density: Indirect sampling (aquaplane or underwater video) tend to underestimate population when living in dense Posidonia beds. Direct sampling by scuba-diving can be calculated both by linear transects and by sample areas, usually by two divers working together. Circle sampling (10 m radium) has proved to detect higher numbers than line transects (Table 2).

Table 2.: N. of fan mussels counted by two methods in Moraira Bay (Alicante, Spain). García-Carrascosa & García-March, 2003 (Valencia Univ. unpub.)

Method	N. ind. 0-5 m depth	N. ind. 5-10 m depth	N. ind. 10-15 m depth
3 x 200 m^2 line transects (600 m^2)	2	8	16
3 x 200 m^2 line circles (600 m^2)	2	13	22

Population structure: It can be inferred from shell-size distribution. It is not possible to measure directly the total size because part of the shell is buried and fixed to the substrate. Nevertheless, the total length can be deduced from measurements of the emerged part of the shell (García-March et al 2002. Fig 6)

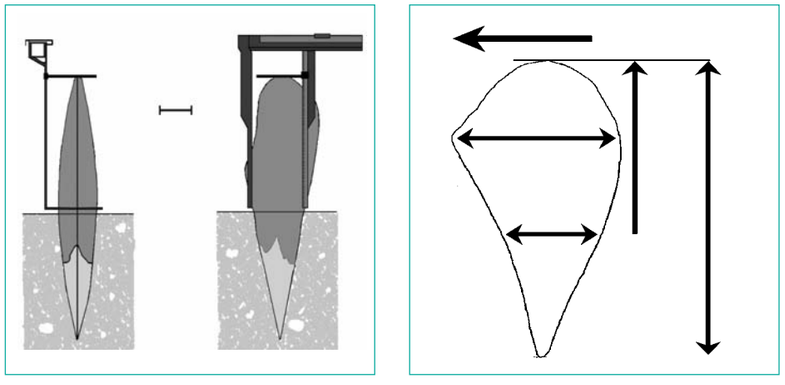

Fig. 6. Measurements of living fan mussels to determinate total dimensions of the shell. (University of Valencia, Spain)

Advantages:

It is one of the easier to identify protected invertebrate and has a high potential public profile. The species is sesile and sample plots can be fixed and exactly positioned (GIS).

Disadvantages:

Needs scuba diving and a high number of stratified (depths and habitats) samples to obtain comparable figures.

Costs:

A team of two scuba divers can study 3-5 samples/day (10 m radium), including density, population estimates (shell size) and description of the habitat (mainly Posidonia, see case study 1).

Expertise:

Basic scuba diving and measurements devices. The calculation of global densities and of the population structure should require certain statistical calculations.

Example: Densities of fan mussel in a proposed MPA.

Situation: Serra Gelada coast (Alicante, Spain) has been proposed as a Natura 2000 site due to its marine life. Exact delimitation of MPA is controversial and needs to be sustained by protected species distribution.

Analysis: The fan mussel was selected among other indicators to detect high quality (priority) sites for protection. 96 10 m-radium samples were randomly selected, in 6-30 m depths, each one positioned with GPS.

Results: Densities in the area range from 0 to 4 mussels/100 m2. High density sites were proposed to be included in the proposed MPA. (Fig.7)

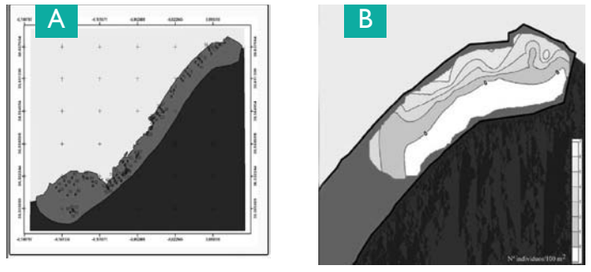

Fig. 7. Study of fan mussel density in Bendidorm and Altea Bays (Alicante). A: Sample design; B: Mussel density in one area. (University of Alicante).

References:

García-March, J. R., García-Carrascosa, A.M. & Peña, A.L. 2002. I*n situ measurements of Pinna nobilis shells for age and growth studies: a new device*. Marine Ecology, 23 (3): 207-217.

CASE STUDY 4: Monitoring fishes in protected areas

Why?: Coastal fishes are excellent MPA bioindicators, as they join both conservation and economic concern. As one of the common rules in MPA regulations is fishing prohibition, or either reduction of the fishing effort, fishes and their population are key items to check enforcement.

What: It is advisable to concentrate studies on species of conservation concern or with high economic (either professional or recreational) value (Fig. 8). Another factor to be taken into account in small to medium MPA is the extent of movements of the selected species, selecting those species with small ranges or even territorial species better than those with pelagic habits or wide ranges exceeding the limits of the MPA. Density, size and fecundity are items to be monitored. Monitoring the effect of the establishment of the MPA outside its limits (spillover) is an excellent argument to defend fishing prohibitions inside.

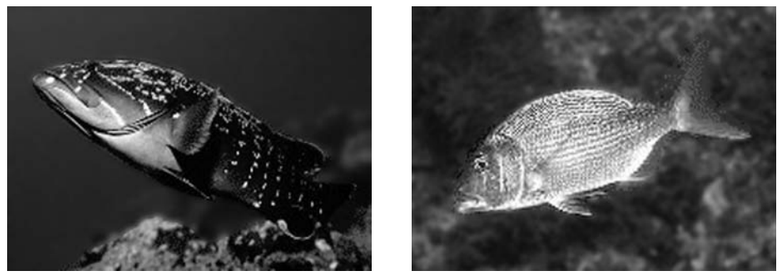

Fig. 8. Species of economic value to be monitored in MPA. Epinephelus marginatus and Diplodus sp. (Institut d'Ecología Litoral).

Methods:

Underwater line transects for visual census is a standardized method worldwide, with long data series in the Mediterranean (Harmelin-Vivien et al., 1985). Fisheries research techniques, like Catch per Effort Unit (CPUE) can offer understandable figures for fishermen to prove spillover effects outside the borders of the protected area (Bennet & Attwood, 1993).

Advantages:

Increase in number, size or fish biomass is one of the best arguments to prove that a MPA is working. For those species with economic value, proving higher catches (either inside or outside) will support protection measures.

Disadvantages:

Fish populations are sensible to factors not related with the protection regime, specially those from outside the protected area. Migration, recruitment outside the area or changes in species composition (increase of predators, decrease in fitobenthos, cascade effect) can produce shifts in species dynamics.

Costs:

Scuba diving line transects doesn't require any special gear. The main cost is man effort to obtain enough samples and comparable data. Using fisheries data (CPEU) is a simple and economic approach to detect population increase.

Expertise:

It requires short training.

Example: Monitoring fish in a MPA.

Situation: Medes Island MPA (Girona, Spain) was established in 1990, with total fishing prohibition in the core area. A monitoring system for fish populations, specially grouper (*E. marginatus*) and other species vulnerable to fishing, has been developed.

Analysis: Fish counts along different line transects, inside and outside the protected area.

Results: A general increase in fish numbers was proved, but with important interannual changes. At the same time, a general decrease in average size/age suggested density increase was due partly to recruitment. In is important to note that species like the grouper change sex with age, and medium ages represent higher females proportion (reproduction potential).

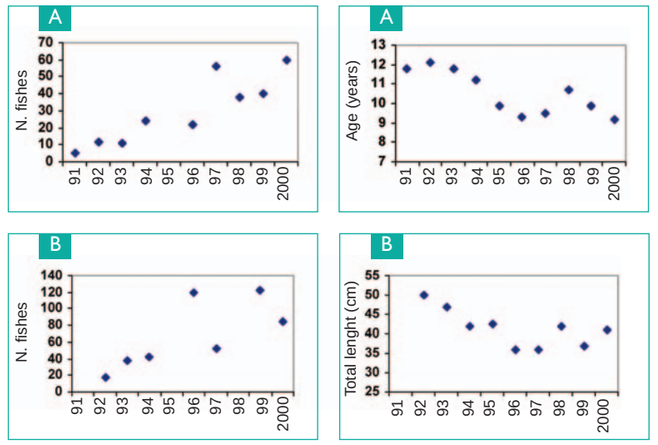

Fig. 9. Time evolution of some fishes in Medes Islands MR (Girona, Spain).
A: Grouper (E. marginatus);
B: Sea-bass (D. labrax).
From García-Rubies et al. (2000)

References:

Bennet, B.A. & Attwood, C.G. 1991. *Evidence for recovery of a surf-zone fish assemblage following the establishment of a marine reserve on the southern coast of South Africa*. Marine Ecology Progress Series, 75: 173-181.

García-Rubies, A., Hereu, B. & Zabala, M. 2000. *Seguiment de la població de meros (Epinephelus marginatus) i d'altres espècies vulnerables de les Illes Medes i la Costa veïna parcialmente protegida (1991-2000)*. Universitat de Barcelona. Departament de Medi Ambient. Generalitat de Catalunya.

Harmelin-Vivien, M.L., Harmelin, J.G., Chauvet, C., Duval, C., Galzin, R., Lejeune, P., Barnabé, G., Blanc, F., Chevalier, R., Cucler, j. & Laserre, G. 1985. *Evaluation visuelle des peuplements et populations des poissons: methodes et problemes*. Rev. Ecol. (Terre Vie), 40: 467-539.

CASE STUDY 5: Monitoring Seabirds

Why?: some Mediterranean seabirds are of conservation concern due to their unfavourable conservation status. Seabird colony site selection is very much influenced and sensitive to disturbance from public use. Seabird population dynamics, specially recruitment, is very sensitive to changes in prey populations. Seabirds are sensitive to fishing activities in long-range. Seabirds are popular and easy to study.

What: Essentially breeding populations (n. breeding pairs Fig. 10) and breeding success (ratio fledglings/pairs). Other parameters such as clutch-size or egg volume can give us an idea of the physical conditions (normally related with food supply) than may help us understand external circumstances.

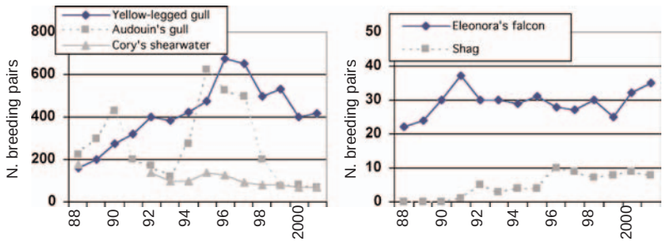

Fig. 10. Evolution of populations (breeding pairs) in some seabirds species in Columbretes Island MR (Castellón, Spain).

Methods:

Breeding population: the relatively small size of Mediterranean seabird colonies usually allows direct count of nests or breeding birds. Big colonies or those partly located in inaccessible places will require sampling. Nocturnal or hidden species should require special techniques (like tape-recorded calls for storm petrels) or indirect counts (counting rafts of shearwaters at dusk before entering the colony).

Clutch size: just counting the number of eggs in a sample of nests. Sample size should be related to colony size.

Breeding success: It is expressed as number of fledglings/breeding pairs. For solitary or loosely colonial species (shags, Eleonora's falcon, shearwaters) it is advisable to determine the number of fledglings from a sample of nests. In dense colonial species, such as gulls, several methods have been proposed, as it is very difficult to follow up the breeding process of each couple of birds. Some techniques employed have been capture-recapture and fencing group of nest until chicks fledge. These methods are quite time-consuming and may not detect early fledgling mortality (usually high). An easy alternative is raft counting, taking into account that juvenile birds tend to get together on the water close to their colonies (Table 3).

Table 3.- Breeding success (fledglings/breeding pair) in a colony of Yellow-legged gull in Bernidorm island (Alicante, Spain). (A. Martínez. IMEDEA, unpub.)

Method	2000	2001	2003
Capture-recapture	0,4	0,5	
Nest fencing			0,7
Raft censuses	0,4	0,4	0,7

Advantages:

Seabirds are easy to identify and usually well known by field staff. Field work doesn't require any special gear. Seabirds are popular and have a high conservation profile.

Disadvantages:

Interpretation of population trends requires long data series (> 10 years). Seabird population dynamics can be related to far away events (feeding grounds, wintering areas).

Costs:

Low. The main expense is man effort.

Expertise:

Can be developed by field staff with short training and following standardized protocols. Interpretation of population trends can require the collaboration of researchers to develop models.

Example: Effects of food supply in breeding performance in two Audouin's gull colonies.

Situation: Audouin's gull in the Ebro Delta and Columbretes Islands (E. Spain) proved to use trawlers discards during the breeding season. In 1991 a trawling moratorium was enforced in the surrounding areas during in this season, and monitoring breeding parameters were intensified to calculate the impact on breeding results.

Analysis: Comparing clutch-size and breeding success among years before and after a trawling moratorium.

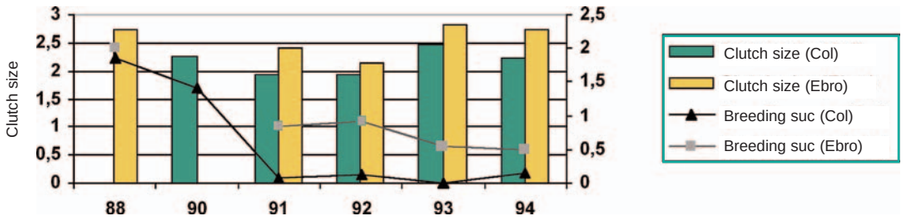

Fig.11. Clutch size (eggs/nest) and breeding success (fledglings/pairs) in two Audouin's gull colonies after a trawling moratorium was enforced (1991) (Jiménez & Martínez-Villalta, 1998).

Results: The trawling moratoria slightly affected clutch-size only when the closed season coincided with the laying period (April-May): with trawlers: 2,25 – 2,39 eggs/nest; without trawlers: 2,10 – 2,18 eggs/nest) but it significantly reduced breeding success, specially in Columbretes, where few other resources were available. Thereafter, the colony at Columbretes became threatened with extinction.

References:

Jiménez, J. & Martínez-Vilalta, A. 1998. *The effects of fishing moratorium on clutch size and breeding success in two Audouin's gull (Larus audouinii) colonies in Eastern Spain. En: Ecologie des oiseaux marines et gestion intégrée du littoral en Méditerranée*. Les Amis des Oiseaux – MEDMARAVIS. Tunis. Pp: 234-248.

CASE STUDY 6: Monitoring cetaceans

Monitoring cetaceans

Why?: As it is the case of sea turtles, marine mammals are among the highest priority species for conservation in the Mediterranean, and MPA justify their importance through the presence of these species. They are included on the lists of protected species of the Barcelona Convention and enjoy high public recognition.

What: For these generally uncommon species, each sighting must be registered, with data on species and number of individuals. Total numbers or densities are difficult and expensive to obtain. Stranded animals offer the opportunity of close examination, being important to identify the species and possible cause of dead/injury in order to build up long term databases that can show trends in the populations or conflicts.

Methods:

Direct monitoring of cetacean populations and distribution can be done through aerial surveys or boat cruising, over large areas, taking into account that most species are migratory (or at least long ranging) and repeated surveys along time should be necessary to detect seasonal changes (Fig. 12).

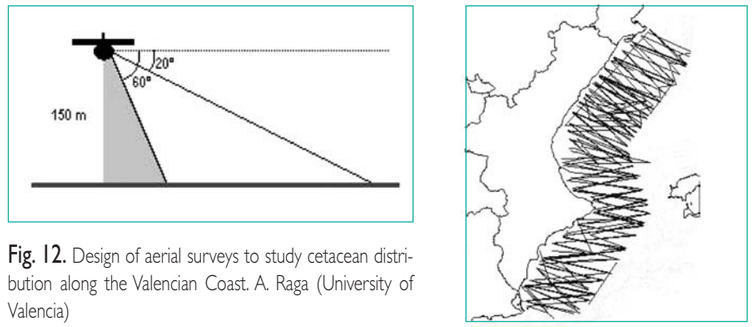

Fig. 12. Design of aerial surveys to study cetacean distribution along the Valencian Coast. A. Raga (University of Valencia)

For resident species (as certain coastal populations of bottlenose dolphin), repeated cruises and photo identification can help determine the total population (Fig. 13).

Oportunistic observations (sightings during routine surveillance, strandings) can offer useful information if long term data series are available (Fig. 14).

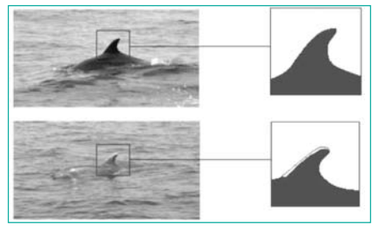

Fig. 13. Two bottlenose dolphins from Alicante (Spain) identified by dorsal fin marks (University of Valencia).

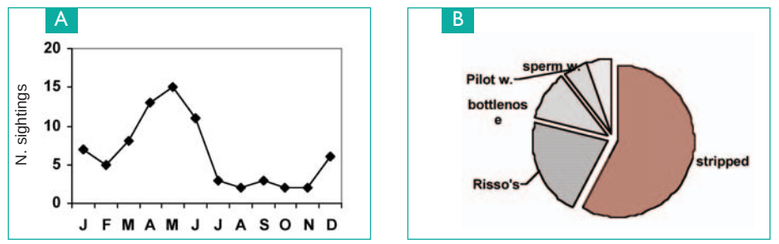

Fig. 14. Oportunistic observations of cetaceans. A : Bottlenose dolphins sightings in Columbretes Island MR 1990-97 (Jiménez & Martínez, 1998). B: Cetaceans stranded at the Valencian coast in 2002.

Advantages:

Figures on cetaceans are highly demanded by public and politicians and can attract international concern about the area. Local strandings are easy to register and databases can be incorporated and compared with regional ones (RAC/SPA database). Resident populations (bottlenose) can be monitored with MPA infrastructure (boats, warden).

Disadvantages:

Open sea transects are expensive either by plane or boat. The transect design (n. of miles, separation between lines, stratified sampling) and interpretation of data should require certain scientific advice to obtain significant results. Trends in pelagic species can only be interpreted in a regional scale.

Costs:

Transects are expensive (300-400 €/100 miles), and due to usual low density of cetaceans, require very long transects to get comparable data.

Expertise:

Control of stranded animals needs a good coverage of the area and a protocol for quick information transmission. Discovering the main causes of dead/injury should need some easily available veterinary help.

Example: Aerial census to detect areas of cetacean concentration off the Valencian coast.

Situation: In order to discover important areas for cetaceans to be proposed as SPAMI (Barcelona Convention), the Spanish Ministry of Environment contracted the University of Valencia to carry out aerial census between the Valencian coast and the Balearic islands (see Fig. 12).

Analysis: The coast was surveyed 6 times in different seasons between 1999 and 2003, over fixed transects with a minimum of 5.000 nautical miles each time. Every cetacean group was counted and identified (Fig. 15) and introduced into a GIS.

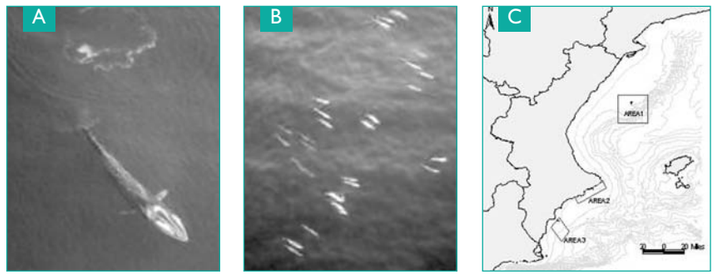

Fig. 15. Aerial photographs of: A. Fin whale; B: Stripped dolphins; C: Proposed areas for cetacean conservation (University of Valencia).

Results: More than 200 sightings of cetaceans belonging to 6 species were registered, adding up to 1.500 individuals. Maximum densities observed reached 10 individuals/100 nm. Three areas of special cetacean conservation interest were identified (Fig. 15). Areas should be large enough (> 50.000 has) to hold significant number of cetaceans.

References:

Jiménez, J. y Martínez, J. 1998. *Observaciones de delfín mular (Tursiops truncatus) en la Reserva Marina de las Islas Columbretes*. Boll. Soc. Hist. Nat. Balears, 41: 119-124.

CASE STUDY 7: Monitoring visitors flow

Why?: MPA usually control visitors either through limiting numbers (quotas) or by restricting access to some areas (zoning). In order to check the accomplishment of regulations, but also if management provisions suit the demand and unveil foreseeable conflicts, it is essential to keep an updated database on visitors flow.

What to monitor?: It depends on the regulation provisions, but basically: number of visitors, distribution through the year, distribution through the area, and maximum arrival.

Methods:

It is desirable to have total figures, counting all the visitors arriving to the MPA. In case of big areas, or when surveillance is not guaranteed over all of the time, a sampling method can be developed taking into account that the sample size is representative and can be repeated in order to make comparisons.

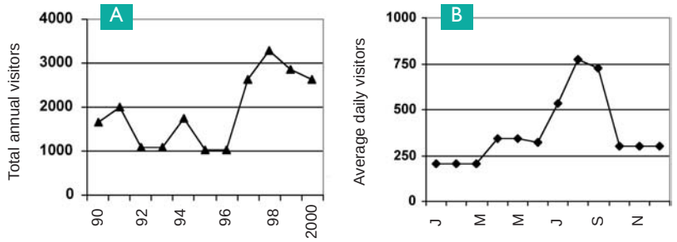

Fig. 16. Visitors statistics in two protected islands. A: Total year visitors landing in Columbretes Islands Marine Reserve . B: Mean monthly daily visitors landing in Benidorm island (2000)

Advantages:

Visitors flow is a key data to evaluate public use and trends in MPA. Counting visitors is an easy task.

Disadvantages:

Trends in visitors arrival need to be considered in a wider perspective as it may be influenced by external conditions (ease of transportation, complementary offers, prices).

Costs:

Low. The main cost is man effort.

Expertise:

Can be developed by field staff with short training and following standardised protocols of data register.

Example: Are daily quotas well suited to actual visitors demand in Columbretes Island MR?

Situation: Tourist enterprises asked for daily quota raising in Columbretes MR arguing that the existing quotas prevent many people visiting the area.

Analysis: Comparing n. of days/year when daily quota was reached.

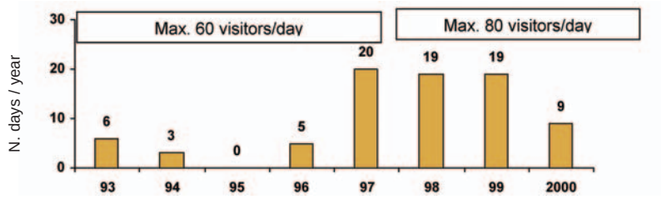

Fig. 17. Evolution of number of days when daily quotas were reached in Columbretes island MPA.

Results: The analysis on frequentation suggested an increase in daily quotas from 60 to 80 visitors in 1998. Subsequent demands on increase were not approved.

CASE STUDY 8: Monitoring visitors activities

Why?: MPA management provisions regulate different activities in the area, normally in accordance to the previous situation and potential risk to nature assets. Knowing beforehand the distribution of activities can help adjusting regulation to demand. On the other hand the declaration of MPA, can promote the increase of some activities or favour new unexpected ones.

What: Depends on the regulation provisions. Each of the allowed activities has to be monitored with numbers both in time (trends) and space (zoning).

Methods:

It is desirable to have total figures, accounting for each activity in each zone. In the case of wide areas, or when surveillance is not guaranteed over all of the time, a sampling method can be developed taking into account that the sample size is representative and can be repeated in order to make comparisons. It is recommended to reduce all possible activities to the most frequent ones or those who represent a potential risk to the conservation regime. In situations when the same visit performs several activities it is better to register only one, preferably the most potentially impacting one (f. e. fishing > mooring > sailing).

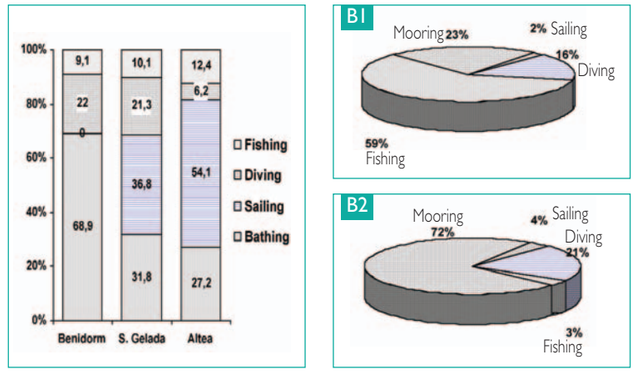

Fig. 18. Activities of visitor boats in two areas A: Sportboat activities in three different coastal areas in proposed MPA of Benidorm-Altea (Alicante, Spain). B1: sport boat activities in Columbretes MR (1998: 1422 boats); B2: sail boats (1998: 403 boats).

Advantages:

Recording activities is easy and trends can be foreseen from samples.

Costs:

Low. The main cost is man effort.

Expertise:

Can be developed by field staff with short training and following standardised protocols.

Example: Trends in tourist activities in Columbretes MR.

Situation: The initial regulations in Columbretes MR were focused on commercial fishing, due to low recreation figures before protection started. After the area was declared as a MPA, a rapid increase in recreation was detected, with few tools to manage it.

Analysis: From the daily control of boats, the trends in activities developed by visiting sport boats were deduced.

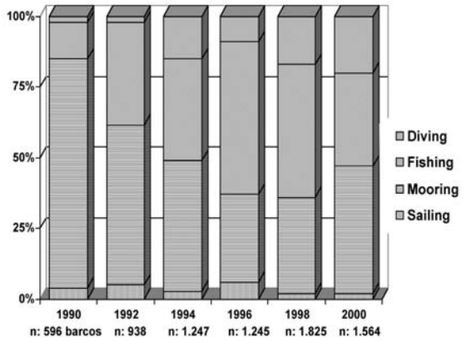

Fig. 19. Trends in main activities of sport boats in Columbretes MR.

Results: Initially, diving showed the higher increase rate (> 1.000% 1990-94), and a special regulation for this activity was approved in 1996. Afterwards, recreational fishing was the activity that showed a higher increase potential (380% 1990-98), being regulated since 1999.

CASE STUDY 9: Monitoring regulation impact on stakeholders.

Why?: Existing or proposed regulation need be evaluated so as their impact on stakeholders or their activities. It is recommended that any proposed rule should include an estimation about the number of possible users affected, so a decision can be taken knowing beforehand what interests would be affected.

What: Some items about stakeholders to be monitored are number, origin and relative importance.

Methods:

Routine surveillance of stakeholders is essential to determine as exactly as possible who and in which way they are using the MPA and/or its resources. Analysis of existing statistics in the surrounding area (n. of recreational boats, number of fishing boats) (Fig. 20) is a basic baseline.

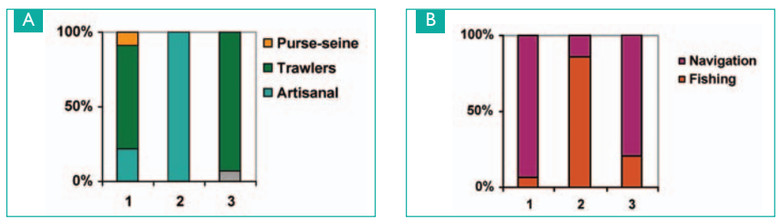

Fig. 20. Distribution of boat activities in three ports (1. Altea; 2: Benidorm; 3: Vilajoyosa) in the vicinity of a proposed MPA. A: Commercial fishing boats; B: Recreational boats.

Advantages:

Either to measure foreseeable impact or to plan participative approaches, it is essential to know beforehand the stakeholders interest and strength.

Disadvantages:

Statistics is just a poor descriptive tool. The relationship of stakeholders with the MPA is a mixture of economic interest, wishes, expectations and emotional engagement.

Example: Impact of the enlargement of a MPA in commercial fishing.

Situation: A proposal from the regional government to enlarge Columbretes Island MR, found strong opposition from professional fishermen. In short, they claimed that fishing prohibition in a larger area should have a negative impact on most of the fleet and would lead to the abandonment of the activity.

Analysis: Columbretes wardens were instructed to detect and identify every fishing boat in the outskirts of the MR, using telescope and radar. At the same time, a complete study of the nearby fishing fleet was carried out using official statistics.

Results: Radar surveillance proved that most of the fishing operation (mainly trawling) took place in the close vicinity of the MPA (Fig. 21). In fact fishing effort (km trawled/km^2) diminished with distance from the MR limits (< 1 km = 23,4; 1-2 km = 15,9; 2-3 km = 12,7), proving that the fleet was taking advantage of the "edge effect" of the MR. In this situation it was possible to argument that enlarging the protected area will mean an increase of the perimeter, and thus of the edge effect.

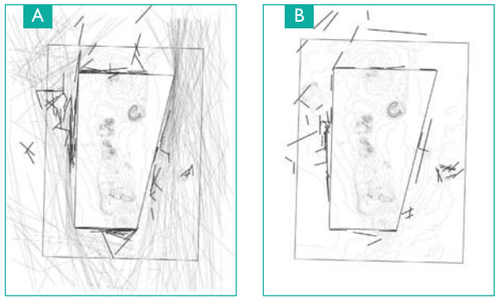

Fig. 21. Commercial fishing around Columbretes Islands MR. Thick lines: artisanal; Thin lines: trawlers. A: May-June 2002; B: July-August 2002 (closed season for trawlers).

The comparison between fishing boats operating close to Columbretes and the local fishing fleet, proved than only 12,8% of the fleet actually worked around the MR. An important percentage of boats (43%) was found in only one port. Frequentation analysis proved than 9 trawlers out of 26 reported around the island added up 68% of the fishing activity and thus only 3 depended on the MR (more than 50% of the activity in the outskirts).

CASE STUDY 10: Monitoring stakeholders and visitors response.

Why?: MPA are developed and managed in a social context. Either facing stakeholders (like fishermen) or visitors, it is essential to monitor their response and attitudes. Scientific or technical data are often misunderstood by users, or simply irrelevant for them. Engagement, enthusiasm, compromise or partnership may even be not related to biological conservation success, but sure will help to maintain protection efforts.

What to monitor?: It is important to determine the extent to which stakeholders adhere to the management provisions. This will happen when they perceive that they obtain a benefit (either economic, aesthetic, recreational or sentimental) from the MPA.

Methods:

The easiest way is simply asking users about their opinion about the protection regime and management provisions. This can be done by personal interviews, polls, organizing meetings or discussion groups. The involvement of social scientist and consultants is recommended.

Table 4.: Perceived changes in performance indicators after the establishment of a marine reserve and sanctuary obtained through local interviews in San Salvador Island Marine Reserve and Fish Sanctuary (Philippines). After White et al. (2002)

	1990	1998
Satisfaction with fishing arrangements		
Sanctuary management	3.24	6.21
Reserve management	3.26	5.88
Mangrove management	2.67	6.62
Benefits from the marine reserve	3.17	6.31
Household well being	4.17	6.71
Household income	3.52	6.38

Advantages:

Public and stakeholders opinion are specially important when the area management depends on public resources, very much conditioned by public and local support.

Disadvantages:

The response of stakeholders can be masked by conflicts with authorities not related with the MPA. Local communities are reluctant to express freely their opinions.

Example: Divers opinion of a MPA.

Situation: Medes Islands MPA is a prime scuba diving destination in NE Spain, with a long recreational and commercial tradition. Since the establishment of the protection regime in 1990, the carrying capacity of divers (quotas) has been controversial between tourist operators (asking for a increase) and conservation managers (trying to decrease previous frequentation levels).

Analysis: A survey was taken from a sample of 500 divers in 1998-99 (out of a estimated population of 20.000). Personal interviews asked for scuba divers profile (sex, age, origin, profession, studies,.....), reasons to choose Medes MPA and level of satisfaction of their visit (Mundet & Ribera, 2001).

Results: The principal reason of choosing Medes MPA was rich marine life, while prices ranked the seventh position. Most of the divers were satisfied of their visit (Fig. 22). A feasible conclusion is that only by conserving the natural environment will the tourist diving industry be maintained as the divers place interest in nature as the most important reason for choosing to dive in the Medes Islands.

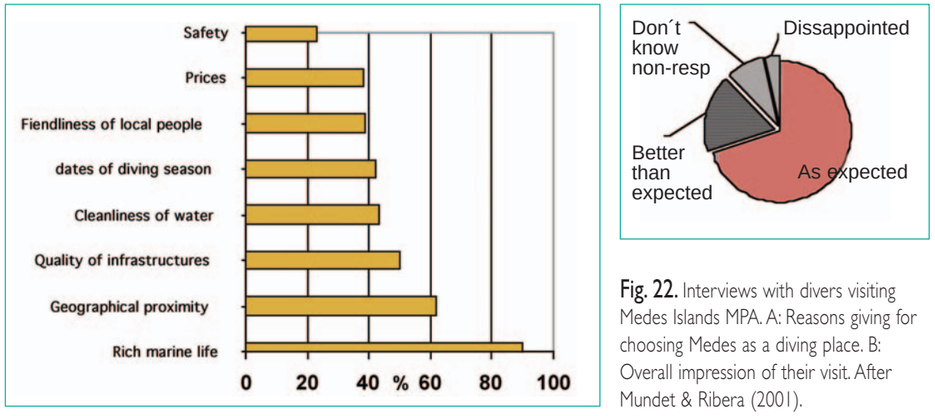

Fig. 22. Interviews with divers visiting Medes Islands MPA. A: Reasons giving for choosing Medes as a diving place. B: Overall impression of their visit. After Mundet & Ribera (2001).

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The MedMPA project is financially supported by the European Commision