United Nations Environment Programme

Mediterranean Action Plan

Regional Activity Centre for Specially Protected Areas

Regional Working Programme for the Coastal and Marine Protected Areas in the Mediterranean Sea including the High Sea

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FOREWORD

The Parties to the CBD agreed in 2004 to take action to address the under representation of marine ecosystems in the global network of protected areas. In this context, they adopted the 2012 target for MPAs that invites countries to achieve by 2012 a global network of comprehensive, representative and effectively managed national and regional protected area system.

During their 14th ordinary meeting (Portoroz, Slovenia, November 2005) the Contracting Parties to the Barcelona Convention invited the Regional Activity Centre for Specially Protected Areas (RAC/SPA) to elaborate a programme of work for the development of marine protected areas (MPAs) aimed at supporting the Mediterranean countries to achieve the CBD's 2012 target by establishing a representative network of MPAs in the Mediterranean Sea.

The draft programme of work presented hereinafter was elaborated by RAC/SPA in consultation with the IUCN Centre for Mediterranean Cooperation, WWF-MedPo, MedPAN and ACCOBAMS. It takes into account the information on MPAs available in the databases and documentation of these organisations. The 9th Meeting of the NFP for SPA (Malta, 3-6 June 2009) reviewed the draft programme and decided to submit it for adoption to the Contracting Parties.

After the adoption of this programme of work, the onus will be on the national authorities of the Contracting Parties to implement it. The partner organisations that participated in its elaboration will provide the Mediterranean countries, upon their request, with the technical and, where possible, financial assistance to undertake the activities of the programme of work.

The first step in the implementation of the programme of work will be an assessment of the representativity and effectiveness of the existing Mediterranean network of marine and coastal protected areas.

Section I: Designing Ecological Networks of MPAs in the Mediterranean Sea

EXECUTIVE SUMMARY

With this document we identify sets of criteria to aid in the creation of representative networks of marine protected areas (MPAs) in the Mediterranean Sea. Such action is needed to enable the RAC/SPA to comply with the request made in 2005 by the Contracting Parties to the Barcelona Convention, to develop a programme of work for the development of marine protected areas (MPAs) aimed at supporting the region's nations to implement by 2012 a representative network of MPAs in the Mediterranean Sea.

We recommend adopting a three-step hierarchical planning approach, which begins at the large scale and focuses in on ever-smaller scales.

1. At the widest scale, in this case that of the Mediterranean Basin, the baseline for designing an ecological network will involve the identification of large scale ecological units. The purpose of this is to recognize ecological distinctions between different parts of the Sea, and ensure that something that is called a "Mediterranean Network of MPAs" is truly comprehensive and representative of all of its sub-regions.

2. At the next scale, priority conservation areas should be identified within each ecological unit. These areas would not constitute MPAs themselves, but would be focal areas for individual MPA networks.

3. Once such priority conservation areas are identified, the task of identifying sites to develop true ecological networks can be initiated. Individual MPAs within these networks should protect what is ecologically most important – i.e., they should focus on habitats where a concentration of ecological processes results in a high diversity of species. To become a network, it will be important not only to establish MPAs to protect these key areas, but also to maintain the ecological linkages between these areas.

To address the selection of priority areas, we require a review of existing classifications, defining the nesting strategy considering from the finest classification scale to the regional scale. We describe steps related to production of maps; the set of variables with adequate set of data and environmental drivers; using as a principle data if these are available and if not use proxies; defining synergies and overlaps with any existing sub-regional classifications. We also intend to provide a brief overview of the general principles for the two realms (pelagic/benthic) and the different classification systems, making explicit which criteria were used by the benthic group to separate the two bathyal zones: the upper and lower bathyal; and make explicit the role of biological data leading to the results.

Concerning the identification of priority conservation areas within each ecological units seven criteria which have been previously proposed could be used in the Mediterranean: uniqueness or rarity; special importance for life history stages of species; importance for threatened, endangered or declining species and/or habitats; vulnerability, fragility, sensitivity or slow recovery; biological productivity; biological diversity; and naturalness.

Once the Mediterranean priority conservation areas have been identified within each ecological unit, qualitative and/or quantitative techniques can be iteratively used to identify sites where MPAs should be established to constitute the network (third step). Area selection should proceed through two phases: first, selection should reflect the areas' recognised ecological importance, vulnerability, and address the requirements of ecological coherence through: representativity; connectivity; and replication. Second, the adequacy and viability of the selected sites should be assessed by considering their size, shape, boundaries, buffering, and appropriateness of the site management regime.

I. INTRODUCTION

A. Context

During their 14th Ordinary Meeting in Portoroz, Slovenia, in November 2005 the Contracting Parties to the Barcelona Convention requested the Regional Activity Centre for Specially Protected Areas (RAC/SPA) to develop a programme of work for the development of marine protected areas (MPAs) aimed at supporting the region's nations to implement by 2012 a representative network of MPAs in the Mediterranean Sea.

Complying with the request from the Barcelona Convention Parties will involve the implementation of a number of different actions, including a greater integration of SAP BIO in the RAC/SPA actions, in particular concerning the creation of networks of MPAs, the strengthening of existing MPAs and the establishment of new MPAs.

Within this framework, we have been requested by the RAC/SPA to support its efforts by identifying criteria for the establishment of a representative network of MPAs in the Mediterranean, as well as proposing guidelines of a medium-term (5 years) programme of work designed to facilitate the creation of new MPAs to integrate the networks.

There is growing consensus in the marine conservation community that strategically designed MPA networks confer huge advantages over single MPAs. Networks can potentially provide maximal conservation benefit by providing the strictest possible protections for the most ecologically important areas, the most environmentally sensitive habitats, and/or the most vulnerable species. Heightened protections may be more feasible through MPA networks than through individual MPAs because while the total target area spanning a network may be large, the actual amount of restricted access or use over that large area is relatively small.

Networks have other benefits as well. They collectively constitute a spatial management tool that can be used to conserve highly migratory or mobile species, wherein key habitats for various life stages of a target organism are preserved. Alternatively, networks can be used to ensure that all representative habitat types within a country's jurisdiction or within a region are conserved. Networks can provide economies of scale for training personnel and provide a mechanism for linking individuals and institutions, facilitate cross-project learning, and allow more integrated research and sharing of scientific data.

This much is clear. It is also clear that the parties to the Barcelona Convention and its Protocol on Specially Protected Areas and Biological Diversity have made serious commitments to establish representative networks of MPAs throughout the Mediterranean. But how could such networks be constructed, and are there universal lessons that can guide MPA network development in the Mediterranean?

It is important to note that the design of any MPA within an ecological network must be developed with socio-economic and socio-political feasibility in mind. In other words, although a scientific spatial planning process may be used to identify potential sites within an ecological network of MPAs, science alone cannot drive decisions on what kind of MPA

is instituted, how large it is, or how it will be managed. These decisions must be made with the individual circumstances of a place in mind, and preferably through a participatory process. Although this report only focuses on the ecological aspects of establishing a regional network of MPAs, it is today common wisdom that the success of MPAs can only derive from addressing a balanced combination between ecological and socio-economic concerns.

B. Ecological MPA networks

It is useful, in fact necessary, to distinguish various kinds of MPA networks. Creating a system of MPAs by pulling together all existing MPAs in a region and calling it a network is often done, but this does not constitute a true network. Rather it is a conglomeration of MPAs, many opportunistically designated, often with many different objectives. In order for MPA networks to make ecological sense,

they must be systematically planned with the same goal in mind. One can imagine a network of MPAs being the subject of a single spatial management plan with the individual MPAs within the network acting as the focal points for conservation.

Just as geographic proximity of already existing MPAs is not a good criterion for determining whether an ecological network is being built, so neither does putting all existing MPAs into a single legal or institutional framework. In the Mediterranean, SPAMI (Specially Protected Areas of Mediterranean Importance) sites are proposed by Contracting Parties to the Barcelona Convention. While these sites are extremely important to raising awareness and generating political will, the SPAMI list in and of itself does not constitute an ecological network.

This is not to say that linking MPAs, or MPA managers, within a region does not confer conservation benefits. Such “networking” is extremely important, and MedPAN as a network of practitioners shows the value of learning from one another. But true ecological networks of MPAs require a systematic and strategic planning effort to identify what areas are ecologically most important and protect them through MPA establishment.

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II. MPA NETWORK DESIGN

Planning often occurs at larger scales than management or conservation interventions, and the end result can be that management on the ground is more ad hoc than the “management dreams” of regional planners. For this reason, a three-step hierarchical planning approach is recommended, which begins at the large scale and focuses in on ever-smaller scales

1. At the largest scale, in this case that of the Mediterranean Basin, the first recommended step in designing an ecological network is the identification of large scale ecological units. The purpose of this is to recognize ecological distinctions between different parts of the Sea, and ensure that something that is called a “Mediterranean Network of MPAs” is truly comprehensive and representative of all of its sub-regions.
2. At the next scale, **priority conservation areas** should be identified within each unit.

These areas would not constitute MPAs themselves, but would be focal areas for individual MPA networks. Such areas may exhibit high biodiversity or have marine species of conservation concern (vulnerable, rare, or highly valued marine species), or they may have a unique or unusual combination of marine habitats (exhibiting high Beta diversity).

3. Once such priority conservation areas are identified, the task of identifying sites to develop true ecological networks can be initiated. Individual MPAs within these networks should protect what is ecologically most important – i.e., they should focus on habitats where a concentration of ecological processes results in a high diversity of species. Such areas might include spawning grounds for fishes, highly productive areas such as upwelling areas, estuaries, or Posidonia beds, aggregating areas such as seamounts, and the like. To become a network, it will be important not only to establish MPAs to protect these key areas, but also to maintain the ecological linkages between these areas. These linkages are made possible by the flow of water through currents and by the movement of organisms through larval dispersion of propagules or movement of adults or juveniles.

We feel there has been some mixing of criteria that are being used for different purposes in most of these methodologies, and propose a division of site-selection criteria and protected area design criteria. Site-selection criteria are meant to highlight areas, due to their biological/ecological value, their potential in filling gaps of representativity, and the degree to which they are threatened and thus need protection (Step 2 above). Design criteria then can direct planners to developing the most efficacious protected area for the site (Step 3 above).

A. Subdivision of the Mediterranean into ecological units

Identifying the subdivision of the Mediterranean into marine ecological units is necessary to the designing of a balanced network of MPAs. Bio-regionalisation at the sub-regional level to create key base data layers is an important step towards the identification and selection of components of representative networks of MPAs, to provide greater understanding of biological patterns and processes at the regional level. Existing global and regional or sub-regional marine regionalization efforts include those by Ekman (1953), Hedgpeth (1957), Briggs (1974), Hayden et al. (1984), Sherman and Alexander (1989), Kelleher et al. (1995), Longhurst (1998), Bailey (1998), Dinter (2001), Spalding et al. (2007), and Ivanov and Spiridonov 2007.

“Ecoregion is a large unit of land or water containing a geographically distinct assemblage of species, natural communities, and environmental conditions. The boundaries of an ecoregion encompass an area within which important ecological and evolutionary processes most strongly interact” (WWF 2003). Ecoregion conservation “is an evolution in thinking, planning, and acting at the spatial and temporal scales best suited for successful biodiversity conservation” (WWF 2003).

A subdivision of the Mediterranean into seven distinct ecoregions was tentatively proposed by Spalding et al. (2007; see UNEP/CBD/COP/8/INF/34). For the Mediterranean region the subdivision of the Mediterranean Sea in the following four areas was agreed within the framework of the elaboration of the concept of Ecosystem Approach : 1. Western Mediterranean; 2. Adriatic Sea; 3. Ionian Sea – Central Mediterranean; 4. Aegean Sea – Levantine Sea (UNEP(DEPI)/MED WG 326/3).

Building upon the results of a workshop organised in Mexico City in Jan. 2007 (UNEP 2008), it may be advisable to approach benthic and pelagic systems separately.

In the pelagic realm to consider the use of fuzzy boundaries for each province; consider the description of transition zones, boundary currents, upwelling systems as main features; and recognize the importance of hotspots and migratory species.

In the benthic realm to start with a habitat/functional classification system and then overlay available species composition and distribution patterns, and consider the connectivity between the benthic and pelagic realms in a second step.

Further work is needed to align and nest such subdivision process based on agreed principles. We recommend that methodologies and tools used are examined to review the existing classification; define the nesting strategy considering from the finest classification scale to the regional scale; describe steps related to produce the maps; provide a set of variables with adequate set of data and environmental drivers, use as a principle data if these are available and if not use proxies; define synergies and overlaps with any existing sub-regional classifications; provide a brief overview of the general principles for the two realms (pelagic/benthic) and the different classification systems; make explicit which criteria were used by the benthic group to separate the two bathyal zones: the upper and lower bathyal; and make explicit the role of biological data leading to the results.

B. Identification of priority conservation areas within ecological units

Once distinct ecological units are identified in the Mediterranean and agreed upon, the process of identifying priority conservation areas within each ecoregion can begin. Areas relevant because of biodiversity richness or the presence of protected species may qualify as priority conservation areas if they meet special criteria.

A number of efforts have recently been devoted to identify, list and describe such criteria. We here refer mostly to the most recent attempt (Convention on Biological Diversity 2007), resulting from a workshop organized in the Azores in 2007, in which the following seven criteria for identifying ecologically or biologically significant marine areas in need of protection, in open ocean waters and deep sea habitats, are recognized:

- Uniqueness or rarity;
- Special importance for life history stages of species;
- Importance for threatened, endangered or declining species and/or habitats;
- Vulnerability, fragility, sensitivity or slow recovery;
- Biological productivity;
- Biological diversity;
- Naturalness.

These criteria are further analysed in Table 1, adapted to the Mediterranean from CBD (2007).

C. Criteria for site selection

There are several guidelines available in the literature and among the materials put out by various organizations that can steer the site selection process that is the formative planning step in constructing truly effective, ecologically coherent, and comprehensive MPA networks.

Thus only certain criteria help elucidate the choice of new sites to form a representative network. These criteria include: representativeness, resilience, shape and size of individual MPAs, connectivity, viability, permanence, replication and degree to which precautionary principles were invoked in designing individual MPAs. Of these, representativeness, viability (or some combination of viability and resilience, which are very similar concepts), connectivity, and replication seem to be the most important considerations in selecting sites for ecologically coherent networks. Achieving representativeness and replication are relatively straightforward, but being able to do so will mean compiling existing information on habitat type and distribution within the study or planning area. Measuring resilience or viability and determining connectedness or connectivity is somewhat more difficult, and we feel that percentage no-take areas are not a good metric to use in this regard.

OSPAR has reformulated the IUCN/WCPA checklist to meet its needs in Northern Europe (OSPAR, 2007). This checklist may be applied at different scales; e.g., employing local, regional, national, or international study areas. It is recommended, however, that the scale of the assessment be made clear at the outset, and that one scale be applied throughout any given assessment.

This checklist is called a “self-assessment” because it is expected that those directly involved in the design and management of a given network would best be able to judge the relative ratings for many of these questions. Nonetheless, it can be expected that different assessors will have different internalized standards by which they rate their networks, and thus two different assessors would likely produce somewhat different scores for the same network. In this light, making comparisons of scores between networks that have used different assessors should be applied with caution.

Table 1 – Criteria for the selection of priority conservation areas in the Mediterranean (adapted from CBD 2007)

Criteria	Definition	Rationale	Mediterranean examples	Consideration in application
Uniqueness or Rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.	Irreplaceable Loss would mean the probable permanent disappearance of diversity or a feature, or reduction of the diversity at any level.	Posidonia meadows Vermetid reefs	Risk of biased-view of the perceived uniqueness depending on the information availability Scale dependency of features such that unique features at one scale may be typical at another, thus a global and regional perspective must be taken.
Special importance for life history stages of species	Areas that are required for a population to survive and thrive.	Various biotic and abiotic conditions coupled with species-specific physiological constraints and preferences tend to make some parts of marine regions more suitable to particular life-stages and functions than other parts.	Area containing (i) breeding grounds, spawning areas, nursery areas, juvenile habitat or other areas important for life history stages of species; or (ii) habitats of migratory species (feeding, wintering or resting areas, breeding, moulting, migratory routes).	Connectivity between life-history stages and linkages between areas: trophic interactions, physical transport, physical oceanography, life history of species Sources for information include: e.g. remote sensing, satellite tracking, historical catch and by-catch data, Vessel monitoring system (VMS) data. Spatial and temporal distribution and/or aggregation of the species.
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.	To ensure the restoration and recovery of such species and habitats.	Areas critical for threatened, endangered or declining species and/or habitats, containing (i) breeding grounds, spawning areas, nursery areas, juvenile habitat or other areas important for life history stages of species; or (ii) habitats of migratory species (feeding, wintering or resting areas, breeding, moulting, migratory routes)	Includes species with very large geographic ranges. In many cases recovery will require reestablishment of the species in areas of its historic range. Sources for information include: e.g. remote sensing, satellite tracking, historical catch and by-catch data

				vessel monitoring system (VMS) data.
Vulnerability, Fragility, Sensitivity, or Slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.	The criteria indicate the degree of risk that will be incurred if human activities or natural events in the area or component cannot be managed effectively, or are pursued at an unsustainable rate.	Vulnerability of species Inferred from the history of how species or populations in other similar areas responded to perturbations. Species of low fecundity, slow growth, long time to sexual maturity, longevity (e.g. sharks, etc). Species with structures providing biogenic habitats, such as deepwater corals, sponges and bryozoans; deep-water species. Vulnerability of habitats. Areas susceptible to ship-based pollution. Ocean acidification can make deep sea habitats more vulnerable to others, and increase susceptibility to human induced changes.	Interactions between vulnerability to human impacts and natural events. Existing definition emphasizes site specific ideas and requires consideration for highly mobile species. Criteria can be used both in its own right and in conjunction with other criteria.
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.	Important role in fuelling ecosystems and increasing the growth rates of organisms and their capacity for reproduction.	Ligurian Sea permanent front Known Mediterranean upwelling areas Cold seeps Eratosthenes Seamounts	Can be measured as the rate of growth of marine organisms and their populations, either through the fixation of inorganic carbon by photosynthesis, chemosynthesis, or through the ingestion of prey, dissolved organic matter or particulate organic matter. Can be inferred from remote-sensed products, e.g., ocean colour or process-based models. Time series fisheries data can be used, but caution is required.

Biological Diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.	Important for evolution and maintaining the resilience of marine species and ecosystems.	Sea-mounts and canyons Fronts and convergence zones Cold coral communities (e.g. off Santa Maria di Leuca, Ionian Sea) Deep-water sponge communities	Diversity needs to be seen in relation to the surrounding environment. Diversity indices are indifferent to species substitutions. Diversity indices are indifferent to which species may be contributing to the value of the index, and hence would not pick up areas important to species of special concern, such as endangered species. Can be inferred from habitat heterogeneity or diversity as a surrogate for species diversity in areas where biodiversity has not been sampled intensively.
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.	To protect areas with near natural structure, processes and functions. To maintain these areas as reference sites. To safeguard and enhance ecosystem resilience.	Corsican-Ligurian-Provencal basin Alborán Sea Most ecosystems and habitats have examples with varying levels of naturalness, and the intent is that the more natural examples should be selected.	Priority should be given to areas having a low level of disturbance relative to their surroundings. In areas where no natural areas remain, areas that have successfully recovered, including reestablishment of species, should be considered. Criteria can be used both in its own right and in conjunction with other criteria.

This checklist is called a “self-assessment” because it is expected that those directly involved in the design and management of a given network would best be able to judge the relative ratings for many of these questions. Nonetheless, it can be expected that different assessors will have different internalized standards by which they rate their networks, and thus two different assessors would likely produce somewhat different scores for the same network. In this light, making comparisons of scores between networks that have used different assessors should be applied with caution.

The checklist has been ordered according to the OSPAR requirement to assess ecological coherence, with the most applicable criteria in Table I, secondary criteria in Table II, and tertiary criteria in Table III. Table IV puts forward criteria that while not applicable to the assessment of ecological coherence, are recognized to be of importance to the long-term success of an MPA network (see Appendix 1). In looking to other parts of the world where ecological MPA networks have been designed or are being considered, (e.g. California, Canada, Great Barrier Reef, South Australia, New Zealand), it is apparent that scale of planning will greatly influence choice of criteria. In an area as large as the federal waters of Canada, one would have to work down through a hierarchy of scales to get to a scale (probably on the level of a National Marine Conservation Area) where one could then design one or more ecologically coherent MPA networks. Similarly in the Mediterranean, a representative system would be one in which representation and replication occur at the scale of habitats within ecoregions, but where connectivity and viability requirements are met at much finer scales. Scaling is thus important – and it needs to be said that not all criteria will be relevant to all scales.

Belgium may have the most useful template to guide MPA network design and site selection, though the criteria used in the country’s “biological valuation” project were not designed with the intent of creating MPA networks. Derous et al. (2006) describe first order and second order criteria for ranking the relative value of marine sites: rarity, aggregation, fitness consequences (main criteria), naturalness and proportional importance (modifying criteria). We think a combination of criteria from WCPA and Derous et al. (2006), applied at appropriate scales, will create a robust set of representative MPA networks for the Mediterranean region.

There is currently some controversy regarding whether distance between boundaries of individual MPAs provides a good measure of the strength of linkage between MPAs. Distance is a crude proxy for determining ecological linkage, since some very close MPAs may have little to no physical or biotic linkages between them, while other very distant MPAs may be closely linked by the movement of, and use of space by, highly mobile species. For this reason, it may be better to answer the question about how well linkages are preserved by looking to see if there is any existing or prospective activity between (i.e. outside of) MPAs that could interrupt the flow of nutrients, the communications among organisms, or the movement of organisms themselves between one MPA and another in the network. If so, then management will have to be directed at such potentially disruptive activities to ensure the network operates as an effective ecological network.

Table 2. Scientific criteria to select areas to establish a representative network of MPAs (from CBD 2007)

Required network criteria	Definition	Applicable site-specific considerations (inter alia)
Ecologically and biologically significant areas	Ecologically and biologically significant areas are geographically or oceanographically discrete areas that provide important services to one or more species/populations of an ecosystem or to the ecosystem as a whole, compared to other surrounding areas or areas of similar ecological characteristics, or otherwise meet the criteria as identified in Table 1.	Uniqueness or rarity Special importance for life history stages of species Importance for threatened, endangered or declining species and/or habitats Vulnerability/ fragility/ sensitivity/ slow recovery Biological productivity Biological diversity Naturalness
Representativity	Representativity is captured in a network when it consists of areas representing the different biogeographical subdivisions of the global oceans and regional seas that reasonably reflect the full range of ecosystems, including the biotic and habitat diversity of those marine ecosystems.	A full range of examples across a biogeographic habitat or community classification; relative health of species and communities; relative intactness of habitat(s); naturalness
Connectivity	Connectivity in the design of a network allows for linkages whereby protected sites benefit from larval and/or species exchanges, and functional linkages from other network sites. In a connected network, individual sites benefit one another.	Currents; gyres; physical bottlenecks; migration routes; species dispersal; detritus; functional linkages. Naturally unconnected sites may also be included (e.g., isolated seamount communities)
Replicated ecological features	Replication of ecological features means that more than one site shall contain examples of a given feature in the given biogeographic area. The term *features* means "species, habitats and ecological processes" that naturally occur in the given biogeographic area.	Accounting for uncertainty, natural variation and the possibility of catastrophic events. Features that exhibit less natural variation or are precisely defined may require less replication than features which are inherently highly variable or are only very generally defined.
Adequate & Viable sites	Adequate & viable sites indicate that all sites within a network should have size and protection sufficient to ensure the ecological viability and integrity of the feature(s) for which they were selected.	Size; shape; buffers; persistence of features; threats; surrounding environment (context); physical constraints; scale of features/processes; spillover/compactness;

As a way of proceeding, we suggest that first qualitative and/or quantitative techniques be iteratively used to identify sites to include in a network. Their selection for consideration of enhanced management should reflect their recognised ecological importance, vulnerability, and address the requirements of ecological coherence through:
Representativity;
Connectivity;
Replication.

At the 2007 Azores workshop (CBD 2007; Table 2), the following consolidated set of scientific criteria for representative networks of marine protected areas, including in open ocean waters and deep-sea habitats, was identified:

- Ecologically and biologically significant areas;
- Representativity;
- Connectivity;
- Replicated ecological features;
- Adequate and viable sites.

As a way of proceeding, we suggest that first qualitative and/or quantitative techniques be iteratively used to identify sites to include in a network. Their selection for consideration of enhanced management should reflect their recognised ecological importance, vulnerability, and address the requirements of ecological coherence through:

- Representativity;
- Connectivity;
- Replication.

Secondly, the adequacy and viability of the selected sites should be assessed. Consideration should be given to their size, shape, boundaries, buffering, and appropriateness of the site management regime. Design criteria can direct planners to developing the most efficacious protected area for the site. Such design criteria would address questions of size, shape, management regime, including whether the MPA should be a no-take or multiple use area.

We feel that such design criteria, captured in other methodologies under headings such as «adequacy» and «management effectiveness», should come in a second phase of the project, once key sites for Mediterranean MPA networks have been determined.

III. MANAGEMENT CONSIDERATIONS

Perhaps the best known is the IUCN/WCPA checklist for MPA networks (Day and Laffoley, 2007), which allows assessment of the relative "value" of sites to a network once that network has been designed. Many of the criteria evaluate how well each individual MPA might perform in meeting its own objectives – a checklist to assess whether best management practices are being utilized, much like Staub and Hatziolos (2004) or Corrales (2005).

IV. CONCLUSION

One can imagine a time in the future when the marine biodiversity of the Mediterranean is truly protected through an ecological network (or networks) of MPAs. In this scenario, each of the seven or eight ecoregions of the Mediterranean would have priority conservation areas demarcated, and within these priority conservation areas, systematically designated and linked individual MPAs within ecological networks.

These networks would be built from existing MPAs by determining which areas are most ecologically critical, and establishing new MPAs in places where MPAs do not already exist. In addition, the integrity of the networks would be maintained by management measures outside MPAs that aim to preserve linkages.

The individual MPAs within any network in any ecoregions of the Mediterranean could be no-take areas, multiple use sanctuaries, biosphere reserves, nature preserves, or any number of other MPA management categories. But the cumulative effect of having these different sorts of MPAs all linked within a network would be to create a whole greater than the sum of its parts, with all MPAs working towards a common goal of biodiversity conservation.

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APPENDIX. OSPAR MPA NETWORK RAPID SELF-ASSESSMENT CHECKLIST

Ecological Coherence Criteria			
Assessment Criterion 1: Adequacy / Viability			
Size & Shape		Score	Comments
Specific consideration was given to the size and shape of the sites within the MPA network when it was designed and implemented in order to maximize the effectiveness of the network to achieve its ecological objectives.	3		
Some consideration was given to the size 115or shape of the sites within the MPA network when it was designed, and some consideration overall to achieving its ecological objectives.	2		
Some consideration was given to the size and/or shape of the sites within the MPA network when it was designed, but no consideration overall to achieving its ecological objectives.	1		
Little or no consideration was given to the size and/or shape of the sites within the MPA network; nor any consideration of the effectiveness of the network to achieve its ecological objectives.	0		
Consideration was given to edge effects of the sites within the MPA network when it was designed.	Bonus 1		
Viability		Score	Comments
The MPA network includes many self-sustaining viable no-take areas, which are all geographically dispersed within the study area ensuring viability at all levels (i.e. at the ecosystem, species and genetic levels) within natural cycles of variation.	3		
The MPA network includes some no-take areas geographically dispersed within the study area, some of which are designed to be self-sustaining.	2		
The MPA network includes a few no-take areas geographically dispersed within the study area.	1		
The MPA network includes no or only a single no-take area.	0		
Assessment Criterion 2: **Representativity**		Score	Comments
The MPA network represents all or almost all (~80-100%) of the range of species and/or habitats and/or ecological processes within the study area.	3		
The MPA network represents most (~30-80%) of the range of species and/or habitats and/or ecological processes known in the study area.	2		
The MPA network represents some (~10 -30%) of the known range of species and/or habitats and/or ecological processes in the study area.	1		
The MPA network comprises only one or two types of marine species and/or habitats known in the study area (e.g. only coral reefs are protected in the network)	0		
Assessment Criterion 3: **Replication**		Score	Comments
The MPA network includes highly protected spatially-separated replicates of 80% or more of the features occurring within the study area (i.e. almost all known features within your network are replicated to spread any risk).	3		
The MPA network includes spatially-separated replicates of highly protected areas within 25 - 80% of the features occurring within the study area.	2		
The MPA network includes some spatially-separated replicates of	1		

highly protected areas, but they represent less than 25% of the features occurring within the study area.			
The MPA network does not have any spatially-separated replicates of highly protected areas within the study area.	0		
Systematic replication is occurring throughout every ecological region in the study area, e.g. cross shelf and long-shore replication.	Bonus 1		
Assessment Criterion 4: **Connectivity**		Score	Comments
The MPA network has been purposefully designed to maximize all / most key ecological processes (spatial and/or temporal) in the study area.	3		
The MPA network was purposefully designed and does consider some of the key ecological processes (spatial and/or temporal) in the study area.	2		
The MPA network was purposefully designed and does consider a few (one or more) of the key ecological processes (spatial and/or temporal) in the study area.	1		
The design of the MPA network took little or no account of any key ecological processes in the study area.	0		
The MPA network has been purposefully designed to maximize and enhance most of the physical linkages between individual MPAs in the network.	Bonus 1		
Table I Total (out of a possible 18)			
Eco-Coherence Weighted Total (total given above x 3)			

Factors Influencing Eco-Coherence			
Resilience		Score	Comments
The MPA network has been specifically designed so 30% or more of the study area is free from extractive activities or habitat-altering activities, or other significant human-induced stresses.	3		
Between 10-30% of the study area is free from extractive activities, habitat-altering activities, or other significant human-induced stresses.	2		
Only a small part of the study area (<10%) is free from extractive activities, habitat-altering activities, or other significant human-induced stresses.	1		
Virtually none of the study area is free from extractive activities, habitat-altering activities, or other significant human-induced stresses.	0		
The MPA network has been specifically designed to maximize the resilience of the network in the face of long-term geophysical and/or biochemical changes;	Bonus 1		
Precautionary design		Score	Comments
The MPA network is configured to take into consideration all or most of the known threats occurring within the study area.	3		
The MPA network considers several of the known threats occurring within the study area.	2		
The MPA network considers a couple of the known threats occurring within the study area.	1		
MPA network does not consider any of the known threats occurring within the study area.	0		
The MPA network has been effectively designed to cope with a lack of comprehensive data.	Bonus 1		

External spatial & temporal considerations		Score	Comments
The design of the MPA network considered a wide range of external spatial and temporal considerations including ecological processes, connectivity and other external influences; and managers continue to consider these as part of ongoing implementation.	3		
The design of the MPA network did consider some external spatial and temporal issues; and managers continue to consider each of these issues as part of ongoing implementation.	2		
The design of the MPA network did consider one or more external spatial or temporal issues; and some of these are still considered by managers in the ongoing implementation of the network.	1		
External spatial and temporal issues were not considered in the design or in the ongoing implementation of the MPA network.	0		
There is good historical baseline information (or historic data) to determine whether there are 'shifting baselines' for a range of issues.	Bonus 1		
Table II Total (out of a possible 12)			
Eco-Coherence Weighted Total (total given above x 2)			

Factors Influencing the Assessment of Eco-Coherence			
Clearly defined objectives		Score	Comments
There is a range of clear, achievable and measurable objectives (including ecological, social and economic objectives) defined for the MPA network and derived from the legislation;	3		
There are various objectives for the MPA network which are clear, achievable and measurable; addressing at least two of the relevant aspects in the necessary range (i.e. ecological, social or economic objectives);	2		
There are some objectives for the MPA network; but only one or two can be considered as clear, achievable and measurable; AND the objectives do not address the necessary range (i.e. ecological, social and economic objectives).	1		
There are no clear objectives for the MPA network.	0		
These objectives were determined through an open, transparent and balanced process involving a wide range of stakeholders.	Bonus 1		
Scientific information		Score	Comments
All available scientific information is used to support planning and management, and it is regularly updated and used for effective decision-making.	3		
There is some scientific information to support planning and management, and whatever is available is used for decision-making.	2		
There is limited scientific information to support planning and management, and it is sometimes used for decision-making.	1		
There is little or no scientific information base to support planning and management; or, the available information is not used for decision-making.	0		
There is an ability to incorporate new scientific information into subsequent planning or for ongoing management tasks.	Bonus 1		

Social & economic information	Score	Comments

All available social and economic information is used to support planning and management, and it is regularly updated and used for effective decision-making.	3		
There is some social and economic information to support planning and management, and whatever is available is used for decision-making.	2		
There is limited social or economic information to support planning and management, and it is sometimes used for decision-making.	1		
There is little or no social or economic information base to support planning and management; or, the available information is not used for decision-making.	0		
There is an ability to incorporate new social or economic information into subsequent planning or for ongoing management tasks.	Bonus 1		
Monitoring & assessment		Score	Comments
A good monitoring and evaluation system exists, with progress against most if not all the objectives of the MPA network being monitored regularly and objectively, with the results being widely disseminated and used in adaptive management.	3		
There is an agreed and implemented monitoring program, and progress against some of the objectives of the MPA network is objectively monitored periodically, with the results publicly available and/or used in adaptive management.	2		
There is some ad hoc monitoring and progress against at least one of the objectives of the MPA network has been monitored and/or publicly reported.	1		
Progress against the objectives of the MPA network is rarely monitored AND no assessment of MPA effectiveness has ever occurred or been reported.	0		
Table III Total (out of a possible 15)			
Eco-Coherence Weighted Total (same as total above)			

Factors Influencing Long-Term Success			
Adaptive management		Score	Comments
The MPA network is readily able to incorporate changes such as new information becomes available (e.g. from 'in-the-field' experience, or as a result of changing external circumstances).	3		
The MPA network has some ability to incorporate some changes when new information becomes available (e.g. 'in-the-field' experience, or as a result of changing external circumstances).	2		
The MPA network is has a limited ability to incorporate occasional changes when new information becomes available (e.g. in the timeframe of several years).	1		
The MPA network does not have management systems or any monitoring arrangements to determine system responses and provide a basis for adaptive management; NOR is it likely able to incorporate changes were new information to become available.	0		

Economic & social considerations		Score	Comments
The design and implementation of the MPA network continues to consider the economic and socio-cultural setting, as well as the real benefits and costs of the network	3		

(including both tangible and intangible benefits and costs);			
The design and implementation of the MPA network initially considered the economic and socio-cultural setting, as well as the real benefits and costs of the network (and may have included tangible and intangible benefits and/or costs).	2		
Some consideration was given to the economic and socio-cultural setting, or to the benefits or costs, when the MPA network was initially designed.	1		
No consideration was given to the economic or socio-cultural setting, or to the benefits or costs, when the MPA network was initially designed, and little/no consideration occurs during implementation.	0		
The MPA network has addressed the need for structural adjustment or compensation for lost benefits from foregone economic opportunities.	Bonus 1		
Institutional & governance considerations		Score	Comments
The MPA network has well established mechanisms for the horizontal integration among all levels of government, and vertical integration among agencies with different mandates, as well as involving local communities, indigenous people and regional groups.	3		
The MPA network has some mechanisms for the horizontal integration among different levels of government, and vertical integration among agencies with different mandates, as well as involving local communities, indigenous peoples and regional groups.	2		
The MPA network has some legislative and administrative arrangements, but these do not provide both effective horizontal integration among different levels of government, and vertical integration between agencies.	1		
The MPA network has little or no mechanisms for the horizontal integration among different levels of government, nor for any vertical integration among agencies with different mandates.	0		
The MPA network has an effective legislative and administrative framework, including a 'nested governance' structure operating simultaneously at multiple scales and levels (integrating local aspirations, national strategies and/or international obligations).	Bonus 1		
Sustainable financing		Score	Comments
The MPA network has a well-developed and periodically audited program of long-term funding (assessed, and if necessary, increased against a recognized financial index) in order to meet both core costs and emerging issues.	3		
The MPA network has an adequate program of long-term funding for core costs and able to seek funding for emerging issues.	2		
The MPA network has poor and spasmodic program of long-term funding to meet core costs, and is sometimes able to seek funding for emerging issues.	1		
The MPA network doest not have a well-developed or periodically audited program of long-term funding.	0		
The budget in the MPA is well managed; and all staff understand the financial situation.	Bonus 1		
Table IV Total (out of a possible 15)			

Eco-Coherence Weighted Total (zero: table not used)		0	
Grand Total of all Tables (out of a possible 60)		Percentage: Grand Total x 100 / 60 =	
Weighted Eco-Coh. Grand Total (out of a possible 93)		Percent: Grand Weighted Total x 100 / 93 =	

Location / Extent of Study Area: the area under consideration in this survey. (For example, it may include the jurisdictional waters of a CP, region within a CP's waters, or it could include a particular biogeographic region.)	
Assessor(s) & Date:	

Section 2 : Elements of the Programme of Work on Marine and Coastal Protected Areas in the Mediterranean Region

The Programme of work presented hereinafter is made of the following four elements:

- **Element 1**: To assess the representativity and effectiveness of the existing Mediterranean network of marine and coastal protected areas

- **Element 2**: To make the Mediterranean network of marine and coastal protected areas more comprehensive and more representative of the ecological features of the region.

- **Element 3**: To improve the management of the Mediterranean marine and coastal protected areas.

- **Element 4:** To strengthen the protected area governance systems and further adapt them to national and regional contexts.

Element 1: To assess the representativity and effectiveness of the existing Mediterranean network of marine and coastal protected areas

Element 1 addresses a series of crosscutting issues; its results will facilitate the implementation of the activities suggested under the three other Elements.

<u>Proposed activity 1.1</u>: Evaluate, at national level, the status, the representativity and the effectiveness of the marine and coastal protected areas

Expected results: In each participating country, a comprehensive assessment of marine and coastal protected areas is carried out at national level (analysis of strengths and gaps including: identification of under-represented ecosystems, identification of areas in urgent need of rehabilitation and restoration of habitats, key threats to protected areas existing and potential forms of conservation, governance systems, lessons learned, identification of potential bilateral or multilateral protected areas, Evaluation of needs (technical assistance, financial, trainings, etc.).

The Criteria developed in Section 1 of this document will be used to assess the ecological representativity of the existing MPAs and to select MPA candidate sites. Where necessary, the assessment exercises will use also the results of the survey carried out by MedPAN to compile the Mediterranean Directory of MPAs.

Implementation Calendar

Year 1		Year 2		Year 3		Year 4		Year 5	

This activity will be implemented by: National teams of experts, including MPA managers.

<u>Proposed activity 1.2:</u> Compile a regional synthesis on the status, the representativity and the effectiveness of the marine and coastal protected areas

Expected results: Gaps, strengths and needs of the Mediterranean network of marine and coastal protected areas evaluated on the basis of the outcomes of the national evaluations (Activity 1.1).

Implementation Calendar

Year 1		Year 2		Year 3		Year 4		Year 5	

This activity will be implemented by: RAC/SPA, with the support of partners (IUCN, MedPAN, WWF-MedPO)

<u>Proposed activity 1.3:</u> Regional expert (Country representatives) meeting on the representativity of the Mediterranean network of MPAs.

Expected results: Needs and actions required for the development of a comprehensive and ecologically representative system of Mediterranean marine and coastal protected areas identified, taking into account the views and opinions of the country representative experts.

The partner organisations will be invited to attend the expert meeting.

Implementation Calendar:

Year 1		Year 2		Year 3		Year 4		Year 5	

This activity will be implemented by: RAC/SPA, with the support of partners (ACCOBAMS, IUCN and MedPAN)

ELEMENT 2: To make the Mediterranean network of marine and coastal protected areas more comprehensive and more representative of the ecological features of the region.

Proposed activity 2.1: Identification of preliminary priority conservation areas

Expected results: The areas which are most ecologically critical for the Mediterranean are identified, including High Seas areas, transboundary areas and areas suitable for ecological corridors. This will be done according to the methodology and the criteria described in Section 1 of this document, including the subdivision of the Mediterranean into ecoregions.

Implementation Calendar

Year 1		Year 2		Year 3		Year 4		Year 5	

This activity will be implemented by: RAC/SPA, the results of this activity will be reviewed by the Expert meeting to be organised under Activity 1.3 and then submitted to the Meeting of the NFP for SPA, with the support of: ACCOBAMS, IUCN, MedPAN

Proposed activity 2.2: Strengthening of the Mediterranean network of marine and coastal protected areas through the creation of new protected areas, and where appropriate the extension of existing ones, in accordance with the results of the Activity 2.1 (Identification of priority conservation areas).

Expected results: The creation by 2012 of a coherent and ecologically representative Mediterranean network of marine and coastal protected areas.

Implementation Calendar

Year 1		Year 2		Year 3		Year 4		Year 5	

This activity will be implemented by: The relevant national authorities of the Contracting Parties, with the support of partners (ACCOBAMS, IUCN, WWF-MedPO).

ELEMENT 3: To improve the management of the Mediterranean marine and coastal protected areas.

Proposed activity 3.1: Evaluation of the management of each Mediterranean marine and coastal protected area.

Expected results: (i) The management effectiveness of the Mediterranean marine and coastal protected areas is evaluated and (ii) recommendations for the improvement of the management of the Mediterranean MPAs.

Implementation Calendar

Year 1		Year 2		Year 3		Year 4		Year 5	

This activity will be implemented by: The relevant national authorities of the Contracting Parties, with the support of: partners (IUCN, WWF-MedPO, MedPAN)

Proposed activity 3.2: Training of the managers and other staff categories of Mediterranean marine and coastal protected areas. This activity will be carried out through the development and implementation of a regional training project whose components will be defined taking into account the gaps and needs identified under the Activity 1.1.

Expected results: The skills and qualifications of the managers and other categories of staff involved in the management of the Mediterranean marine and coastal protected areas are improved. As part of activity 3.2, a regional programme for the training of protected area staff will be developed.

Implementation Calendar

Year 1		Year 2		Year 3		Year 4		Year 5	

This activity will be implemented by: RAC/SPA, ACCOBAMS through the programme "Training to Trainers", sponsored by Italy, IUCN, MedPAN

<u>Proposed activity 3.3</u>: Elaboration of a regional strategy for the early warning, mitigation of an adaptation to the impacts of Climate change and Invasive species in the Mediterranean MPAs.

Expected results: The Mediterranean MPAS are adequately prepared to face the issues of Climate Change and Biological Invasions.

Implementation Calendar

Year 1		Year 2		Year 3		Year 4		Year 5	

This Activity will be implemented by: RAC/SPA, with the support of: partners (ACCOBAMS, IUCN, MedPAN)

<u>Proposed activity 3.4</u>: Establish a framework for exchange between Mediterranean MPA Managers.

Expected results: Exchange and technical mutual assistance between the Mediterranean MPAs managers improved.

Implementation Calendar

Year 1		Year 2		Year 3		Year 4		Year 5	

This activity will be implemented by: RAC/SPA and MedPAN

ELEMENT 4: To strengthen the protected area governance systems and further adapt them to national and regional contexts.

<u>Proposed activity 4.1</u>: Evaluate the existing protected area governance types in the Mediterranean countries.

Expected results: The protected areas governance systems analysed (strengths, weaknesses, lessons learned) and options for their improvement/strengthening evaluated.

Implementation Calendar

Year 1		Year 2		Year 3		Year 4		Year 5	

This activity will be implemented by: RAC/SPA. It will include assistance to countries to improve their national legislation in relation with the protected areas and the financing systems of their marine and coastal protected areas, with the support of partners (ACCOBAMS, IUCN, WWF-MedPO, MedPAN).

<u>Proposed activity 4.2</u>: Identify opportunities for the Mediterranean marine and coastal protected areas to contribute to the social and economic development at local and national scale, including poverty alleviation.

Expected results: Guidelines available to managers of marine and coastal protected areas on how better integrate their protected areas with their local context.

Implementation Calendar

Year 1		Year 2		Year 3		Year 4		Year 5	

This activity will be implemented by RAC/SPA Further activities will be implemented by other partners (ACCOBAMS, IUCN, MedPAN, WWF MedPO).

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