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VARSTVO NARAVE

REVIJA ZA TEORIJO IN PRAKSO
OHRANJANJA NARAVE

Suplement 1

NATURE CONSERVATION

A PERIODICAL FOR RESEARCH AND PRACTISE
OF NATURE CONSERVATION

LJUBLJANA
2011

VSEBINA/CONTENTS

PREFACE

The contracting parties to the Convention for the Protection of the Mediterranean Marine Environment and Coastal Area, better known as Barcelona Convention, adopted the »Regional work programme for coastal and sea protected areas in the Mediterranean, including the high sea« at their 9th session held in November 2009 in Marrakech, Morocco. The most important objective of the adopted programme was formation of a representative network of effectively managed marine protected areas in the Mediterranean. The programme signifies an additional tool, with which the contracting parties of the Barcelona Convention are to implement, in the ensuing years and decades, two important objectives of the Convention, i.e. to conserve biodiversity and to provide for sustainable development of the Mediterranean Sea area. At the same time, the programme calls for emplacement of the principles, goals and programmes of the Biodiversity Convention (the ecosystem approach principle, 2012 target, protected areas work programme) and the EU environmental policy into the Mediterranean area.

In the adopted programme, the Adriatic Sea is specified as one of the Mediterranean's seven ecoregions. The following step envisaged in the programme would be classification of priority conservation areas. These can be areas of great biotic diversity, habitats of endangered species, and other areas that meet the criteria for the stipulation of ecologically and biologically significant areas, adopted within the framework of the 8th Biodiversity Convention in Bonn, Germany.

With a wish to stimulate the process of defining ecologically and biologically significant areas in the Adriatic Sea and thus to contribute to the implementation of the *Regional work programme for the Mediterranean coastal and marine protected areas, including the open sea*, the Institute of the Republic of Slovenia for Nature Conservation decided to organise yet another workshop (after the two in 2006 and 2008), dedicated to the biodiversity conservation in the Adriatic, this time on the subject of marine and coastal protected areas. The organization of the workshop was enabled by the financial support of the Principality of Monaco and partially by the Regional Centre for Specially Protected Areas of the Barcelona Convention, which accepted the role of the session's co-organiser.

The introductory contributions were presented by Tullio Scovazzi, international law professor at the University of Milano, Chedly Rais, former scientific director of the Regional Centre for Protected Areas of the Barcelona Convention in Tunis, Giuseppe Notarbartolo di Sciara, president of the ACCOBAMS agreement professional council, Evangelos Papathanassiou, director of the Greek Sea Research Centre, and Joachim Claudet from the University of Perpignan.

Central topics of the session were professional backgrounds, formal and procedural methods, as well as manners and steps for the formation of a representative network of protected areas in the Adriatic. The meeting was attended by researchers, managers of marine and coastal protected areas, as well as representatives of governmental and non-governmental organisations from Croatia, Montenegro, Greece, Italy and Slovenia, and indirectly from Albania. The participants discussed both the methodology of stipulating priority conservation

areas in the Adriatic Sea and a more accurate specification of areas that were to create a representative network of protected marine areas in the Northern Adriatic.

In the current issue of our journal *Varstvo narave*, we have gathered a few contributions, poster summaries, prepared by the meeting's participants, as well as conclusions and recommendations that have been sent to all pertinent stakeholders and protagonists taking part in the process of forming representative and effectively managed networks of marine and coastal protected areas in the Adriatic Sea.

Robert Turk, MSc

PREDGOVOR

Države podpisnice Konvencije za varstvo morskega okolja in obalnega območja Sredozemlja, bolj znane z imenom Barcelonska konvencija, so na svojem 9. rednem srečanju, ki je potekalo novembra 2009 v Marakešu, sprejele »Regionalni delovni program za obrežna in morska zavarovana območja v Sredozemlju, vključno z odprtim morjem". Najpomembnejši cilj sprejetega programa je oblikovanje reprezentativne mreže učinkovito upravljanih morskih zavarovanih območij v Sredozemlju. Program pomeni dodatno orodje, s katerim naj bi države podpisnice Barcelonske konvencije v naslednjih letih in desetletjih uresničevale dva pomembna cilja konvencije, tj. ohranjanje biotske raznovrstnosti in zagotavljanje trajnostnega razvoja območja Sredozemskega morja. Obenem pa pomeni program tudi umestitev načel, ciljev in programov Konvencije o biotski raznovrstnosti (načelo ekosistemskega pristopa, cilj 2012, Delovni program za zavarovana območja) ter okoljske politike Evropske unije, v sredozemski prostor.

V sprejetem programu je Jadransko morje opredeljeno kot ena izmed sedmih ekoregij Sredozemlja. Naslednji korak, predviden v programu, bi bila opredelitev prednostnih območij z vidika ohranjanja narave - *priority conservation areas*. To so lahko območja velike biotske pestrosti, življenjski prostori ogroženih vrst in druga območja, ki ustrezajo kriterijem za opredeljevanje ekološko in biološko pomembnih območij, sprejetih v okviru 8. konvencije o biotski raznolikosti v Bonnu.

Z željo, da bi spodbudili proces opredeljevanja ekološko in biološko pomembnih območij v Jadranskem morju in s tem prispevali k uresničevanju *Regionalnega delovnega programa za obalna in morska zavarovana območja v Sredozemlju, vključno z odprtim morjem*, smo se na Zavodu RS za varstvo narave odločili, da po letih 2006 in 2008 organiziramo v oktobru 2010 še tretjo delavnico, posvečeno ohranjanju morske biotske raznovrstnosti v Jadranu, tokrat na temo morskih in obalnih zavarovanih območij. Organizacijo delavnice je finančno podprla Kneževina Monako, delno pa tudi Regionalni center za posebna območja varstva Barcelonske konvencije, ki je sprejel vlogo soorganizatorja srečanja.

Uvodne prispevke so predstavili Tullio Scovazzi, profesor mednarodnega prava na milanski univerzi, Chedly Rais, nekdanji znanstveni direktor Regionalnega centra za zavarovana območja Barcelonske konvencije v Tunisu, Giuseppe Notarbartolo di Sciara, predsednik strokovnega sveta dogovora ACCOBAMS, Evangelos Papathanassiou, direktor grškega centra za raziskave morja, in Joachim Claudet z Univerze v Perpignanu.

Osrednje teme srečanja so bile strokovne podlage ter formalni in proceduralni postopki, načini in koraki v smeri oblikovanja reprezentativne mreže morskih zavarovanih območij v Jadranu. Srečanja so se udeležili raziskovalci, upravljavci morskih in obalnih zavarovanih območij ter predstavniki vladnih in nevladnih organizacij iz Hrvaške, Črne gore, Grčije, Italije in Slovenije, ter posredno tudi iz Albanije. Udeleženci so razpravljali tako o metodologiji določanja prednostnih območij varovanja v Jadranskem morju kakor tudi v smeri natančnejše opredelitve območij, ki bi tvorila reprezentativno mrežo morskih zavarovanih območij v severnem Jadranu.

V tokratni številki Varstva narave so zbrani nekateri prispevki, povzetki posterjev, ki so jih pripravili udeleženci srečanja ter zaključki in priporočila, ki so bila poslana vsem pomembnim

deležnikom in akterjem procesa oblikovanja reprezentativne in učinkovito upravljane mreže morskih in obalnih zavarovanih območij v Jadranskem morju.

Mag. Robert Turk

For the attention of DG Environment and DG Research, the UNEP MAP Coordinating Unit, the RAC/SPA, the MAP and SPA National Focal Points, the Governments of the Adriatic Countries

CONCLUSIONS AND RECOMMENDATIONS FROM THE INTERNATIONAL WORKSHOP "TOWARDS A REPRESENTATIVE NETWORK OF MARINE PROTECTED AREAS IN THE ADRIATIC"

held in Piran, Slovenia, 28th and 29th October 2010

Taking into account the "Regional Working Programme for the Coastal and Marine Protected Areas in the Mediterranean including the High Sea", adopted by the Contracting Parties to the Barcelona Convention during their last Meeting in Marrakech in November 2009, the 2012 target was adopted within the framework of the Convention on Biological Diversity as well as within the environmental policy of the European Union.

The participants to the international workshop "Towards a representative network of MPAs in the Adriatic", through their interventions and discussions, agreed on the following:

The current situation of MPAs in the Adriatic (Mediterranean) is unsatisfactory in terms of their representativity and management.

The MPA agenda is progressing too slowly to be able to accomplish the goal of protecting the region's biodiversity in order to halt and reverse degradation effectively.

An evaluation at the national level of the status, the representativity and the effectiveness of the marine and coastal protected areas should be carried out throughout the Adriatic countries as soon as possible. National strategies that aim to ensure conservation for all types of marine biodiversity, including resources, should be elaborated, ensuring also that appropriate human and financial resources are made available to protected areas so they can meet their goals.

An *ad hoc* multi-disciplinary working group of experts should be set up that would:

- take stock of existing habitat inventorying and/or mapping initiatives in the area;
- initiate studies on connectivity throughout the Adriatic (habitat mapping, tagging, genetics etc.) and agree on a common assessment methodology and on a monitoring plan that could be conducted on a regular basis,
- use a precautionary approach when data limitation cannot be overcome within an appropriate time frame;
- identify missing scientific information concerning EBSAs and propose ways and means to secure this missing information, *and*
- based on the EBSA defined in the Adriatic, and the findings of the relevant recent investigations, further develop the identification of marine areas that could be proposed as SPAMIs.

The relevant organizations such as RAC/SPA, IUCN, WWF, etc. are invited to provide support and facilitate the setting up of this working group as well as the progress of the work.

The administrative and legal constraints to the establishment of SPAMIs in areas beyond the territorial waters, including deep waters, should be identified.

Based on the national strategies and regularly updated with newly achieved scientific information, a sub regional (Adriatic) strategy with the aim to ensure conservation for all types of marine habitats in the Adriatic should be elaborated and implemented through existing or newly developed frameworks.

Beside the development of a representative network of MPAs, it is of uttermost importance in terms of conservation that the national strategies, as well as the regional one, focus also on a better governance system outside MPAs. In this context, the EU Integrated Maritime Policy, in particular Marine Spatial Planning (MSP), has the potential to help further integrating the MPAs with the other sea uses. Identification, design and effective management of MPAs should be included as a priority in the process of Marine Spatial Planning.

V vednost naslednjih inštitucij:

DG Environment in DG Research, UNEP MAP Coordinating Unit, RAC/SPA, MAP in SPA National Focal Points, vlade jadranskih držav

ZAKLJUČKI IN PRIPOROČILA Z MEDNARODNE DELAVNICE "OBLIKOVANJE REPREZENTATIVNE MREŽE MORSKIH ZAVAROVANIH OBMOČIJ V JADRANSKEM MORJU",

ki je potekala 28. in 29. oktobra 2010 v Piranu

Upoštevaje "Regionalni delovni program za obrežna in morska zavarovana območja v Sredozemlju, vključno z odprtim morjem", ki so ga sprejele države podpisnice Barcelonske konvencije na svojem 9. rednem srečanju, ki je potekalo novembra 2009 v Marakešu, so bili začrtani cilji 2012 v okviru Konvencije o biotski pestrosti in tudi v okviru okoljske politike Evropske unije.

Udeleženci delavnice "Oblikovanje reprezentativne mreže morskih zavarovanih območij v Jadranu" so se med razpravami strinjali o naslednjem:

Trenutno stanje morskih zavarovanih območij je nezadovoljivo glede na njihovo upravljanje in reprezentativnost.

Program morskih zavarovanih območij poteka prepočasi, da bi lahko dosegli zastavljeni cilj zaščite biotske raznovrstnosti v regiji in učinkovito zaustavili proces degradacije okolja.

V vseh jadranskih državah bi morali na nacionalni ravni kar najhitreje opraviti oceno stanja, reprezentativnosti in učinkovitosti morskih in obrežnih zavarovanih območij. Pripraviti bi morali nacionalne strategije, ki naj bi zagotovile ohranitev vseh tipov morske biotske pestrosti, vključno z naravnimi viri, in zagotoviti vse ustrezne človeške in finančne vire za zavarovana območja, če želimo doseči zastavljene cilje.

V ta namen bi morala biti ustanovljena multidisciplinarna delovna skupina izvedencev, ki bi:

- popisala obstoječe habitate in pobude v območju;
- spodbudila študije o povezanosti prek celega Jadrana (kartiranje habitatov, obročkanje, genetika itd.) in se dogovoriti o skupni metodologiji ocenjevanja kot tudi o načrtu monitoringa, ki bi ga lahko izpeljali na redni osnovi,
- uporabiti varnostni pristop, kadar omejitve podatkov ni mogoče premagati v ustreznem časovnem okviru;
- opredeliti manjkajoče znanstvene podatke glede EBSA (ecologically and biologically significant areas)in predlagati načine, kako zagotoviti manjkajoče podatke, in
- na osnovi EBSA, opredeljenih v Jadranu, in ugotovitev nedavnih pomembnejših raziskovanj nadalje razviti identifikacijo morskih območij, ki bi jih lahko predlagali kot sredozemsko pomembna posebna območja varstva (SPAMI - Specially Protected Areas of Mediterranean Importance).

Za podporo in pomoč pri ustanavljanju te delovne skupine in njenem delu so vljudno vabljene pomembne organizacije, kot so RAC/SPA, IUCN in WWF.

Identificirane bi morali biti administrativne in pravne ovire pri ustanavljanju SPAMI-jev v območjih onkraj teritorialnih voda, vključno z globokomorskimi območji.

Na osnovi nacionalnih strategij, redno "posodobljenih" z na novo doseženimi znanstvenimi informacijami, bi bilo treba z namenom, da se zagotovi zaščita za vse tipe morskih habitatov v Jadranu, pripraviti in tudi uresničiti subregionalno (jadransko) strategijo znotraj že obstoječih ali na novo razvitih okvirov.

Poleg razvoja reprezentativne mreže morskih zavarovanih območij je v naravovarstvenem pogledu nadvse pomembno, da se nacionalne strategije (in regijska) osredotočijo tudi na boljše upravljanje sistema zunaj morskih zavarovanih območij. V tem kontekstu ima enotna morska politika Evropske unije (EU Integrated Maritime Policy) , še posebej pa morsko prostorsko načrtovanje (Marine Spatial Planning - MSP), vse možnosti, da pomaga pri nadaljnjem združevanju morskih zavarovanih območij z drugimi rabami morja. V proces morskega prostorskega načrtovanja bi morali prednostno vključiti opredelitev, označevanje in učinkovito upravljanje morskih zavarovanih območij.

THE REGIONAL DIMENSION OF ENVIRONMENTAL GOVERNANCE: THE CASE OF THE MEDITERRANEAN SEA

REGIONALNA RAZSEŽNOST OKOLJSKEGA UPRAVLJANJA: PRIMER SREDOZEMSKEGA MORJA

Tullio SCOVAZZI

Key words: Mediterranean Sea, UNCLOS, Barcelona Convention, Specially Protected Areas

Ključne besede: Sredozemsko morje, UNCLOS, Barcelonska konvencija, posebna območja varstva

ABSTRACT

The so-called Barcelona system, composed of a framework Convention and seven Protocols, is a notable instance of fulfilment of the obligation to co-operate for the protection of a semi-enclosed sea. While presenting several innovative aspects, the legal instruments applying to the protection of the Mediterranean environment are consistent with the general principles and objectives of the United Nations Convention on the Law of the Sea to which they bring an added value. The Protocols relate respectively to pollution by dumping from ships and aircraft or incineration at sea, pollution from ships, pollution from land-based sources and activities, specially protected areas and biodiversity, pollution from exploration and exploitation of the continental shelf, the seabed and its subsoil, pollution by transboundary movements of hazardous wastes and their disposal, and integrated coastal zone management. A notable remark is that UNEP Mediterranean Action Plan is broadening its scope. At their 2009 meeting, the parties adopted the Marrakesh Declaration which aims at promoting a better regional environmental governance, especially to meet the future challenges of climate change. The parties declared themselves also concerned by the serious threats to the environment that are confronting the Mediterranean, including the destruction of its biodiversity, adverse effects on the countryside, coastline and water resources, soil degradation, desertification, coastal erosion, eutrophication, pollution from land-based sources, negative impacts related to the growth of maritime traffic, the over-exploitation of natural resources, the harmful proliferation of algae or other organisms, and the unsustainable exploitation of marine resources.

IZVLEČEK

Tako imenovani Barcelonski sistem, ki sestoji iz okvirne konvencije in sedmih protokolov, je pomemben primer izpolnjevanja obveznosti do sodelovanja pri zaščiti polzaprtega morja. Pravna orodja, ki zadevajo zaščito sredozemskega okolja z vrsto inovativnih pristopov, so sicer v skladu s splošnimi principi in cilji Konvencije Združenih narodov o Zakonu o morju in ji prinašajo dodano vrednost. Protokoli zadevajo onesnaževanje z odpadki, odvrženimi z ladij in letal ali njihovim sežiganjem na morju, ladijsko onesnaževanje, onesnaževanje z viri in dejavnostmi s kopnega, posebna območja varstva in biotsko pestrost, onesnaževanje zaradi raziskovanja in izkoriščanja celinske police, morskega dna in njegovega podtalja, onesnaževanje zaradi čezmejnega prevažanja nevarnih odpadkov in njihovega odlaganja, in celostno upravljanje obalnega pasu. Pri tem pa je pomembno, da sredozemski akcijski načrt UNEP-a (Okoljskega programa Združenih narodov) širi svojo pristojnost. Države podpisnice Barcelonske konvencije so na svojem 9. rednem srečanju, ki je potekalo leta 2009 v Maroku, sprejele tako imenovano Marakeško deklaracijo, katere cilj je pospeševanje boljšega regionalnega okoljskega upravljanja in še posebno spoprijemanje s prihodnjimi izzivi klimatskih sprememb. Države podpisnice so hkrati izrazile veliko zaskrbljenost zaradi resne

ogroženosti sredozemskega okolja, vključno z uničevanjem njegove biotske raznovrstnosti, škodljivimi posledicami za njegovo pokrajino, obalo in vodne vire, degradacijo tal, dezertifikacijo, obalno erozijo, evtrofikacijo, onesnaževanjem s kopenskimi viri, negativnimi učinki, povezanimi z morskim prometom, pretiranim izkoriščanjem naravnih virov, škodljivo bujno rastjo alg in drugih organizmov, in netrajnostnim izkoriščanjem morskih virov.

1. THE IMPLEMENTATION OF A GENERAL OBLIGATION AT THE REGIONAL LEVEL

The Mediterranean is a regional sea surrounded by the territories of twenty-two States[1]. The bordering countries, all of which have ancient historical and cultural traditions, differ as far as their internal political systems and levels of economic development are concerned. Highly populated cities, ports of worldwide significance, extended industrial areas and renowned holiday resorts are located along the Mediterranean shores. Important routes of international navigation pass through the Mediterranean waters, which connect the Atlantic and the Indian Oceans through the strait of Gibraltar and the Suez Canal. The Mediterranean region is an area of major strategic importance and, in certain cases, of high political tension. The protection of the Mediterranean environmental balance, which is particularly fragile because of the very slow exchange of waters, is of a particularly serious concern.

As regards the legal framework applying to the Mediterranean environment, under the United Nations Convention on the Law of the Sea (Montego Bay, 1982)[2], "States have the obligation to protect and preserve the marine environment" (Art. 192)[3]. To this aim, they are bound to co-operate on a global and, as appropriate, regional basis in formulating and elaborating international rules, standards and recommended practices and procedures, taking into account characteristic regional features (Art. 197)[4]. These general obligations must be fulfilled through the adoption, individually or jointly, of measures addressing pollution from all sources, such as the operation of ships, land-based activities, exploitation of the sea-bed, dumping of wastes.

In general terms, an obligation to co-operate implies a duty to act in good faith in pursuing a common objective and in taking into account the requirements of the other interested States. In practice, such an obligation can have several facets (information, consultation, negotiation,

[1] Spain, the United Kingdom (as far as Gibraltar and the sovereign base areas of Akrotiri and Dhekelia are concerned), France, Monaco, Italy, Malta, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro, Albania, Greece, Cyprus, Turkey, Syria, Lebanon, Israel, Egypt, Libya, Tunisia, Algeria, Morocco. This paper does not consider the Black Sea, a semi-enclosed sea connected to the Mediterranean by the straits of Dardanelles and Bosphorus.

[2] Hereinafter: UNCLOS.

[3] The UNCLOS also provides that States are bound to take measures "necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life" (Art. 194, para. 5).

[4] Part IX of the UNCLOS, relating to enclosed or semi-enclosed seas, confirms that international co-operation in several fields, including the protection of the environment, is particularly suited in the case of countries surrounding the same regional sea. The Mediterranean fully fits the definition of enclosed or semi-enclosed sea, namely "a gulf, basin or sea surrounded by two or more States and connected to another sea or the ocean by a narrow outlet or consisting entirely or primarily of the territorial seas and exclusive economic zones of two or more coastal States". (Art. 122).

joint participation in preparing environmental impact assessments or emergency plans), depending on the different instances.

As remarked by the International Court of Justice, "the parties are under an obligation to enter into negotiations with a view to arriving at an agreement, and not merely to go through a formal process of negotiation (...); they are under an obligation so to conduct themselves that the negotiations are meaningful, which will not be the case when either of them insists upon its own position without contemplating any modification of it"[5].

The obligation to co-operate applies to both the global and the regional basis. While general concerns need to be faced on a world scale, regional or sub-regional treaties are the best tool to take into account the peculiarities of a specific marine area. The number of treaties, which have so far been concluded to protect the marine environment, is ever increasing. In many regional seas, both treaties having a worldwide scope and treaties having a regional (or even sub-regional) scope are applicable at the same time. It often happens that the same subject matter (for example, pollution from dumping) is regulated by two or more treaties and that complex legal questions of coordination arise[6].

Luckily enough, the UNCLOS, the only global treaty on the law of the sea, specifies that its provisions on the protection of the environment are without prejudice to the specific obligations assumed by States under special conventions and agreements concluded previously which relate to the protection and preservation of the marine environment, and to agreements which may be concluded in furtherance of the general principles set forth in the UNCLOS itself (Art. 237, para. 1). It adds that specific obligations assumed by States under special conventions, with respect to the protection and preservation of the marine environment, should be carried out in a manner consistent with the general principles and objectives of the UNCLOS (Art. 237, para. 2).

While presenting several innovative aspects, the legal instruments applying to the protection of the Mediterranean environment, belonging to the so-called Barcelona system, are consistent with the general principles and objectives of the UNCLOS, to which they bring an added value.

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[5] Para. 85 of the judgment of 20 February 1969 on the *North Sea Continental Shelf* case. In another case, the International Tribunal for the Law of the Sea found that the parties were bound, as a provisional measure, to enter into consultations with regard to possible consequences arising out of the commissioning of a nuclear plant (para. 89 of the order of 3 December 2001 on the *MOX Plant* case). The Tribunal confirmed that the duty to co-operate is a fundamental principle in the prevention of pollution of the marine environment under the UNCLOS and general international law (*ibid.*, para. 82).

[6] As provided for in the 1969 Vienna Convention on the law of treaties, the legal tools for tackling the problem of potentially overlapping treaties derive from the combination of different criteria (*ratione temporis*, *ratione personae* and *ratione materiae*, to speak in Latin). A conflict between treaties arises only if two successive treaties have been concluded by the same parties and regulate in a different way the same subject-matter. From a logical point of view and assuming, for the sake of simplicity, that all the parties to the earlier treaty are also parties to the later one, the following questions need to be addressed: *a*) whether the provisions of two different treaties relate to the same subject-matter; *b*) if so, whether one of the two treaties specifies that it is subject to the other; *c*) if not, whether the two provisions in question are really incompatible, considering that the special rules (with respect to their subject matter or their territorial application) prevail over the general ones; *d*) finally, if the provisions in question remain incompatible, those of the later treaty prevail.

2. THE BARCELONA SYSTEM

The Barcelona system[7] is a notable instance of fulfilment of the obligation to co-operate for the protection of a semi-enclosed sea[8].

On 4 February 1975, a policy instrument, the Mediterranean Action Plan (MAP), was adopted by an intergovernmental meeting convened in Barcelona by the United Nations Environment Programme (UNEP). One of the main objectives of the MAP was to promote the conclusion of a framework convention, together with related protocols and technical annexes, for the protection of the Mediterranean environment. This was done on 16 February 1976, when the Convention on the Protection of the Mediterranean Sea against Pollution and two protocols were opened to signature in Barcelona. The Convention, which entered into force on 12 February 1978, is chronologically the first of the so-called regional seas agreements concluded under the auspices of UNEP.

In the years following the Rio Conference on Environment and Development (1992), several components of the Barcelona system underwent important changes. In 1995, the MAP was replaced by the "Action Plan for the Protection of the Marine Environment and the Sustainable Development of the Coastal Areas of the Mediterranean (MAP Phase II)". Some of the legal instruments were amended. New protocols were adopted either to replace the protocols which had not been amended or to cover new subjects of cooperation. The present Barcelona legal system includes a framework convention and seven protocols, specifically:

a) the Convention on the Protection of the Mediterranean Sea against Pollution which, as amended in Barcelona on 10 June 1995, changes its name into Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean[9] (the amendments entered into force on 9 July 2004);

b) the Protocol for the Prevention of the Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft (Barcelona, 16 February 1976; in force from 12 February 1978), which, as amended in Barcelona on 10 June 1995, changes its name into Protocol for the Prevention and Elimination of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft or Incineration at Sea[10] (the amendments are not yet in force[11]);

c) the Protocol Concerning Co-operation in Combating Pollution of the Mediterranean Sea by Oil and Other Harmful Substances in Cases of Emergency (Barcelona, 16 February

[7] On the Barcelona system see RAFTOPOULOS, *Studies on the Implementation of the Barcelona Convention: The Development of an International Trust Regime*, Athens, 1997; JUSTE RUIZ, *Regional Approaches to the Protection of the Marine Environment*, in *Thesaurus Acroasium*, 2002, p. 402; RAFTOPOULOS & McCONNELL (eds.), *Contributions to International Environmental Negotiation in the Mediterranean Context*, Athens, 2004; SCOVAZZI, *The Developments within the "Barcelona System" for the Protection of the Mediterranean Sea against Pollution*, in *Annuaire de Droit Maritime et Océanique*, 2008, p. 201.

[8] Other treaties, that do not belong to the Barcelona system, are relevant for the Mediterranean marine environment, such as, the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (Monaco, 1996; so-called ACCOBAMS) and, on the sub-regional level, the Agreement between France, Italy and Monaco on the protection of the waters of the Mediterranean shore (Monaco, 1976; so-called RAMOGE).

[9] Hereinafter: the Convention.

[10] Hereinafter: the Dumping Protocol.

[11] The amendments will enter into force on the thirtieth day following the receipt by the depositary of notification of their acceptance by three fourth of the parties to the amended protocol.

1976; in force from 12 February 1978), which has been replaced by the Protocol Concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea (Valletta, 25 January 2002[12]; in force from 17 March 2004);

d) the Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources (Athens, 17 May 1980; in force from 17 June 1983), which, as amended in Syracuse on 7 March 1996, changes its name into Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities[13] (in force from 11May 2008);

e) the Protocol Concerning Mediterranean Specially Protected Areas (Geneva, 1 April 1982; in force from 23 March 1986), which has been replaced by the Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean (Barcelona, 10 June 1995[14]; in force from 12 December 1999);

f) the Protocol Concerning Pollution Resulting from Exploration and Exploitation of the Continental Shelf, the Seabed and its Subsoil (Madrid, 14 October 1994[15]; in force from 24 March 2011);

g) the Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal (Izmir on 1 October 1996[16]; in force from 18 December 2007);

h) the Protocol on Integrated Coastal Zone Management in the Mediterranean (Madrid, 21 January 2008[17]; in force from 24 March 2011).

The updating and the additions to the Barcelona legal system show that the parties consider it a dynamic body capable of being subject to re-examination and improvement, whenever appropriate[18]. Each of the new instruments contains important innovations, which will be reviewed hereunder. The protocols even display a certain degree of legal imagination in finding constructive ways to address complex environmental problems.

3. THE CONVENTION

The Convention, as amended in 1995, retains its character of a framework treaty that has to be implemented through specific protocols. It also retains what in 1976 was seen as a major innovation, that is the possibility of participation by the European Economic Community (now the European Community, EC) and by similar regional economic groupings at least one member of which is a coastal State of the Mediterranean Sea and which exercise competence

[12] Hereinafter: the Emergency Protocol.
[13] Hereinafter: the Land-Based Protocol.
[14] Hereinafter: the Areas Protocol.
[15] Hereinafter: the Seabed Protocol.
[16] Hereinafter: the Wastes Protocol.
[17] Hereinafter: the Coastal Zone Protocol.
[18] The Barcelona system also includes some “soft law” instruments . For instance, on 18 January 2008, the meeting of the parties to the Convention, held in Almeria, adopted a set of Guidelines for the Determination of Liability and Compensation for Damage resulting from Pollution of the Marine Environment in the Mediterranean Sea Area.

in fields covered by the Convention (Art. 30). In fact, the EC is a party to the Convention and some of its protocols, together with seven Mediterranean States which are members of this organization (Cyprus, France, Greece, Italy, Malta, Slovenia and Spain).

In 1995, the geographical coverage of the Convention was extended to include all maritime waters of the Mediterranean Sea, irrespective of their legal condition[19]. However, the sphere of territorial application of the Barcelona legal system is flexible, in the sense that any protocol may extend the area to which it applies. For example, and for obvious reasons, the Seabed Protocol applies also to the continental shelf, the seabed and its subsoil. The Land-Based Protocol applies also to the "hydrologic basin" of the Mediterranean Sea Area, this being "the entire watershed area within the territories of the Contracting Parties, draining into the Mediterranean Sea Area". The application of the Convention may also be extended to "coastal areas as defined by each Contracting Party within its own territory", as it was recently done with the Coastal Zone Protocol.

The amended text of the Convention recalls and applies to a regional scale the main concepts embodied in the instruments adopted by the 1992 Rio Conference (the Declaration on Environment and Development and the Programme of action "Agenda 21"), such as sustainable development, the precautionary principle, the integrated management of the coastal zones; the use of best available techniques and best environmental practices, as well as the promotion of environmentally sound technology, including clean production technologies. For the purpose of implementing the objectives of sustainable development, the parties are called to take fully into account the recommendations of the Mediterranean Commission on Sustainable Development, a new body established within the framework of the MAP, Phase II.

A new provision (Art. 15) relates to the right of the public to have access to information on the state of the environment and to participate in the decision-making processes relevant to the field of application of the Convention and the protocols. Nothing, however, is said as regards the equally important question of access of the public to justice.

Compliance with the Convention and the protocols, as well as with the decisions and recommendations adopted during the meetings of the parties, is assessed on the basis of the periodical reports that the parties are bound to transmit to the UNEP at regular intervals[20]. Such reports, which are examined by the biannual meetings of the parties, relate to the legal, administrative or other measures taken by the parties, their effectiveness and the problems encountered in their implementation. The meeting of the parties can recommend, when appropriate, the necessary steps to bring about full compliance with the Convention and the protocols and to promote the implementation of decisions and recommendations (Arts. 26 and 27). Specific reporting obligations are found in the protocols (see, for example, Art. 23 of the Areas Protocol).

In 2008, the Meeting of the parties adopted the procedures and mechanisms on compliance and established a compliance committee. The objective is "to facilitate and promote compliance

[19] Taking into consideration the present multiform legislation of Mediterranean States, such waters can have the legal condition of maritime internal waters, territorial seas, fishing zones, ecological protection zones, exclusive economic zones or high seas.

[20] The secretariat functions are carried out by the UNEP (Art. 17), through the UNEP/MAP, located in Athens.

with the obligations under the Barcelona Convention and its Protocols, taking into account the specific situation of each Contracting Party, in particular those which are developing countries"[21].

4. THE DUMPING PROTOCOL

The Dumping Protocol applies to any deliberate disposal of wastes or other matter from ships or aircraft, with the exception of wastes or other matters deriving from the normal operations of vessels or aircraft and their equipment which are considered as pollution from ships. The protocol, as amended in 1995, presents two major changes with respect to the previous text.

First, the protocol applies also to incineration at sea, which is prohibited (Art. 7). It is defined as "the deliberate combustion of wastes or other matter in the maritime waters of the Mediterranean Sea, with the aim of thermal destruction and does not include activities incidental to the normal operations of ships and aircraft".

Second, the protocol is based on the idea that the dumping of wastes or other matter is in principle prohibited, with the exception of five categories of matters specifically listed, such as dredged materials, fish waste, inert uncontaminated geological materials. The original protocol was based on the idea that dumping was in principle permitted, with the exception of the prohibited matters listed in Annex I (the so-called black list) and the matters listed in Annex II (the so-called grey list), which required a prior special permit. The logic of the original text is thus fully reversed in order to ensure a better protection of the environment[22].

5. THE LAND-BASED PROTOCOL

The Land-Based Protocol applies to discharges originating from land-based points and diffuse sources and activities. Such discharges reach the sea through coastal disposals, rivers, outfalls, canals or other watercourses, including groundwater flow, or through run-off and disposal under the seabed with access from land.

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[21] See PAPANICOLOPULU, *Procedures and Mechanism on Compliance under the 1976/1995 Barcelona Convention on the Protection of the Mediterranean Sea and its Protocols*, in TREVES, PINESCHI, TANZI, PITEA, RAGNI & ROMANIN JACUR (eds.), *Non-Compliance Procedures and Mechanisms and the Effectiveness of International Environmental Agreements*, The Hague, 2009, p. 155.

[22] On the world level, the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Wastes and Other Matter (London, Mexico City, Moscow, Washington, 1972) introduces a similar reversal of the logic followed in the parent convention. It is also based on the assumption that the parties shall prohibit the dumping of any wastes or other matter with the exception of those listed in an annex. In the 2000 report on Oceans and the law of the sea by the United Nations Secretary-General, the 1996 Protocol was seen as a "milestone in the international regulations on the prevention of marine pollution by dumping of wastes" and "a major change of approach to the question of how to regulate the use of the sea as a depository for waste materials" (U.N. doc. A/55/61 of 20 March 2000, para. 159). The same words could be said about the Mediterranean Dumping Protocol as well.

The Protocol, as amended in 1996, takes into account the objectives laid down in the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, adopted in Washington in 1995 by a UNEP intergovernmental conference. The Programme is designed to assist States in taking individual or joint actions leading to the prevention, reduction and elimination of what is commonly regarded as the main source (about 80%) of pollution of the marine environment[23].

As already said[24], the amended protocol enlarges its application to the "hydrologic basin of the Mediterranean Sea Area". To face land-based pollution of the sea, action must primarily be taken where the polluting sources are located, that is on the land territory of the parties. The Land-Based Protocol provides that parties shall invite States that are not parties to it and have in their territories parts of the hydrological basin of the Mediterranean Area to cooperate in the implementation of the protocol. But a party cannot be held responsible for any pollution originating in the territory of a non-party State.

With the aim of eliminating pollution deriving from land-based sources, the parties "shall elaborate and implement, individually or jointly, as appropriate, national and regional action plans and programmes, containing measures and timetables for their implementation" (Art. 5, para. 2). The parties shall give priority to the phasing out of inputs of substances that are toxic, persistent and liable to bioaccumulate (Art. 1). These kinds of substances were not specifically mentioned in the original protocol.

The amended protocol was the subject of extensive negotiations – not only among the parties but also between the non-governmental environmentalist organizations and the organizations representing the chemical industry – as regards the crucial question on how to implement the obligation "to prevent, abate, combat and eliminate to the fullest possible extent pollution". Finally the following solution was found satisfactory by everybody. On the one hand, the environmentalists accepted that their initial request, that is an absolute ban by the year 2005 of any kind of discharge and emission of substances which are toxic, persistent and liable to bioaccumulate, would be impossible to achieve because of its serious economic and social repercussions. On the other hand, the chemical industry agreed to be bound by measures and timetables having a legally obligatory nature, provided that they were related to specific groups of substances and were adapted to the specific requirements of the different instances.

The procedural machinery to achieve what was agreed upon is embodied in Art. 15. It provides that the meeting of the parties adopts, by a two-thirds majority, the short-term and medium-term regional plans and programmes, containing measures and timetables for their implementation, in order to eliminate pollution deriving from land-based sources and

[23] The Global Programme of Action strongly encourages action on a regional level as crucial for successful actions to protect the marine environment from pollution from land-based activities: "This is particularly so where a number of countries have coasts in the same marine and coastal area, most notably in enclosed or semi-enclosed seas. Such cooperation allows for more accurate identification and assessment of the problems in particular geographic areas and more appropriate establishment of priorities for action in these areas. Such cooperation also strengthens regional and national capacity-building and offers an important avenue for harmonizing and adjusting measures to fit the particular environmental and socio-economic circumstances. It, moreover, supports a more efficient and cost-effective implementation of the programmes of action" (para. 29).

[24] *Supra*, para. 3.

activities, in particular to phase out inputs of substances that are toxic, persistent and liable to bioaccumulate. These measures and timetables become binding on the 180th day following the date of their notification for all the parties, which have not notified an objection. The result is a mechanism that is intended to be both realistic and effective.

Major changes were also made with respect to the annexes. Annex I relates to the "Elements to be taken into account in the preparation of action plans, programmes and measures for the elimination of pollution from land-based sources and activities". It provides that in preparing action plans, programmes and measures, the parties "will give priority to substances that are toxic, persistent and liable to bioaccumulate, in particular to persistent organic pollutants (POPs), as well as to wastewater treatment and management". It lists nineteen categories of substances and sources of pollution, which will serve as guidance in the preparation of action plans, programmes and measures, including, as first entry, the organohalogen compounds and substances which may form such compounds in the marine environment[25]. Annex II relates to the "Elements to be taken into account in the issue of the authorizations for discharges of wastes" and Annex III to the "Conditions of application to pollution transported through the atmosphere". Finally, Annex IV gives the "Criteria for the definition of best available techniques and best environmental practice"[26].

6. THE AREAS PROTOCOL

Several international policy instruments stress that marine protected areas are one of the means to put into effect the principle of sustainable development. For example, the Implementation Plan adopted by the World Summit on Sustainable Development (Johannesburg, 2002) invites States to "develop and facilitate the use of diverse approaches and tools, including (...) the establishment of marine protected areas consistent with international law and based on scientific information, including representative networks by 2012".

Among the relevant legal instruments, the 1982 United Nations Convention on the Law of the Sea provides that the measures to be taken for the protection of the marine environment include "those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life" (Art. 194, para. 5).

In the case of the Mediterranean, the 1995 Areas Protocol is very different from the previous 1982 protocol, and formally distinct from it[27]. The new protocol is applicable to all the marine

[25] Priority is given to Aldrin, Chlordane, DDT, Dieldrin, Dioxins and Furans, Endrin, Hexachlorobenzene, Mirex, PCBs and Toxaphene.

[26] The criteria listed in Annex IV of the Land-Based Protocol are literally taken from the Convention for the Protection of the Marine Environment of the North-East Atlantic (Paris, 1992; so-called OSPAR Convention). In fact, the State which proposed the criteria in question simply presented a photocopy of the relevant OSPAR annex. However, unlike the case of literary works, copying is by no means illegal in the process of drafting a legal text. In the case in question, copying was tantamount to paying tribute to the wisdom of the drafters of another regional sea treaty.

[27] The 1995 Areas Protocol implements the objectives set forth in Agenda 21. According to this instrument, States,

waters of the Mediterranean, irrespective of their legal condition, as well as to the seabed, its subsoil and to the terrestrial coastal areas designated by each party, including wetlands. On the contrary, the application of the 1982 protocol was limited to the territorial sea of the parties and did not cover the high seas. The extension of the geographical coverage of the instrument was seen necessary to protect also those highly migratory marine species (such as marine mammals) which, because of their natural behaviour, cross the artificial boundaries drawn by man on the sea.

The purpose to establish marine protected areas also on the high seas gave rise to some difficult legal problems due to the lack of territorial jurisdiction in these waters. As some coastal States have not yet established their exclusive economic zone, there are in the Mediterranean extents of waters located beyond the 12-mile limit of the territorial sea, which still have the status of high seas. However, if all coastal States proclaimed an exclusive economic zone, the high seas would disappear in the Mediterranean, as no point in this semi-enclosed sea is located more than 200 n.m. from the nearest land or island. Another delicate question was the possibility to establish marine protected areas in waters where the maritime boundaries have yet to be agreed upon by the interested countries. In the Mediterranean there are several cases where a delimitation of the territorial seas or other maritime zones is particularly complex because of the local geographic characteristics.

In order to overcome these difficulties, the new protocol includes two very elaborate disclaimer provisions (Art. 2, paras. 2 and 3), which have two important aims. First, the establishment of intergovernmental cooperation in the field of the marine environment cannot prejudice other legal questions, which have a different nature and are still pending, such as those relating to the nature and extent of marine jurisdictional zones or to the drawing of marine boundaries between adjacent or opposite States. Second, the very existence of such legal questions cannot jeopardize or delay the adoption of measures necessary for the preservation of the ecological balance of the Mediterranean.

The Areas Protocol provides for the establishment of a List of specially protected areas of Mediterranean importance (SPAMI List)[28]. The SPAMI List may include sites which "are of importance for conserving the components of biological diversity in the Mediterranean; contain ecosystems specific to the Mediterranean area or the habitats of endangered species; are of special interest at the scientific, aesthetic, cultural or educational levels". The procedures for

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acting individually, bilaterally, regionally or multilaterally and within the framework of IMO and other relevant international organizations, should assess the need for additional measures to address degradation of the marine environment. This should be done, inter alia, by taking action to ensure respect of areas which are specially designated, consistent with international law, in order to protect and preserve rare or fragile ecosystem (para. 17.30). Agenda 21 stresses the importance of protecting and restoring endangered marine species, as well as preserving habitats and other ecologically sensitive areas, both on the high seas (para. 17.46, *e*, *f*) and in the zones under national jurisdiction (para. 17.75, *e*, *f*). In particular, "States should identify marine ecosystems exhibiting high levels of biodiversity and productivity and other critical habitat areas and provide necessary limitations on use in these areas, through, inter alia, designation of protected areas" (para. 17.86). On the protocol see SCOVAZZI (ed.), *Marine Specially Protected Areas - The General Aspects and the Mediterranean Regional System*, The Hague, 1999; BOU FRANCH & BADENES CASINO, *La protección internacional de zonas y especies en la región mediterránea*, in *Anuario de Derecho Internacional*, 1997, p. 33.

[28] The existence of the SPAMI List does not prejudice the right of each party to create and manage marine protected areas which are not intended to be listed as SPAMIs.

the establishment and listing of SPAMIs are specified in detail in the protocol. For instance, as regards an area located partly or wholly on the high seas, the proposal must be made "by two or more neighbouring parties concerned" and the decision to include the area in the SPAMI List is taken by consensus by the contracting parties during their periodical meetings.

Once the areas are included in the SPAMI List, all the parties agree "to recognize the particular importance of these areas for the Mediterranean" and – this is also important – "to comply with the measures applicable to the SPAMIs and not to authorize nor undertake any activities that might be contrary to the objectives for which the SPAMIs were established". This gives to the SPAMIs and to the measures adopted for their protection an *erga omnes partes* effect. As regards the relationship with third countries, the parties are called to "invite States that are not Parties to the Protocol and international organizations to cooperate in the implementation" of the protocol. They also "undertake to adopt appropriate measures, consistent with international law, to ensure that no one engages in any activity contrary to the principles and purposes" of the protocol. This provision aims at facing the potential problems arising from the fact that treaties, including the Areas Protocol, can create rights and obligations only among parties.

The Areas Protocol is completed by three annexes, which were adopted in 1996 in Monaco. They are the "Common criteria for the choice of protected marine and coastal areas that could be included in the SPAMI List" (Annex I), the "List of endangered or threatened species" (Annex II), and the "List of species whose exploitation is regulated" (Annex III).

At the Meeting of the Contracting Parties held in 2001, the first twelve SPAMIs were inscribed in the SPAMI List, namely the island of Alborán (Spain), the sea bottom of the Levante de Almería (Spain), Cape Gata-Nijar (Spain), Mar Menor and the East coast of Murcia (Spain), Cape Creus (Spain), Medas Islands (Spain), Columbretes Islands (Spain), Port-Cros (France), the Kneiss Islands (Tunisia), La Galite, Zembra and Zembretta (Tunisia) and the French-Italian-Monegasque sanctuary for marine mammals (so-called Pelagos sanctuary, jointly proposed by the three States concerned and covering also high seas waters[29]). Other SPAMIs have subsequently been added, namely the Cabrera Archipelago (Spain) and Maro-Cerro

[29] On 25 November 1999 France, Italy and Monaco signed in Rome an Agreement on the creation in the Mediterranean sea of a sanctuary for marine mammals. This is the first international agreement ever adopted with the specific objective of establishing a sanctuary for marine mammals. The area covered by the sanctuary, which extends over 96,000 km2, includes waters which have the legal status of maritime internal waters, territorial sea, ecological protection zone and high seas. It is inhabited by the eight cetacean species regularly found in the Mediterranean, namely the fin whale (*Balaenoptera physalus*), the sperm whale (*Physeter catodon*), Cuvier's beaked whale (*Ziphius cavirostris*), the long-finned pilot whale (*Globicephala melas*), the striped dolphin (*Stenella coeruleoalba*), the common dolphin (*Delphinus delphis*), the bottlenose dolphin (*Tursiops truncatus*) and Risso's dolphin (*Grampus griseus*). In this area, the water currents create conditions favouring phytoplankton growth and abundance of krill (*Meganyctiphanes norvegica*), a small shrimp that is preyed upon by pelagic vertebrates. Under the agreement, the parties undertake to adopt measures to ensure a favourable state of conservation for every species of marine mammal and to protect them and their habitat from negative impacts, both direct and indirect. They prohibit in the sanctuary any deliberate "taking" (defined as "hunting, catching, killing or harassing of marine mammals, as well as the attempting of such actions") or disturbance of mammals. Non-lethal catches may be authorized in urgent situations or for *in-situ* scientific research purposes. There is a direct connection between the Sanctuary Agreement and the Areas Protocol. As provided for in the former, as soon as the Areas Protocol "enters into force for them, the Parties will present a joint proposal for inclusion of the sanctuary in the list of specially protected areas of Mediterranean importance". This was actually done in November 2001 by France, Italy and Monaco.

Gordo (Spain) in 2003, Kabyles Bank (Algeria), Habibas Islands (Algeria) and Portofino (Italy) in 2005, Miramare (Italy), Plemmirio (Italy), Tavolara – Punta Coda Cavallo (Italy) and Torre Guaceto (Italy) in 2008, Bonifacio Mouths (France), Capo Caccia – Isola Piana (Italy), Punta Campanella (Italy) and Al-Hoceima (Morocco) in 2009.

Also to ensure a more representative network of SPAMIs, the Parties to the Convention reaffirmed in the Declaration adopted on 4 November 2009 in Marrakesh "the necessity, at the Mediterranean level, of pursuing efforts to identify varied methods and tools for the conservation and management of ecosystems, including the establishment of marine protected areas and the creation of networks representing such areas in accordance with the relevant objectives for 2012 of the World Summit on Sustainable Development (...)". This would be particularly appropriate for the Adriatic Sea, where sub-regional co-operation has already been established under the 1974 Agreement between Italy and Yugoslavia on the Preservation from Water Pollution of the Adriatic Sea and the Coastal Zones that is today applicable to the successor States of the former Yugoslavia.

7. THE SEABED PROTOCOL

The Seabed Protocol relates to pollution resulting from exploration and exploitation of the seabed and its subsoil. Several of its provisions set forth obligations incumbent on the parties with respect to activities carried out by operators, who can be private persons, either natural or juridical. This kind of obligations is to be understood in the sense that each party is bound to exercise the appropriate legislative, executive or judicial activities in order to ensure that the operators comply with the provisions of the protocol. The definition of "operator" is broad. It includes not only persons authorized to carry out activities (for example, the holder of a licence) or who carry out activities (for example, a sub-contractor), but also any person who does not hold an authorization but is *de facto* in control of activities. The parties are under an obligation to exercise due diligence in order to make sure, within the seabed under their jurisdiction, that no one engages in activities, which have not previously been authorized or which are exercised illegally.

All activities in the Seabed Protocol area, including erection of installations on site, are subject to the prior written authorization by the competent authority of a party. Before granting the authorization, the authority must be satisfied that the installation has been constructed according to international standards and practice and that the operator has the technical competence and the financial capacity to carry out the activities. Authorization must be refused if there are indications that the proposed activities are likely to cause significant adverse effects on the environment that could not be avoided by compliance with specific technical conditions. This obligation can be seen as an application of the precautionary principle. Special restrictions or conditions may be established for the granting of authorizations for activities in specially protected areas.

The parties are bound to take measures to ensure that liability for damage caused by activities to which the protocol applies is imposed on operators who are required to pay prompt and

adequate compensation. They shall also take all measures necessary to ensure that operators have and maintain insurance cover or other financial security in order to ensure compensation for damages caused by the activities covered by the protocol[30].

8. THE WASTES PROTOCOL

The Wastes Protocol is applicable to a subject matter already covered, on the world scale, by the Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel, 1989). The Basel Convention allows its parties to enter into regional agreements, provided that they stipulate provisions which are not less environmentally sound than those of the Basel Convention itself. This mean that, to have some purpose, a regional instrument on movements of wastes should bring some "added value" to the rights and obligations already established under the Basel Convention. In the specific case, this occurs in three instances at least.

First, while the Basel Convention does not apply to radioactive wastes, the Wastes Protocol covers also "all wastes containing or contaminated by radionuclides, the radionuclide concentration or properties of which result from human activity".

Second, unlike the Basel Convention, the Wastes Protocol applies also to a particular kind of substances, which are properly to be considered products instead of wastes, as they are not intended for disposal. These are the "hazardous substances that have been banned or are expired, or whose registration has been cancelled or refused through government regulatory action in the country of manufacture or export for human health or environmental reasons, or have been voluntarily withdrawn or omitted from the government registration required for use in the country of manufacture or export".

Third, the Wastes Protocol clarifies an important question that was not settled in precise terms by the Basel Convention: what are the rights of the coastal State if a foreign ship carrying hazardous wastes is transiting through its territorial sea? The Basel Convention, which is applicable to both land and marine transboundary movements of hazardous wastes, provides in general that movements may only take place with the prior written notification by the State of export to both the State of import and the State of transit and with their prior written consent. However, as far as the sea is concerned, it contains a disclaimer provision which protects both the sovereign rights and jurisdiction of coastal States, on the one hand, and the exercise of navigational rights and freedoms, on the other. Because of its wording, this provision is open to different interpretations and, indeed, has been interpreted in opposite ways by States inclined to give priority to one or the other solution. In fact, under The Basel Convention, doubt remains as to whether the export State has any obligation to notify the coastal transit State or to obtain its prior consent. The alternative is reflected in two opposite schemes, namely "notification and authorization", on the one hand, and "neither notification, nor authorization", on the other.

The Wastes Protocol gives a definite answer to the question by providing for an intermediate solution, consisting of a "notification without authorization" scheme. The transboundary

[30] On the subject of liability and compensation, see *infra*, para. 11.

movement of hazardous wastes through the territorial sea of a State of transit may take place only with the prior notification by the State of export to the State of transit. The approach adopted by the Wastes Protocol strikes a fair balance between the interests of maritime traffic and those of the protection of the marine environment. On the one side, ships carrying hazardous wastes keep the right to pass, as their passage is not subject to authorization by the coastal State. On the other, the coastal State has a right to be previously notified, in order to know what occurs in its territorial sea and to be prepared to intervene in cases of casualties or accidents during passage which could endanger human health or the environment[31]. Yet transparency can only lead to cooperation, while attachment to secrets does not seem a promising way to ensure the protection of the marine environment.

9. THE EMERGENCY PROTOCOL

The 2002 Emergency Protocol has replaced the previous 1976 protocol. As in the case of the Areas Protocol, the changes with respect to the previous instrument were so extensive that the Parties decided to draft a new instrument, instead of merely amending the old text. The adoption of a strengthened legal framework for combating pollution from ships is particularly important in view of the increasing maritime traffic and transport of hazardous cargo within and through the Mediterranean. The Emergency Protocol takes into account the lessons learned from the accident of the tanker *Erika* (1999).

It is true that pollution from ships is a typical field where regulation at the world level is mostly appropriate. All the technical rules, such as those relating to requirements in respect to design, construction, equipment and manning of ships, need to be adopted at a global and uniform level. Navigation, which is the traditional cornerstone of the regime of oceans and seas, would be impossible if different and conflicting provisions on technical characteristics of ships were adopted at the domestic or regional levels. Art. 211 of the UNCLOS, relating to pollution from vessels, explicitly refers to "generally accepted international rules and standards established through the competent international organization or general diplomatic conference". It would also be unrealistic to try to modify the allocation of enforcement powers among the flag State, the port State and the coastal State set forth in Arts. 217, 218 and 220 of the UNCLOS, which were the outcome of a difficult negotiation.

[31] The "notification without authorization" scheme of the Wastes Protocol is fully compatible with the international law of the sea, as embodied in the UNCLOS. Under the UNCLOS section on innocent passage in the territorial sea, passage must be innocent, i.e. "not prejudicial to the peace, good order or security of the coastal State" (Art. 19, para. 1). Any act of wilful and serious pollution contrary to the UNCLOS is incompatible with the right of innocent passage (Art. 19, para. 2, *h*). Foreign ships have the right to pass (Art. 17), but nowhere in the UNCLOS it is said that they have the right to pass secretly or covertly. Moreover, under Art. 22, paras. 1 and 2, of the UNCLOS some particularly dangerous ships, namely "tankers, nuclear-powered ships and ships carrying nuclear or other inherently dangerous or noxious substances may be required to confine their passage" to sea lanes designated or prescribed by the coastal State. An obvious question can be asked in this respect: how could a coastal State exercise its right to prescribe sea lanes for ships carrying noxious substances if it were not even entitled to know that a foreign ship is carrying these substances?

The Emergency Protocol acknowledges in the preamble the role of the International Maritime Organization (IMO), which is the competent international organization in the field of safety of navigation, and the importance of cooperating in promoting the adoption and the development of international rules and standards on pollution from ships within the framework of IMO. This is a clear reference to the various conventions, which have been concluded under the sponsorship of IMO[32] and to the competences that since longtime IMO has been exercising as regards safety of shipping (such as decisions on traffic separation schemes, ships reporting systems, areas to be avoided, etc.). All such instruments and competences are in no way prejudiced by the Emergency Protocol[33].

However, it is also true that regional cooperation, too, has a role to play in the field of pollution from ships. For instance, international cooperation for prompt and effective action in taking emergency measures to fight against pollution needs to be organized at the regional level. The first Emergency Protocol already provided for the setting up of an institutional framework for actions of regional cooperation in combating accidental marine pollution: the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC), which is administered by IMO (International Maritime Organization) and UNEP and is located in Malta.

The Emergency Protocol is not limited (as was the former instrument) to emergency situations. It also covers some aspects of the subject matter of pollution from ships and aims at striking a fair balance between action at the world and action at the regional level. For instance, Art. 15, relating to environmental risk of maritime traffic, provides that "in conformity with generally accepted international rules and standards and the global mandate of the International Maritime Organization, the Parties shall individually, bilaterally or multilaterally take the necessary steps to assess the environmental risks of the recognized routes used in maritime traffic and shall take the appropriate measures aimed at reducing the risks of accidents or the environmental consequences thereof".

The "added value" brought by the new Protocol may be found in several of its provisions. It covers not only ships, but also places where shipping accidents can occur, such as ports and offshore installations. The definition of the "related interests" of a coastal State that can be affected by pollution has been enlarged to include also "the cultural, aesthetic, scientific and educational value of the area" and "the conservation of biological diversity and the sustainable use of marine and coastal biological resources". A detailed provision on reimbursement of costs of assistance has been elaborated.

The Emergency Protocol sets forth a number of obligations directed to the masters of ships sailing in the territorial sea of the parties (including ships flying a foreign flag), namely: to

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[32] Such as the Convention for the prevention of pollution from ships as amended by the Protocol (London, 1973-1978; so-called MARPOL), the Convention on oil pollution preparedness, response and co-operation (London, 1990), the Convention on the control of harmful anti-fouling systems on ships (London, 2001) or the Convention for the control and management of ships' ballast waters and sediments (London, 2004).

[33] The Emergency Protocol also acknowledges "the contribution of the European Community to the implementation of international standards as regards maritime safety and the prevention of pollution from ships". The European Community has enacted a number of legal instruments relating to the control and prevention of marine pollution from ships which apply for its member States in addition to rules adopted under the aegis of IMO.

report incidents and the presence, characteristics and extent of spillages of oil or hazardous and noxious substances; to provide the proper authorities, in case of a pollution accident and at their request, with detailed information about the ship and its cargo and to cooperate with these authorities. The obligations in question, which have a reasonable purpose and do not overburden ships, do not conflict with the right of innocent passage provided for in the UNCLOS. The lessons arising from the *Erika* accident are particularly evident in the provision according to which the Parties shall define strategies concerning reception in places of refuge, including ports, of ships in distress presenting a threat to the marine environment.

10. THE COASTAL ZONE PROTOCOL

To confirm the dynamic character of the Barcelona legal system, a new protocol, relating to the integrated coastal zone management, was opened to signature in 2008. It addresses the increase in anthropic pressure on the Mediterranean coastal zones, which is threatening their fragile equilibrium and provides Mediterranean States with the legal and technical tools to ensure sustainable development throughout the shores of this regional sea[34]. It is the first treaty ever adopted, which is specifically devoted to the coastal zone.

The Coastal Zone Protocol defines "integrated coastal management" as "a dynamic process for the sustainable management and use of coastal zones, taking into the account at the same time the fragility of coastal ecosystems and landscapes, the diversity of activities and uses, their interactions, the maritime orientation of certain activities and uses and their impact on both the marine and land parts" (Art. 2, *g*).

The precise delimitation of the geographical coverage of the protocol gave rise to lengthy discussion during the negotiations. The question was finally solved in a both precise and flexible way (Art. 3). The seaward limit of the coastal zone is the external limit of the territorial sea[35]; the landward limit of the coastal zone is the limit of the competent coastal units as defined by parties. But parties may establish different limits, in so far as certain conditions occur.

Art. 6 of the protocol lists a number of general principles of integrated coastal zone management. For instance, the parties are bound to formulate "land use strategies, plans and programmes covering urban development and socio-economic activities, as well as other relevant sectoral polices"[36]. They shall take into account in an integrated manner "all elements relating to hydrological, geomorphological, climatic, ecological, socio-economic and cultural systems", so as "not to exceed the carrying capacity of the coastal zone and to prevent the negative effects of natural disasters and of development". The parties are also required to take into account the

[34] See *Report by the Coordinator for the 15th Meeting of the Contracting Parties*, doc. UNEP(DEP)/MED IG.17/3 of 21 November 2007, p. 7.

[35] Presently 12 n.m. for most Mediterranean States, with the exceptions of the United Kingdom (3 n.m.), Greece (6 n.m.) and Turkey (6 n.m. in the Aegean Sea).

[36] Art. 17 provides for the definition by parties of a common regional framework for integrated coastal zone management in the Mediterranean. Under Art. 18, parties are bound to formulate a national strategy for integrated coastal zone management and coastal implementation plans and programmes consistent with the common regional framework.

diversity of activities in the coastal zone and to give priority "where necessary, to public services and activities requiring, in terms of use and location, the immediate proximity of the sea".

Art. 8 of the protocol provides for the establishment of a 100-meter zone where construction is not allowed. However, "adaptations" are allowed "for projects of public interest" and "in areas having particular geographical or other local constraints, especially related to population density or social needs, where individual housing, urbanisation or development are provided for by national legal instruments". Other important obligations of the parties relate to "limiting the linear extension of urban development and the creation of new transport infrastructure along the coast", to "providing for freedom of access by the public to the sea and along the shore" and to "restricting or, where necessary, prohibiting the movement and parking of land vehicles, as well as the movement and anchoring of marine vessels in fragile natural areas on land or at sea, including beaches and dunes".

Some provisions of the protocol deal with specific activities, such as "agriculture and industry", "fishing", "aquaculture", "tourism, sporting and recreational activities", "utilization of specific natural resources" and "infrastructure, energy facilities, ports and maritime works and structure" (Art. 9, para. 2), as well as with certain specific coastal ecosystems, such as "wetlands and estuaries", "marine habitats", "coastal forests and woods" and "dunes" (Art. 10). Due emphasis is granted to risks affecting the coastal zone, in particular climate change (Art. 22) and coastal erosion (Art. 23).

11. CONCLUSIVE REMARKS

When it was originally drafted, the Barcelona system served as an example for the elaboration of other UNEP regional seas instruments. A similar role can be played also today, after the updatings and additions that it has undergone. The Barcelona system has been adapted to the evolution of international law in the field of the protection of the marine environment and has addressed concrete problems in clear and sensible ways. It is to be regretted that some of the new or updated protocols have taken too much time to enter into force. Governments are sometimes led by different reasons to balance environmental needs with other interests and may be hesitant to promptly endorse the most advanced instruments. But the fact remains that all the present new or updated instruments of the Barcelona system constitute effective tools to preserve a common natural heritage and to face the common concerns of the bordering States. They bring an added value to the general obligation to cooperate for the protection of the marine environment already embodied in the UNCLOS and in customary international law.

A notable remark is that UNEP Mediterranean Action Plan is broadening its scope. At their 2009 meeting, the parties to the Barcelona Convention adopted the Marrakesh Declaration, which aims at promoting a better regional environmental governance, especially to meet the future challenges of climate change. The parties declared "themselves concerned by the serious threats to the environment that are confronting the Mediterranean, including the destruction of its biodiversity, adverse effects on the countryside, coastline and water resources, soil degradation,

desertification, coastal erosion, eutrophication, pollution from land-based sources, negative impacts related to the growth of maritime traffic, the over-exploitation of natural resources, the harmful proliferation of algae or other organisms, and the unsustainable exploitation of marine resources".

The parties also considered that climate change is the major challenge that humanity will face in the next decades. Its impacts, in particular the rise in the level of the sea, the increase in temperatures, the acidification of marine waters and the modification of the economic and social equilibrium of coastal communities, will have significant consequences in the specific case of the Mediterranean, in which a great majority of the population is concentrated on the coastline. In this context, the parties declared themselves aware that "it is essential to reinforce regional co-operation to identify and assess the short- medium- and long-term impacts of, and vulnerabilities to, climate change in the Mediterranean region, and to design and implement the best adaptation and prevention options". Under the Marrakesh Declaration, the objective to promote better regional environmental governance in the Mediterranean region should be achieved through "an integrated approach that guarantees coherence between the various sectoral strategies and takes into consideration their impact on ecosystems", ensuring co-ordination among all regional institutions and initiatives.

With the Marrakesh Declaration, the prospects for the broadening of the scope of UNEP-MAP's activities seem promising. It is sometimes suggested that a Forum for Governance of the Mediterranean Basin be established as a periodical and open-ended machinery for the discussion and elaboration of rules and policies relevant for the management of the Mediterranean, as well as procedures to implement them[37]. The UNEP Mediterranean Action Plan could become a leading player in such machinery.

[37] See, for example, the study European Commission – EuropeAid Cooperation Office, *Study on the Current Status of ratification, Implementation and Compliance with Maritime Treaties Applicable to the Mediterranean Sea Basin*, Part 2, December 2009, para. 10.4 (published on the website http://ec.europa.eu/maritimeaffairs/mediterranean_en.html).

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REPRESENTATIVITY AND COHERENCE OF MPA NETWORKS: CONCEPTS AND APPLICABILITY TO THE MEDITERRANEAN SEA

REPREZENTATIVNOST IN SKLADNOST MREŽ MORSKIH ZAVAROVANIH OBMOČIJ: KONCEPTI IN NJIHOVA UPORABNOST V SREDOZEMSKEM MORJU

Chedly RAIS

Key words: Mediterranean MPAs, ecological representativity, MPA network coherence

Ključne besede: sredozemska morska zavarovana območja (MPA-ji), ekološka reprezentativnost, skladnost mrež MPA-jev

ABSTRACT

The establishment of MPAs is still being implemented in many Mediterranean countries in an opportunistic way without ecological planning, since MPAs were created to preserve individual sites, but not within the framework of a national or regional strategy that aims to ensure conservation for all types of habitats. Therefore, the existing network of Mediterranean MPAs is not representative of all the Mediterranean habitats.

The issue of improving the representativity of the MPA networks at the national and regional levels is relevant not only for the Mediterranean, but it has emerged at the beginning of this century as a global concern. In this context, the Parties to CBD adopted in 2004 the Program of Work on Protected Areas, whose aim is to establish and maintain national and regional systems of MPAs that are comprehensive, effectively managed, and ecologically representative.

A survey conducted in 2009 concluded that most of the Mediterranean habitat types are not adequately represented in MPAs and that although 80% of the species listed in the Annexes to the SPA and biodiversity Protocol are recorded in the Mediterranean MPAs, thirty one species are not listed in any of the Mediterranean MPAs.

Several initiatives were undertaken to assess the representativity of MPAs in the Mediterranean or to identify gaps in the coverage of habitats and species. However, a regional assessment, using commonly agreed criteria and reference list of Habitats, is still needed.

IZVLEČEK

Morska zavarovana območja (MPA-ji) se v mnogih sredozemskih državah še vedno ustanavljajo oportunistično, se pravi brez ekološkega načrtovanja, saj nastajajo z namenom, da se zaščitijo posamezne lokalitete, vendar ne v okviru nacionalne ali regionalne strategije, ki si prizadeva zavarovati vse tipe habitatov. To pomeni, da obstoječa mreža sredozemskih MPA-jev ni reprezentativna za vse sredozemske habitate.

Vprašanje izboljšanja reprezentativnosti mrež MPA-jev na nacionalni in regionalni ravni ne zadeva le Sredozemlja, saj se je začelo zastavljati že v začetku tega stoletja kot globalna skrb. V tem kontekstu so podpisnice Konvencije o biotski pestrosti leta 2004 sprejele Program dela v zavarovanih območjih, katerega namen je osnovati in vzdrževati nacionalne in regionalne sisteme MPA-jev, ki so vseobsegajoči, učinkovito upravljani in ekološko reprezentativni.

S popisom, opravljenim leta 2009, je bilo ugotovljeno, da večina sredozemskih habitatnih tipov ni ustrezno zastopana v MPA-jih in da 31 vrst ni na seznamu sredozemskih MPA-jev kljub dejstvu, da je bilo 80 % vrst, naštetih v aneksih v Protokolu o posebnih območjih varstva in biodiverziteti, zabeleženih v sredozemskih MPA-jih.
V Sredozemlju je bilo sproženih že več pobud z namenom, da bi ocenili reprezentativnost MPA-jev ali identificirali vrzeli v pokrivanju habitatov in vrst v tem delu sveta. Vendar pa je še vedno potrebna regionalna ocena z uporabo splošno sprejetih kriterijev in referenčnih seznamov habitatov.

1. INTRODUCTION

Creating Marine Protected Areas (MPAs) is among the main tools used to preserve the components of the marine biodiversity, including sensitive or threatened species, habitats and other ecological features of the marine environment. In the Mediterranean, the first MPA was created at the beginning of the sixties. At that time and during the following two decades, there was no real planning for MPAs, since these were created to preserve individual sites, but not within the framework of a national or regional strategy that aims to ensure conservation for all types of habitats. In many Mediterranean countries, the establishment of MPAs is still implemented in an opportunistic way without ecological planning. A recent assessment made by RAC/SPA (May, 2010) of the ecological status and pressures to Mediterranean marine and coastal biodiversity concluded that "the existing MPAs are not representative of all the Mediterranean habitats: the present situation of Mediterranean MPAs is neither representative nor consistent".

The issue of improving the representativity of the MPA networks at the national and regional levels is relevant not only for the Mediterranean, but it has emerged at the beginning of this century as a global concern. In this context, the Parties to CBD adopted in 2004 the Program of Work on Protected Areas whose aim is to establish and maintain national and regional systems of MPAs that are comprehensive, effectively managed, and ecologically representative. The Parties committed them selves to achieve this objective by 2010 for the terrestrial areas and by 2012 for the marine areas.

The assessment of the representativity of an MPA network at a given spatial scale consists in analysing the extent to which important ecological features of the marine environment are sufficiently represented within the network. It is a gap analysis to identify absent and/or underrepresented elements that make the biological diversity of the considered area. The gap analysis should also take into account the efficiency of the protection and of the management system of the network constituting MPAs.

Assessing the representativity of the Mediterranean Network of MPAs could be done through assessments at sub-regional scales to cover portions of the Mediterranean Sea identified using agreed criteria such as the CBD criteria for the establishment of Ecologically or Biologically Significant Areas (EBSAs). However, the overall Mediterranean assessment would be achieved only if the sub-regional approach covered the whole Mediterranean using common assessment criteria and reference list of Habitats. The classification of Habitats and the relevant lists of reference of habitats developed for the EU Natura 2000 initiative and the reference list of marine habitats adopted under the Barcelona Convention are appropriate

references for assessing the representativity of the MPA networks in the Mediterranean.

In the Mediterranean, the first MPA was created at the beginning of the sixties and the total number of MPAs declared by the Mediterranean countries has evolved to reach, in 2009, 158 Marine Protected Areas (MPA) located in 18 countries (Figure 1). A full list of these MPAs is provided in Annex 1 to this document.

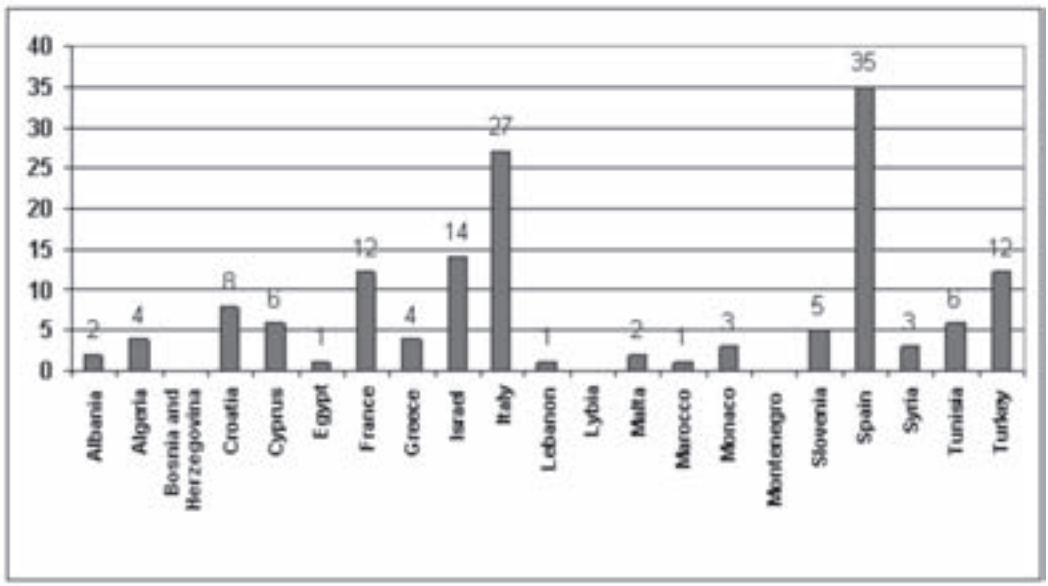

Figure 1: Number of Marine Protected Areas in the Mediterranean Countries (Source: RAC/SPA databases 2009)
Slika 1: Število MPA-jev v sredozemskih državah (vir: RAC/SPA databases 2009)

Under the Barcelona Convention[1], the Mediterranean countries are committed to protect, preserve and manage in a sustainable and environmentally sound way the areas that are of particular natural or cultural value. However, in many Mediterranean countries, the establishment of MPAs is done on an opportunistic way without ecological planning, since MPAs are usually created to preserve individual sites, but not within the framework of a national or regional strategy that aims to ensure conservation for all types of habitats.

[1] 21 Mediterranean riparian countries and the EC are Parties to the Barcelona Convention (Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean)

2. THE CONCEPT OF REPRESENTATIVITY OF THE PROTECTED AREA SYSTEMS

The representativity of systems of protected areas emerged as an issue of priority importance for the conservation of the Planet's biodiversity by the beginning of this century. Its importance was highlighted by several assessments of the effectiveness of protected area systems that stressed the under-representation of many ecosystems and habitat types in the existing protected areas. For the marine environment, representativity is one of required network properties and components to establish a representative network of MPAs, as defined within the framework of the CBD. These are:

- ecological and biological significance of the area forming the network
- representativity
- connectivity
- replicated ecological features
- adequate and viable sites

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*" (CBD, 2007).

At the regional level, a system of protected areas could be considered representative of the ecological features of the region when all the ecosystem and habitat types recorded in the region are adequately covered by protected areas.

A recent survey was conducted in 2009 to assess the extent to which the most significant Mediterranean marine habitat types are represented in the existing Mediterranean MPAs (Rais 2009). The survey assessed the presence of the types of habitats appearing in the reference list of benthic habitats adopted by the Contracting Parties to the Barcelona Convention for the identification at national level of sites of conservation interest. The results of this assessment are represented in Figure 2.

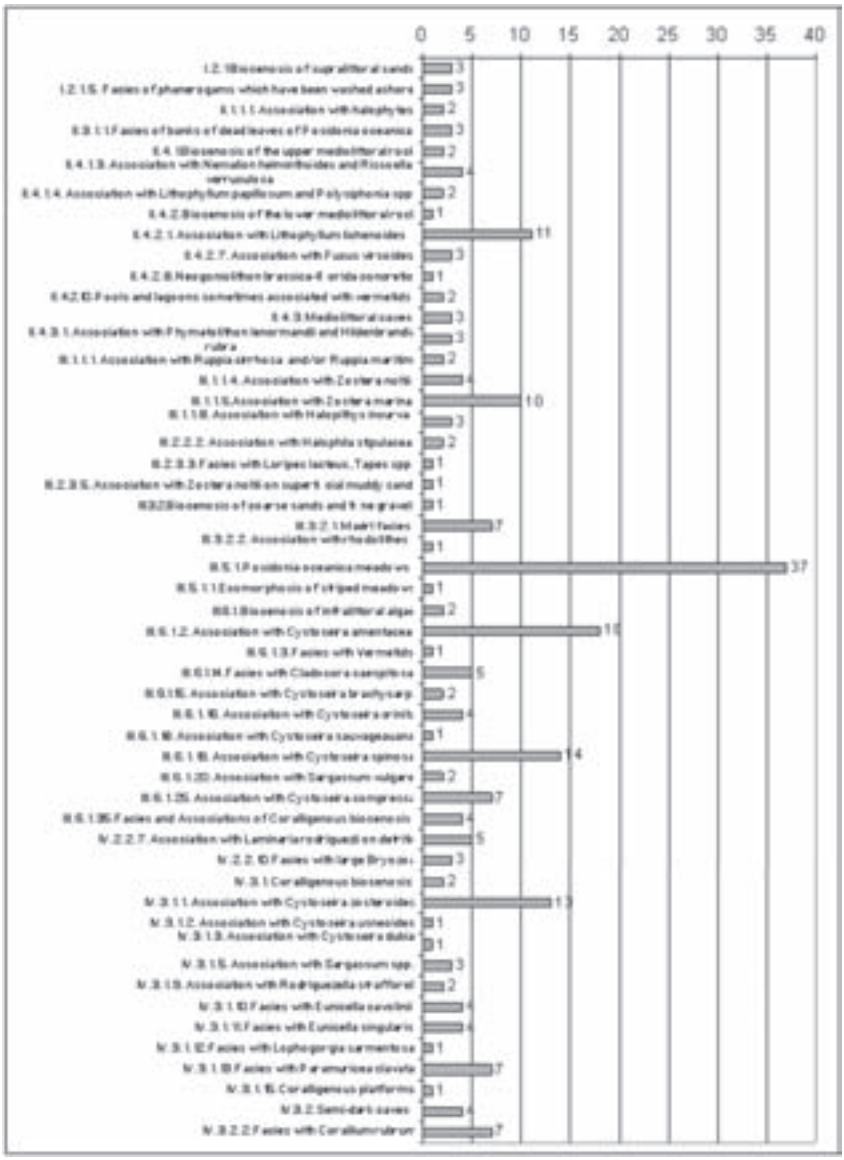

Figure 2: Presence in the Mediterranean MPAs of the types of habitats appearing in the reference list of benthic habitats adopted by the Contracting Parties to the Barcelona Convention for the identification at the national level of sites of conservation interest (with the bars indicating the number of Mediterranean MPAs where each type of habitat is recorded)

Slika 2: Habitatni tipi v sredozemskih MPA-jih, našteti na referenčnih seznamih bentoških habitatov, ki so jih sprejele podpisnice Barcelonske konvencije za identifikacijo naravovarstveno pomembnih lokalitet na nacionalni ravni (ležeči stolpci označujejo število sredozemskih MPA-jev, kjer so bili zabeleženi vsi habitatni tipi)

The assessment considered also the species appearing in the Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.

Figure 3: Presence in the Mediterranean MPAs of the species listed in the Annexes to the SPA & Biodiversity Protocol (with the bars indicating the number of MPAs where each species is recorded)

Slika 3: Vrste v sredozemskih MPA-jih, naštete v aneksih k Protokolu o posebnih območjih varstva in biodiverziteti (ležeči stolpci ponazarjajo število MPA-jev, v katerih so bile zabeležene vse vrste)

Concerning the species, the survey concluded that 80% of the species listed in the Annexes to the Protocol are recorded in the Mediterranean MPAs. Presented below are the species not listed in any of the Mediterranean MPAS:

Chlorophyta
Caulerpa ollivieri
Phaeophyta
Cystoseira sedoides
Rhodophyta
Ptilophora mediterranea
Porifera
Ircinia pipetta
Cnidaria
Errina aspera
Echinodermata
Bryozoa
Mollusca
Ranella olearia
Gibbula nivosa
Crustacea
Pachylasma giganteum
Scyllarides pigmaeus
Pisces
Alosa alosa
Aphanius iberus
Huso huso
Lampetra fluviatilis
Lethenteron zanandreai
Pomatoschistus canestrinii
Pomatoschistus tortonesei
Raja alba
Valencia hispanica
Reptiles
Trionyx triunguis
Aves
Pelecznus onocrotalus
Sterna bengalensis
Mammalia
Balaenoptera acutorostrata
Balanoptera borealis
Eubalaena glacialis
Kogia simus
Megaptera novaeangliae
Mesoplodon densirostris
Orcinus orca
Phocoena phocoena
Pseudorca crassidens
Steno bredanensis

The approach of assessing the representativity of the Mediterranean network of MPAs only through the presence of habitat types or species of particular importance in the existing MPAs provides a general picture of the situation, but does not reflect properly whether or not the biological and ecological significant features of each ecological unit of the Mediterranean Sea are well represented. Indeed, the assessment of the representativity of an MPA network at a given spatial scale consists in analysing the extent to witch important ecological features of the marine environment are sufficiently represented within the network. It is a gap analysis to identify absent and/or underrepresented elements that make the biological diversity of the considered area. The gap analysis should also take into account the efficiency of the protection and of the management system of the network constituting MPAs.

Assessing the representativity of the Mediterranean Network of MPAs could be done through assessments at sub-regional scales to cover portions of the Mediterranean Sea identified using agreed criteria such as the CBD criteria for the establishment of Ecologically or Biologically Significant Areas (EBSAs). Details on the approaches for the identification of the ecological units and of the EBSAs are presented in the working document "Methods for the identification of EBSAs in the Adriatic Sea", prepared by Giuseppe Notarbartolo di Sciara to this International Workshop (Notarbartolo di Sciara 2010).

3. REGIONAL INITIATIVES UNDERTAKEN SO FAR TO IMPROVE THE REPRESENTATIVITY OF THE MEDITERRANEAN NETWORK OF MPAS

At the global level, the Parties to CBD adopted in 2004 the Program of Work on Protected Areas whose aim is to establish and maintain national and regional systems of MPAs that are comprehensive, effectively managed, and ecologically representative. The Parties committed themselves to achieve this objective by 2010 for the terrestrial areas and by 2012 for the marine areas.

At the Mediterranean level, several regional initiatives were undertaken in the last decade to assess and/or to improve the representativity of the Mediterranean network of MPAs. All of them are inline with the general orientations of the CBD's Programme of Work on Protected Areas. The more recent of these regional initiatives are the following:

The WWF gap analysis for the Mediterranean marine environment

The aim of the Mediterranean Marine Gap-Analysis conducted by WWF was to provide an overview of marine and coastal features of the entire Mediterranean Sea and to identify the most important unprotected coastal marine areas in the region. To overcome the lack of reliable biological data, the project used a methodology based on the statistical analysis of the sea-bed using the available digital bathymetry maps. The project was finalised in 2001, it identified 13 priority areas as areas in need of urgent protection because of their high level of biodiversity, the significant presence of flag-ship species and the presence of important threats from human pressure. Here are the identified areas (WWF 2002):

1 - Alboran Sea (Spain, Morocco, Algeria)
2 - Balearic Islands (Spain)
3 - Liguro-Provençal coast (France, Italy, Monaco)
4 - Corso-Sardinian coast (France, Italy)
5 - Southern Tyrrhenian coast (Italy)
6 - Dalmatian coast (Croatia)
7 - Eastern Ionian coast and islands (Albania, Greece)
8 - Aegean Sea and Anatolia coast (Greece, Turkey)
9 - Cilician coast (Turkey) and Cyprus Island coast
10 - Cyrenaica (Libya)

11 - Gulf of Sirte (Libya)
12 - Gulf of Gabès (Tunisia)
13 - Algero-Tunisian coast (Algeria, Tunisia)

Programme of work in marine and coastal protected areas within the Mediterranean region

This programme was elaborated by the Regional Activity Centre for Specially Protected Areas to promote the implementation in the Mediterranean of the CBD's Programme of Work on Protected Areas and to support the establishment and maintenance of comprehensive, effectively managed, and ecologically representative systems of protected areas (at the national and regional levels). It was adopted by the Contracting Parties to the Barcelona Convention during their Sixteenth Ordinary Meeting (Marrakech, November 2009).

The programme of work recommends adopting a three-step hierarchical planning approach, which begins at the large scale (the Mediterranean Basin) and focuses in on ever-smaller scales to identify ecological units and priority conservation areas within each ecological units, using seven criteria: 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. The programme of work has 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.

Elements 1 and 2 of the work programme address the issue of representativity of the Mediterranean network of marine and coastal protected areas. Element 1 includes activities to:

(i) Evaluate, at the national level, the status, the representativity and the effectiveness of the marine and coastal protected areas and
(ii) Compile a regional synthesis on the status, the representativity and the effectiveness of the marine and coastal protected areas.

The activities included in Element 2 of the work programme include:

(i) Identification of preliminary priority conservation areas and
(ii) Strengthening of the Mediterranean network of marine and coastal protected areas through the creation of new protected areas and, where appropriate, the extension of the existing ones.

As set by the calendar of implementation of the work programme, the activities under Element 1, as well as the "Identification of preliminary priority conservation areas" of Element

2, are expected to be finalised by mid 2011, while the creation of new protected areas and the extension of the existing ones, included under Element 2, are to be carried out during the five years of the programme's duration.

Med-RAS: Identifying Priority Representative Areas and Species in the Mediterranean Sea to Conserve

Med-RAS is a project coordinated by the IUCN Centre for Mediterranean Cooperation. It aims at elaborating maps of sensitive areas and spatial distribution of sites in need of protection and are not included in the current Mediterranean system of MPAs. These maps cover pilot Mediterranean zones representative of different eco-regions in the Mediterranean Sea (west, north-west, east and south). The project developed standard methodologies of analysis that take into account the latest scientific developments in the disciplines of spatial planning, marine ecology, species modelling, and remote sensing. This included developing standardized definitions; defining operating principles; and guiding criteria for sites selection. Currently the project is implemented in the Alboran Sea and in Libya. Although the project is focusing on the biological and ecological features of the covered zone, it takes also into consideration the socioeconomic value of the sites and the threats, including human activities, in particular over-fishing, shipping, land and marine based pollution as well as invasive species (IUCN 2008).

Project concerning the establishment of a representative ecological network of protected areas in the Mediterranean open seas, including the deep sea, through the SPAMI system

This is a Joint Management Action of the European Community with the United Nations Environment Programme/Mediterranean Action Plan. It envisages a process developed in two phases:

The first phase of the initiative, entitled "Identification of possible SPAMI in the Mediterranean areas beyond national jurisdiction", consisted of identifying, on the basis of sound science, priority conservation areas in the open seas, including the deep sea, that could contain sites that could be candidates for the SPAMI List. The first activities under this first phase were launched in 2008 and led to the identification of twelve priority conservation areas[2] in the Mediterranean open seas, including the deep sea, that could contain sites that could be candidates for the SPAMI List. The Northern and Central Adriatic is among the identified priority conservation areas.

The second phase will consist of the collection of data through field surveys and of the elaboration of SPAMI presentation reports for submission to the Contacting Parties of the Barcelona Convention as application for inscription of the concerned sites on the SPAMI List.

[2] Alborán Seamounts, Southern Balearic, Gulf of Lions shelf and slope, Central Tyrrhenian, Northern Strait of Sicily (including Adventure and nearby banks), Southern Strait of Sicily, Northern and Central Adriatic, Santa Maria di Leuca, Northeastern Ionian, Thracian Sea, Northeastern Levantine Sea and Rhodes Gyre and the Nile Delta Region

The Natura 2000 network

The Natura 2000 initiative is applicable only for the countries that are members of the European Union (EU) and for the countries preparing their accession to the EU. Its legal basis is mainly provided by the "Habitat" and "Bird" Directives. This initiative stimulated a wide effort of inventory of sites of conservation interest according to common criteria. Nine Mediterranean countries have participated in this initiative[3].

Other relevant initiatives

There are other initiatives that are not specifically addressing the issue of MPAs representativity in the Mediterranean, but they have close links to this issue since their objectives and activities include the strengthening of the Mediterranean MPAs. MedPAN is one of these initiatives. It is an association of MPA managers, whose purpose[4] "is to promote the creation, perpetuation and operation of a Mediterranean ecological network of marine protected areas". There are also two new complementary initiatives being conducted by WWF and RAC/SPA within the framework of the Strategic Partnership for the Mediterranean Sea large Marine Ecosystem:

(i) the MedPAN South Project, whose aim is to promote the effective conservation of regionally important coastal and marine biodiversity features through providing support to the participating countries[5] to improve the management effectiveness of their MPAs and to establish new ones.

(ii) the MedMPAnet Project being coordinated and implemented by RAC/SPA is aimed at the development of a Mediterranean marine and coastal protected areas network through the boosting of Mediterranean MPAs creation and management in areas within national jurisdiction[6].

All these initiatives will probably help the Mediterranean countries to develop a representative network of MPAs, but will most likely not be achieved by 2012 due to many hindrances. The most important hindrance is the non-availability of reliable data about the occurrence distribution and the status of marine habitats and species. Another hindrance is the lack, at least in some Mediterranean sub-regions, of the needed political will to ensure the required international coordination and cooperation for the MPA planning and management. Coordination and cooperation between countries sharing a given ecological unit is essential to achieve coherence and complementarity of their MPAs and to strengthen the effectiveness of the protection measures, especially for the species populations that are shared by two or more countries. Coordination and cooperation are essential for the management of the mitigation and management of the transboundary impacts of threats to biodiversity. In this

[3] The following Mediterranean EU member countries carried out inventories of sites of conservation interest within the framework of Natura 2000: Cyprus, France, Greece, Italy, Malta, Slovenia, and Spain. Croatia, as part of its EU pre-accession activities, has also carried out an inventory of the sites to include in its Natura 2000 network. An exercise of inventorying natural sites using the Natura 2000 methodology and criteria was also conducted in Bosnia and Herzegovina.

[4] As stated in the charter of the association (source: www.medpan.org)

[5] Albania, Algeria, Croatia, Egypt, Lebanon, Libya, Montenegro, Morocco, Syria, Tunisia and Turkey.

[6] The MedMPAnet Project includes regional activities and activities in pilot sites in Albania, Croatia, Libya, Montenegro and Tunisia.

context, mutual assistance, exchange of information and experiences are also of particular importance.

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ANNEX 1: List of MPAs in the Mediterranean countries
PRILOGA 1: Seznam MPA-jev v sredozemskih državah

COUNTRY	CODE	NAME OF MPA	YEAR OF ESTABLISHMENT	MARINE SURFACE(Km^2)
ALBANIA	ALB 01	KEPI I RODONIT		
	ALB 02	PORTO PALERMO		
	ALB 03	SAZANI ISLAND - KARABURUNI PENINSULA	2010	
ALGERIA	ALG 01	BANC DES KABYLES		6
	ALG 02	CAP DE GARDE	1983	72
	ALG 03	ILE HABIBAS	2003	27
	ALG 04	ILE RACHGOUN		10,8
BOSNIA & HERZEGOVINA				
CROATIA	CRO 01	BRIJUNI	1983	34
	CRO 02	CRES-LOSINJ ARCHIPELAGO	2006	523
	CRO 03	KORNATI	1980	216
	CRO 04	LASTOVO ARCHIPELAGO	2006	196
	CRO 05	LIMSKI ZALJEV	1979	4
	CRO 06	MALOSTONSKI ZALJEV	1983	173
	CRO 07	MLJET	1960	53
	CRO08	TELASCICA	1988	70
CYPRUS	CYP 01	CAPE GRECO		9,3
	CYP 02	LARA TOXEFTRA	1989	1
	CYP 03	MOULIA		2
	CYP 04	NISSIA		1,85
	CYP 05	PETRA TOU ROMIOU		20,85
	CYP 06	POLIS/YIALIA	2003	17
EGYPT	EGY 01	SALLOUM		1064
FRANCE	FR 01	COTE BLEUE	1983	101,7
	FR 02	DPM A SAINT FLORENT	1998	0,07
	FR 03	DPM GROTTE MARINE DE TEMULI/ SAGONE	2000	
	FR 04	IMPERIAUX		
	FR 05	POSIDONIES DE LA COTE DES ALBERES	1998	
	FR 06	POSIDONIES DE LA COTE PALAVASIENNE	2001	
	FR 07	POSIDONIES DU CAP D AGDE	2002	
	FR 08	CERBERE-BANYULS	1974	6,5
	FR 09	BOUCHES DE BONIFACIO		792
	FR 10	PORT-CROS	1963	24,75
	FR 11	SCANDOLA		
	FR 13	CAPO AGDE		

COUNTRY	CODE	NAME OF MPA	YEAR OF ESTABLISHMENT	MARINE SURFACE(Km²)
GREECE	GRE 01	ALONNISSOS NORTHERN SPORADES	1992	2301
	GRE 02	ZAKYNTHOS	1999	102,96
	GRE 03	SCHINIA-MARATHONA		14,39
	GRE 04	MESSOLONGHI-AETOLIKO LAGOONS,ESTUARIES OF ACHELOON AND ECHINADES ISLANDS		334,7
ISRAEL	ISR 01	AKHZIV	1968	0,45
	ISR 02	ASHQELON	1965	2,19
	ISR 03	ATIQOT QESARYA	1968	0,4
	ISR 04	ATLIT	1972	0,15
	ISR 05	HOF DOR-HABONIM	1980	0,42
	ISR 06	HOF HASHARON	1973	1,24
	ISR 07	HOF PALMAHIM	2003	0,22
	ISR 08	HOF ROSH HA-NIQRA	2003	0,26
	ISR 09	HOLOT HA-MIFRAZ	1995	0,12
	ISR 10	HOLOT NIZZANIM	0	20,27
	ISR 11	MA'AGAN MICHAwEL island	1964	0,02
	ISR 12	ROSH HA-NIKRA island	1965	0,31
	ISR 13	NAHAL ALEXANDER	1982	3,28
	ISR 14	NAHAL POLEG	1971	0,45
	ISR 15	NAHAL RUBIN	2002	0,78
	ISR 16	NAHAL TANNINIM	1992	0,22
	ISR 17	ROSH HA-NIQRA	0	0,22
	ISR 18	SHIQMONA	2008	1,67
	ISR 19	SIDNEY ALI	1966	0,13
	ISR 20	YAM DOR HA-BONIM	2002	5,23
	ISR 21	YAM GADOR	2004	0,94
	ISR 22	YAM SHIQMA	2005	1,1
	ISR 23	YAM EVTAH	2003	1,34
	ISR 24	MPB-CENTRAL	0	12,59
	ISR 25	MPB - NORTHERN	0	11,15
ITALY	ITA 01	PENISOLA DEL SINIS - ISOLA DE MAL DI VENTRE	1997	329
	ITA 02			
	ITA 03			
	ITA 04			
	ITA 05			
	ITA 06			
	ITA 07			
	ITA 08			
	ITA 09			
	ITA 11			

COUNTRY	CODE	NAME OF MPA	YEAR OF ESTABLISHMENT	MARINE SURFACE(Km^2)
ITALY	ITA 12	ISOLE TREMITI	1989	15
	ITA 13	ISOLE PELAGIE	2002	32
	ITA 14	ISOLE EGADI	1991	540
	ITA 15	ISOLE DI VENTOTENE E SANTO STEFANO	1997	28
	ITA 16	ISOLE CICLOPI	1989	6
	ITA 17	ISOLA DELL'ASINARA	2002	107
	ITA 18	GAIOLA	2002	0,4
	ITA 19	CINQUE TERRE	1997	27
	ITA 20	CASTELLABATE	1972	44
	ITA 21	CAPO RIZZUTO	1991	147
	ITA 22	CAPO GALLO - ISOLA DELLE FEMMINE	2002	22
	ITA 23	CAPO CARBONARA	1998	86
	ITA 24	CAPO CACCIA - ISOLA PIANA	2002	26
	ITA 25	BAIA	2002	1,8
	ITA 26	ARCIPELAGO MADDALENA	1994	150
	ITA 27	ARCHIPELAGO TOSCANO	1989	568
	ITA 28	ASINARA		107
LEBANON	LEB 01	PALM ISLANDS	1992	100
LIBYA				
MALTA	MAL 01	ZONA FIL-BAHAR FL-INHAWI TAD-DWEJRA,GOZO	2007	
	MAL 02	RDUM MAJJIESA TO RAS IR-RAHEB	2007	
MOROCCO	MARO 01	AL HOCEIMA	1992	196
MONACO	MON 01	MONACO RED CORAL RESERVE	1986	
	MON 02	MONACO UNDERWATER RESERVE - LARVOTTO	1976	50
	MON 04	TOMBANT DES SPELUGHES	1986	
MONTENEGRO				
SLOVENIA	SLO 01	CAPE MADONA	1990	0,12
	SLO 02	DEBELI RTIC	1991	0,24
	SLO 03	STRUNJAN	1990	0,9
	SLO 04	STRUNJAN STJUZA	1990	0,34
	SLO 05	STUNJAN LANDSCAPE PARK	1990	4,28
SPAIN	SPA 01	ARCHIPELAGO DE CABRERA	1991	100,21
	SPA 02	ÁREA MARINA CAP CALA FIGUERA	2006	1,29
	SPA 03	AREA MARINA COSTA DE LLEVANT C	2006	20,13
	SPA 04	AREA MARINA DE CALA SAONA	2006	4,44
	SPA 05	AREA MARINA DE SES MARGALIDES	2006	0,98
	SPA 06	AREA MARINA DE TAGOMAGO	2006	7,48

COUNTRY	CODE	NAME OF MPA	YEAR OF ESTABLISHMENT	MARINE SURFACE(Km²)
SPAIN	SPA 07	AREA MARINA DEL CAP MARTINET	2006	5,55
	SPA 08	AREA MARINA DEL NORD DE MANORCA	2006	51,52
	SPA 09	AREA MARINA DEL SUD DE MONORCA	2006	22,54
	SPA 10	AREA MARINA PLATJA DE MIGJORN	2006	20,43
	SPA 11	AREA MARINA PLATJA DE TRAMUNTANA		14,15
	SPA 12	AREA MARINA PUNTA PRIMA-ILLA DE L'AIRE	2006	13,35
	SPA 13	CABO DE CREUS	1998	138,86
	SPA 14	CABO DE PALOS-ISLAS HORMIGAS	1995	18,98
	SPA 15	CABO SAN ANTHONIO	1993	110
	SPA 16	CAP NEGRO-PA DE PESSIC	1993	0,15
	SPA 17	FONDOS MARINOS DEL LEVANTE ALMERIENSE	2001	63,14
	SPA 18	FREUS DE EIVISSA I FORMENTERA	1999	136,17
	SPA 19	ILLA DEL TORO	2004	1,36
	SPA 20	ISLA DE TABARCA	1986	145,73
	SPA 21	ISLAS COLUMBRETES	1990	123,06
	SPA 22	ISLAS MALGRATS	2004	0,89
	SPA 23	ISLAS MEDAS	1990	5,33
	SPA 24	MAR MENOR	2001	275,03
	SPA 25	MASIA BLANCA	1999	0,44
	SPA 26	MIGJORN DE MALLORCA	2004	59
	SPA 27	NORTE DE MENORCA	1999	51,19
	SPA 28	S'ARENAL-CABO REGANA	1999	23,94
	SPA 29	SA DRAGONERA	2006	12,79
	SPA 30	BAHIA DE PALMA	1982	
	SPA 31	CABO DE GATA NIJAR	1987	434
	SPA 32	ACANTILADOS DE MARO- GERRO GORDO	1989	
	SPA 33	SES NEGRES	1993	
	SPA 34	ISLA DE ALBORAN	1997	4,29
	SPA 35	ISLA CHAFARINAS	2006	0,53
SYRYA	SYR 01	FANAR IBN HANI	2000	10
	SYR 02	RAS AL BASSIT	1999	30
	SYR 03	OM-ALTOYOUR	1999	10
TUNISIA	TUN 01	ARCHIPEL DE KERKENNAH		
	TUN 02	CAP NEGRO-CAP SERRAT		
	TUN 03	GALITE		19
	TUN 04	ILES KURIAT		
	TUN 05	ZEMBRA AND ZEMBRETTA	1977	47
	TUN 06	ILES KNEISS		58,5

COUNTRY	CODE	NAME OF MPA	YEAR OF ESTABLISHMENT	MARINE SURFACE(Km^2)
TURKEY	TUR 01	DATKA BOTZBURUN	1990	736,63
	TUR 02	DILEK YARIMADASI	1966	120
	TUR 03	FETHIYE GOCEK	1988	340,11
	TUR 04	FOCA	1990	51,72
	TUR 05	GOKOVA	1988	299,35
	TUR 06	GOKSU DELTA	1990	80,78
	TUR 07	KAS-KEKOVA	1990	165,91
	TUR 08	KOYCEGIZ DALYAN	1988	40,84
	TUR 09	PATARA	1990	49,9
	TUR 10	GELIBOLU PENINSULA	1973	330
	TUR 11	OLIMPOS-BEYDAGLARI	1972	
	TUR 12	AYVALIK ISLANDS	1995	
FRANCE ITALY MONACO		PELAGOS SANCTUARY	1993	87500

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METHODS FOR THE IDENTIFICATION OF EBSAS IN THE ADRIATIC SEA

METODE ZA IDENTIFIKACIJO EKOLOŠKO ALI BIOTSKO POMEMBNIH OBMOČIJ V JADRANSKEM MORJU

Giuseppe NOTARBARTOLO DI SCIARA

Key words: Adriatic, ecologically and biologically significant areas, criteria, SPAMI

Ključne besede: Jadran, ekološko ali biotsko pomembna območja, SPAMI (sredozemsko pomembna posebna območja varstva)

ABSTRACT

The Adriatic Sea is a very special portion of the Mediterranean region, which in spite of its limited water volume has distinctive geographic, geomorphological, oceanographic and ecological characteristics. One of the main tools to protect the Adriatic ecosystem biodiversity and functions from intense human pressures, such as coastal degradation, land-based pollution sources, fisheries and tourism, consists in the establishment of an ecologically representative network of marine protected areas (MPAs). The case for Adriatic MPAs should be best framed within the context of the current efforts of establishing a network of MPAs in the Mediterranean Sea, including in the region's open seas, under the aegis of the Barcelona Convention. Based on a process, which was recently applied to support the development of a representative network of MPAs throughout the Mediterranean, a strategic and hierarchical process is described herein, whereby the existing data and expert knowledge are used to locate the Adriatic Sea areas of conservation importance, through the application of criteria developed within the framework of the Convention of Biological Diversity for the identification of Ecologically or Biologically Significant Areas (EBSAs).

IZVLEČEK

Jadransko morje je zelo poseben del Sredozemske regije, saj ima kljub svojemu omejenemu vodnemu volumnu prav posebne geografske, geomorfološke, oceanografske in ekološke značilnosti. Eno izmed glavnih orodij za zavarovanje biotske pestrosti in funkcij jadranskega ekosistema pred intenzivnimi človekovimi posegi, kot so degradacija obale, kopenski viri onesnaževanja, ribištvo in turizem, je osnovanje ekološko reprezentativnega omrežja morskih zavarovanih območij (MPA-jev). Primer jadranskih zavarovanih območij bi bilo najbolje spraviti v okvir sedanjih naporov za osnovanje mreže MPA-jev v Sredozemskem morju, vključno z regionalnimi odprtimi morji pod zaščito Barcelonske konvencije. Na osnovi procesa, ki se je pred kratkim začel uresničevati z namenom, da se podpre razvoj reprezentativnega omrežja morskih zavarovanih območij po vsem Sredozemlju, je v tem prispevku opisan strateški in hierarhični proces, pri čemer so uporabljeni obstoječi podatki in strokovno znanje za lociranje jadranskih območij naravovarstvenega pomena z uporabo kriterijev, razvitih v okviru Konvencije o biotski raznovrstnosti za identifikacijo ekološko ali biotsko pomembnih območij.

1. INTRODUCTION

The Adriatic Sea, which is recognised as one of the sub-areas of the Mediterranean Sea in the EU Marine Strategy Framework Directive, is a very special, diverse and characteristic portion of the Mediterranean in many ways. It is an elongated body of water, about 800 km long and less than 200 km wide in its widest point, extending across almost 6° of Latitude (from 40°N to 45°45'N, the northernmost in the Mediterranean). The sea is surrounded by land, except for its narrow opening into the Ionian Sea, the Otranto Channel, which is 75 km wide. The Adriatic coastline is subdivided amongst six nations: Italy, Slovenia, Croatia, Bosnia & Herzegovina, Montenegro and Albania. The coastline is flat and largely consisting of sandy beaches along the western (Italian) shores, and rocky and fragmented into many small islands along the eastern shores. The Adriatic is extremely shallow (mean depth 240 m), averaging less than 50 m of depth in its northern part, but with a deep basin in the south, exceeding a depth of 1,400 m. During winter, the northern Adriatic waters can become very cold, and the area is therefore a source of Mediterranean deep waters. The mean salinity in the northern Adriatic is lower than the Mediterranean average, due to the many rivers that flow into the sea (mostly from northern Italy), which also carry large amounts of sediments as well as man-made contaminants from heavily urbanised, agricultural and industrialised northern Italy.

In spite of its vulnerability due to human pressures (caused by the high population densities along its shores, by the intense level of fisheries, and by the high levels of pollution discharged into the sea, in particular through the Po river), the Adriatic Sea still harbours a very valuable marine biodiversity and includes ecosystems having great ecological, economic, aesthetic and cultural values. Marine mammals are represented by several species of odontocetes (although only bottlenose dolphins, *Tursiops truncatus*, are now regular in the northern part) and by monk seals (*Monachus monachus*), which have recently been repeatedly sighted in Istria and surrounding waters. The marine bird fauna is abundant and diverse, particularly in the north-west and across an area connecting the southern Dalmatian islands in Croatia to the Gargano peninsula in Italy (Carboneras et Requena 2010). In a recent paper, Casale et al. (2010) determined that the northern Adriatic is one of the Mediterranean areas with the highest loggerhead turtle density, whereas the southern Adriatic is an important developmental area for the same species in the first years of life. Furthermore, the Adriatic still contains important nursery areas for several elasmobranch species (Serena, pers. comm.), and used to be a major feeding ground for the now endangered bluefin tuna (*Thunnus thynnus*). The Adriatic Sea's importance for a very large number of fish and benthic invertebrate species is very well known.

Establishing marine protected areas (MPAs) in key locations of high ecological value, and organising MPAs into networks, is considered one of the most effective ways of conserving marine ecosystem biodiversity and functions. The case for Adriatic MPAs should be best framed within the context of the current efforts of establishing a network of MPAs in the Mediterranean Sea, including in the region's open seas, under the aegis of the Barcelona Convention and its Specially Protected Areas of Mediterranean Importance (SPAMI) listings,

both in the territorial waters of the riparian states and in the areas beyond national jurisdiction (ABNJ).

This document briefly describes a process which was recently applied to support the development of a representative network of MPAs throughout the Mediterranean, whereby existing data and expert knowledge is used to identify the Adriatic Sea areas of conservation importance, denominated *Ecologically or Biologically Significant Areas* (EBSAs).

A major challenge in applying the above described process resides in the lack of adequate data, in particular due to the fragmentary knowledge currently existing of the ecology of part of the southern and eastern portions of the Mediterranean basin.

2. THE IDENTIFICATION PROCESS

The process of identifying sites to construct an ecologically representative network of MPAs in the Mediterranean, described in Notarbartolo di Sciara et Agardy (2009), consists of a three-stage hierarchical planning approach.

The first stage, on the widest regional scale, involves subdividing the Mediterranean into few large units (or sub-regions) having some ecological homogeneity.

The second stage foresees the identification within each sub-region of priority conservation areas, i.e., areas which possess high biodiversity values, and/or where significant ecological processes occur, and that raise concern due to their vulnerability to human pressures.

The third stage concerns the development of an ecologically representative network of MPAs (including corridors), which will involve first the identification of sites within the priority areas identified in the previous step, which will constitute the building blocks of an ecologically representative network once declared as MPAs, and second in addressing the socio-economic, legal, administrative and political aspects that are necessary for the formal establishment of such MPAs.

This document addresses in detail only the second of these three stages. The first stage is already concluded, given that the Mediterranean sub-region in which the process will occur – the Adriatic Sea – is already identified and represents the goal of this effort. The third stage, which is outlined only briefly in Section 4 of this document, will demand a dedicated effort in view of the complexities inherent in its political, social and economic implications.

The second stage is of a pure scientific, ecological nature, and involves the identification in the Adriatic Sea of *Ecologically or Biologically Significant Areas* (EBSAs), a process that was developed in recent years under the impetus of the Convention on Biological Diversity (CBD). A first attempt at such process was already the object of an effort led by the RAC/SPA in 2009, in cooperation with the European Commission, and which led to the identification of a number of EBSAs in the Mediterranean, including one in the northern and central Adriatic Sea (UNEP MAP 2010, Annex III). This portion of the Adriatic was selected for having a high natural productivity supporting an extensive food web, including sea birds, loggerhead sea turtles and several shark species, and its selection was based on the criteria of biological productivity, special importance for life history stages of species, and importance

for threatened, endangered or declining species and/or habitats. However, as warned by Notarbartolo di Sciara et Agardy (2009), further analysis, with a finer comb and with more statistically rigorous methodologies, is now needed in each sub-region to ensure that MPAs are designated with sufficient topographical and ecological accuracy, so that the future network of MPAs is maximally effective and representative.

The process involves the application of selection criteria (3.1), the collection of relevant available knowledge (3.2), and the mapping of EBSAs (3.4).

2.1 SELECTION CRITERIA

The process described in UNEP MAP (2010), and endorsed by the Focal Points for SPAs, involves the adoption of operational criteria for identifying potential SPAMIs in the open seas, including the deep sea. These include a combination between the criteria for SPAMIs included in Annex I to the 1995 SPA/BD Protocol to the Barcelona Convention, and criteria which had been developed within the framework of a number of other relevant organisations (e.g., GFCM, CBD, IMO PSSA, etc.).

However, considering that the theme of this document is circumscribed to the identification of EBSAs in the Adriatic Sea, as a further refinement in this sub-region of the work promoted by the RAC/SPA in 2009, only the seven criteria which are relevant to the identification of EBSA (Convention on Biological Diversity 2008) will be considered here. These are:

1. **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.
2. **Special importance for life history stages of species**: areas that are required for a population to survive and thrive.
3. **Importance for threatened, endangered or declining species and/or habitats**: area containing habitats for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.
4. **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.
5. **Biological productivity**: area containing species, populations or communities with comparatively higher natural biological productivity.
6. **Biological diversity**: area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.
7. **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.

2.2 COLLECTION OF AVAILABLE KNOWLEDGE

The ecological knowledge of the Adriatic Sea must be reviewed to enable locating on the map the presence of natural features that are relevant on the basis of the seven CBD criteria listed above.

The types of knowledge that are relevant to the process include information on the distribution of key physical and biogenic habitats; the distribution of habitats of selected species such as cetaceans, the monk seal, marine birds, ichthyofauna (including sharks and rays); and hotspots of benthic biodiversity. In addition, and particularly when detailed knowledge of species is unavailable, the presence of geomorphological and oceanographic features (such as seamounts, canyons, ridges, upwelling areas, frontal systems, etc.) can be used as proxies for the presence of elements having a high biodiversity value.

The types of knowledge listed above can be accessed in a number of ways:

1. Through reviews of scientific publications, both published and from the "grey" literature, cruise reports, fisheries data, internet-based databases, conference presentations, detailed maps of the sea bottom, etc.
2. From GIS maps of the distribution of particular taxa, which are becoming increasingly available through species-based efforts. One example is the GIS mapping of seabird distribution (Carboneras et Requena 2010), resulting in 10x10 km cells that are weighed according to the conservation value of the seabird species present, which is computed on the basis of the number of species observed per cell and their conservation status (Fig. 1).

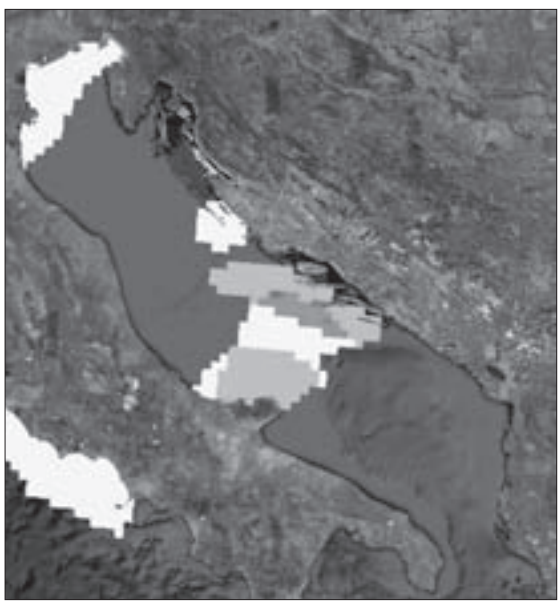

Fig. 1: Distribution of seabirds in the Adriatic Sea, subdivided into three levels (bright orange = highest, yellow = lowest) of conservation status (Carboneras et Requena 2010)
Slika 1: Razširjenost morskih ptic v Jadranskem morju, razdeljena na tri ravni (živo oranžna = najvišja, rumena = najnižja) varstvenega statusa (Carboneras in Requena 2010)

3. Through the collection of expert opinion (a.k.a. Delphic method), performed by inventorying knowledge from key experts in all the relevant fields of marine science (marine geology,

oceanography, remote sensing, and ecology of the relevant species). In this respect it is important to consider that this method of collecting useful knowledge is very rapid and can be quite helpful in an initial phase of the investigations, also considering that in many instances this is the only method available. However, being opinion-based, its results are often very subjective, imprecise, and the relative weights (e.g., from one expert to another) are difficult to assess; therefore this method should be limited preferably to an initial phase, while more rigorous quantitative data are being collected.

4. Through the implementation of *in situ* field campaigns, to be decided on the basis of evidence of severe knowledge gaps deriving from the analyses mentioned above (points 1 through 3), and of course on the necessary availability of human and financial resources.

Expert opinion surveys can be performed in different ways. The method used by Notarbartolo di Sciara et Agardy (2009) involved engaging selected experts in a survey (see the Annex 1), and asking survey participants to provide one or more polygons with a short description of the relevance of each polygon to the exercise. Given that the polygons were scored on the basis of each of the seven CBD criteria, a "mild" quantitative approach could be introduced, to compare and rank the relative importance of the polygons based on the CBD criteria.

To perform an analysis of the presence of EBSAs in any specific Mediterranean sub-region, such as in the case at hand of the Adriatic Sea, and with the opportunities offered by a more limited territorial extension, which can be scrutinised within more comfortable deadlines than what was possible with the pan-Mediterranean exercise (Notarbartolo di Sciara et Agardy 2009), it may be advisable to create an *ad hoc* multi-disciplinary group (composed by one expert for each of the relevant disciplines and methods), charged to perform a thorough inventory of the available knowledge and expertise, including the identification, enrolment and involvement in the process of the various scientific institutions that are known to actively operate in the sub-region.

The availability of spatially more precise information (e.g. through GIS analyses) and of quantitative data (e.g. through survey-derived spatial modelling) will eventually allow the application of more rigorous methods to identify EBSAs, for example through decision support tools such as the MARXAN software (Ardron et al. 2008).

However, seeking too much precision in the placement of polygons on a map may become a hindrance when considering that critical habitat of highly mobile species, such as marine mammals and birds, may change significantly from year to year (as exemplified by the observed fluctuation of fin whale distribution in the north-western Mediterranean; Panigada, pers. comm.). Therefore, for best results, distributional data for mobile species should be integrated over several years of observation before being used to identify EBSAs; often, such integration may be unintentionally provided through expert opinion, which in such cases may be more accurate than hard data collected over a short period.

2.3 MAPPING

All spatially-explicit data obtained through the above methods are transposed on a map to highlight the locations and delimitations of EBSAs. This can be done either through one of the

many professional GIS software packages available, or very easily (i.e. by anyone without the need for specialised GIS expertise and software availability) through Google Earth.

Google Earth allows for the handy creation of polygons that can be labelled, identified through colour and text, be made to acquire variable degrees of transparency so that overlays between polygons are visible, and saved on ".kmz" or ".kml" files that are quite easy to handle and exchange through email.

By way of example, 86 polygons collected with a survey performed by Notarbartolo di Sciara et Agardy (2009) were overlaid on the map of the Mediterranean Sea through Google Earth (Fig. 2 and 3). EBSAs can be inferred in those locations where polygons are clustered together (e.g. the Alborán Sea, the Strait of Sicily and the northern Adriatic Sea).

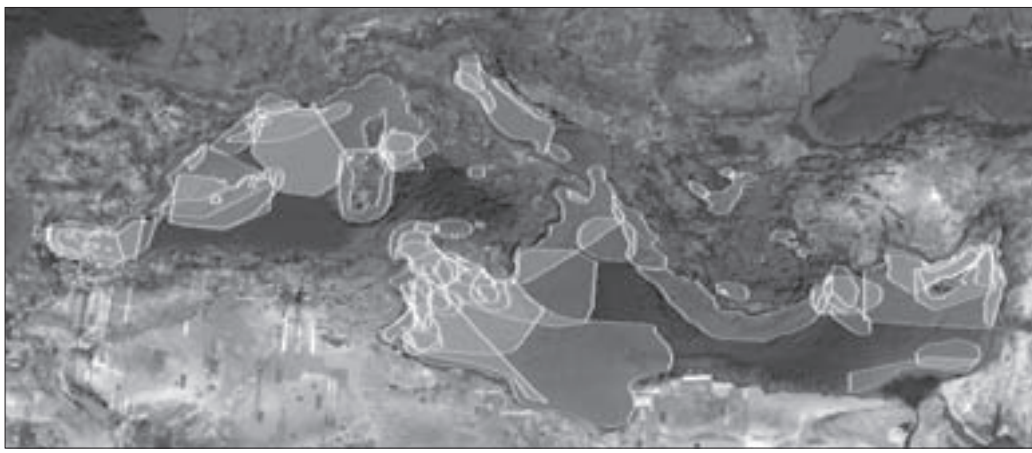

Fig. 2: Locations of 86 polygons referring to areas scored for one or more of the CBD criteria for the identification of EBSAs in the Mediterranean Sea (Notarbartolo di Sciara et Agardy 2009)
Slika 2: Lokacije 86 poligonov v območjih, ki dosegajo enega ali več kriterijev Konvencije o biotski raznovrstnosti za identifikacijo ekološko ali biotsko pomembnih območij v Sredozemskem morju (Notarbartolo di Sciara et Agardy 2009)

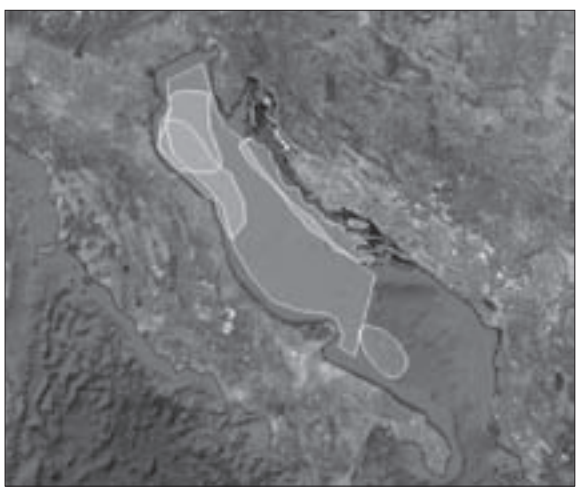

Fig. 3: Locations of 5 polygons referring to areas scored for one or more of the CBD criteria for the identification of EBSAs in the Adriatic Sea (Notarbartolo di Sciara et Agardy 2009). Polygons refer to areas important for marine turtles, nursery areas for elasmobranchs, suitable areas for small pelagics, and deep-sea coral reefs.

Obviously the overlap and clustering of polygons can only be a first, rough indication of the presence of an EBSA; in such areas, finer-scale analyses should be performed as soon as possible for more accurate assessments.

3. FROM EBSAS TO SPAMIS

After EBSAs have been identified and mapped in the Adriatic sub-region, and even before the creation of MPAs within such EBSAs is considered under the aspects of existing threats and socio-economic, institutional, governance, administrative and political angles, much remains to be done to provide guidance to the concerned riparian governments about the optimal order for MPA (or SPAMI) planning and implementation, and how each protected area should be designed.

Declaring protected areas spanning each identified EBSA would not necessarily assure that a representative network would be created to maximize biodiversity conservation in the Adriatic Sea. Given that the overall objective of establishing a network of representative marine protected areas is to capture the full suite of Adriatic biodiversity and utilise protected areas to conserve it, the entire network of sites must be evaluated in terms of its geographical representation, as well as its representation of all major habitat types.

"Scientific criteria and guidance for selecting areas to establish a representative network of marine protected areas, including in open ocean waters and deep-sea habitats" were provided by CBD (Convention on Biological Diversity 2008, Table 2, Annex III). To effectively be part of a representative network, an MPA should fulfil the following criteria: the area must be within an EBSA; the area must be representative (details on the approaches for dealing with the issue of representativity in an MPA network are presented in the working document "Representativity and coherence of MPA networks: concepts and applicability to the Mediterranean Sea" prepared by Chedly Rais for this International Workshop); the area must offer connectivity, allowing for linkages whereby they benefit from larval and/or species exchanges, and functional linkages from other network sites; ecological features (i.e., species, habitats and ecological processes that naturally occur in the given biogeographic area) must be replicated in different MPAs to account for uncertainty, natural variation and catastrophic events; and finally, sites must be adequate and viable (i.e. they should have size and protection sufficient to ensure the ecological viability and integrity of the feature(s) for which they were selected).

The MPA network evaluation could be best performed through the application of statistically rigorous methodologies (e.g. through a combination of Delphic methods and decision support tools such as MARXAN, see Ardron et al. 2008), to ensure that the proposed network of MPAs is maximally effective and representative.

Only once a blueprint for an MPA (or SPAMI) network, which is ecologically representative of the Adriatic Sea, is completed from the scientific point of view, on the basis of the process outlined above, the conditions will be mature for the setting up the necessary procedure of coordination and consultation between neighbouring countries, to address all the necessary

political, legal, socio-economic, administrative, and institutional aspects of the network creation process.

4. LITERATURE

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ANNEX 1
PRILOGA 1

Expert Survey
for the identification of Ecologically or Biologically Significant Areas
in Mediterranean Areas Beyond National Jurisdiction

Date

Dear Colleague:

We have been asked by UNEP MAP's Regional Activity Centre / Specially Protected Areas (RAC/SPA) of Tunis to provide an expert opinion based on collective knowledge about the presence in the Mediterranean Sea of the so-called ***Ecologically or Biologically Significant Areas*** (also known as EBSAs) where the establishment of SPAMIs (= ***Specially Protected Areas of Mediterranean Importance***) might be recommended to the Contracting Parties to the Barcelona Convention in the near future. In particular, the current effort is concentrated on the identification of EBSAs in Mediterranean areas beyond national jurisdiction, i.e., generally at a distance from the coast greater than 12 nautical miles (22,2 km).

Given what you know about the attached subset of the Mediterranean Sea <xxxx> we are kindly asking you to identify such noteworthy areas by drawing one or more polygons on the map. Such areas may be characterised by a number of features significant for marine biodiversity, including benthic features (e.g. seamount communities, cold water coral reefs, coral, sponge and bryozoan aggregations, hydrothermal vent ecosystems, cold seeps, canyons, trenches), pelagic habitats (e.g. upwelling areas, fronts, or gyres), or the presence of vulnerable and/or highly migratory species, critical habitats and corridors (e.g. cetaceans, seabirds, sea turtles, sharks and rays, highly migratory fish, or discrete deep-sea fish populations.).

When in doubt, we recommend that you be inclusive rather than exclusive.

We would also like to determine, which of the following criteria support your assessment for each polygon:

1. Uniqueness or rarity
2. Special importance for life history of species
3. Importance for threatened, endangered or declining species and/or habitats
4. Vulnerability, fragility, sensitivity, slow recovery
5. Biological productivity
6. Biological diversity
7. Naturalness

For definitions and a further explanation of the criteria, please see the attached documentation[1].

In light of this, could you score each criterion for its importance in determining each polygon's value by checking the appropriate boxes in the table below as follows:

[1] The documentation is not attached here. It can be found in the Convention on Biological Diversity (2008).

Criterion	0 not at all	1 a little	2 somewhat	3 a lot	4 completely
Uniqueness or rarity					
Special importance for life history of species					
Importance for threatened, endangered or declining species and/or habitats					
Vulnerability, fragility, sensitivity, slow recovery					
Biological productivity					
Biological diversity					
Naturalness					

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RAC/SPA CONTRIBUTION TO THE DEVELOPMENT OF A MEDITERRANEAN MARINE PROTECTED AREAS NETWORK IN COASTAL AND OPEN SEA WATERS

PRISPEVEK RAC/SPA K RAZVOJU OMREŽJA SREDOZEMSKIH ZAVAROVANIH OBMOČIJ V OBREŽNIH VODAH IN NA ODPRTEM MORJU

Atef LIMAM, Célia LE RAVALLEC

Key words: RAC/SPA, marine protected areas network, MedMPAnet project, SPAMIs in open seas project

Ključne besede: RAC/SPA, omrežje morskih zavarovanih območij, projekt MedMPAnet, SPAMI-ji v projektu odprtih morij

ABSTRACT

In 2009, the Contracting Parties to the Barcelona Convention adopted a regional working programme for the coastal and marine protected areas in the Mediterranean, including the high sea.
Through two main projects, the MAP/RAC-SPA provides technical and financial support for the countries to undertake the activities of this regional work programme:

- A "Project for the Development of a Mediterranean Marine and Coastal Protected Areas Network through the boosting of Mediterranean MPAs creation and management in areas within national jurisdiction of eastern and southern Mediterranean countries" (MedMPAnet Project), which consists in enhancing the effective conservation of regionally important coastal and marine biodiversity features in areas under national jurisdiction. This will be achieved through a series of demonstration activities and targeted capacity-building exercises that will be conducted in the countries involved in the project.
- A project for facilitating the establishment of Specially Protected Areas of Mediterranean Importance (SPAMIs) in open seas, including the deep seas. Its working methodology aims at enhancing the governance of the areas that lie in the open seas using a sub-regional or local approach, organizing skills networks between the neighbouring Parties concerned or making use of existing networks and initiatives.

The two projects pursue the same overall objective of creating an ecologically representative marine protected areas network in the Mediterranean region.

IZVLEČEK

Leta 2009 so države podpisnice Barcelonske konvencije sprejele regionalni delovni program za obrežna in morska zavarovana območja v Sredozemlju, vključno z odprtim morjem.
Prek dveh glavnih projektov, MAP/RAC-SPA zagotavlja tehnično in finančno podporo državam, ki bodo sodelovale pri dejavnostih v okviru tega regionalnega delovnega programa:

- „Projekt za razvoj omrežja sredozemskih morskih in obrežnih območij s pospeševanjem ustanavljanja morskih zavarovanih območij in upravljanjem v območjih znotraj nacionalne jurisdikcije vzhodnih in južnih sredozemskih držav" (Projekt MedMPAnet), ki zajema pospeševanje učinkovitega varstva

regionalno pomembnih obrežnih in morskih biodiverzitetnih posebnosti v območjih pod nacionalno jurisdikcijo. To bo doseženo skozi niz nazornih predavanj in vaj za dvigovanje kapacitet, organiziranih v državah, sodelujočih pri projektu.

- Projekt za omogočanje ustanavljanja sredozemsko pomembnih posebno zaščitenih območij (SPAMI-jev) na odprtem morju. Delovna metodologija projekta je načrtovana tako, da bo pospeševala upravljanje območij, ki ležijo na odprtem morju, in sicer s sub-regionalnim ali lokalnim pristopom, z organizacijo omrežij veščin med sodelujočimi sosednjimi državami ali z uporabo že obstoječih omrežij in pobud.

Oba projekta želita doseči isti skupni cilj, to je ustvariti ekološko reprezentativno omrežje morskih zavarovanih območij v Sredozemlju.

1. INTRODUCTION

The World Summit on Sustainable Development held in Johannesburg in 2002 highlighted the need to promote ocean conservation and called for the establishment of representative networks of marine protected areas by 2012 (United Nations 2002).

In 2004, the Parties to the Convention on Biological Diversity (CBD) adopted a programme of work on protected areas with the objective to establish, by 2012, comprehensive, effectively managed, and ecologically representative national and regional systems of marine protected areas (UNEP/CBD 2004).

In 2010, at the Nagoya Conference of the Parties, the Parties to the CBD, other Governments and relevant organizations were invited to cooperate, as appropriate, collectively or on a regional or subregional basis, to identify and protect ecologically or biologically significant areas in open-ocean waters and deep-sea habitats in need of protection, including by establishing representative networks of marine protected areas in accordance with international law and based on scientific information (UNEP/CBD 2010).

On the Mediterranean scale, the Protocol concerning Specially Protected Areas and Biological Diversity (SPA/BD) and the Regional working programme for the coastal and marine protected areas in the Mediterranean including the high seas are the main tools the Contracting Parties to the Barcelona Convention possess for implementing the Convention on Biological Diversity (UNEP/MAP 1995, 2009a).

By implementing two complementary projects, the MAP-RAC/SPA supports the Parties to the Barcelona Convention with technical and financial assistance to undertake activities, which contribute to develop a Mediterranean Marine Protected Areas network in coastal and open sea waters.

2. INSTITUTIONAL AND LEGAL FRAMEWORKS

The political and legal frameworks to address conservation matters at the Mediterranean level exist within the Mediterranean Action Plan (MAP), thanks to the Barcelona Convention adopted by 21 riparian countries and the European Commission.

Seven Protocols addressing specific aspects of Mediterranean environmental conservation complete the MAP legal framework, in particular the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD Protocol) adopted in 1995 (UNEP/MAP 1995).

The SPA/BD Protocol is the main tool the Contracting Parties to the Barcelona Convention possess for implementing the 1992 Convention on Biological Diversity, as regards the *in situ* sustainable management of coastal and marine biodiversity.

It envisages three main lines in order to ensure the safeguarding of biological diversity in the Mediterranean:

- The creation, protection and management of Specially Protected Areas (SPAs),
- The establishment of a list of Specially Protected Areas of Mediterranean Importance (SPAMIs),
- The protection and conservation of species.

The Regional Activity Center for Specially Protected Areas (RAC/SPA) is one of the 6 Centers responsible of respective components of MAP. Its specific objective is to contribute to the implementation of the SPA/BD Protocol by providing assistance to Mediterranean countries in the implementation of their commitments under the Protocol, especially in regard to developing and promoting Specially Protected Areas, with a particular focus on Specially Protected Areas of Mediterranean Importance (SPAMIs) as a tool to reduce the loss of marine and coastal biodiversity.

Taking into consideration the CBD decisions, the Mediterranean Parties to the Barcelona Convention decided in 2008 to promote measures for the establishment of a comprehensive and coherent Mediterranean network of coastal and marine protected areas by 2012 (UNEP/MAP 2008).

Furthermore, in the 2009 Marrakech Declaration, the States were called to continue the establishment of marine protected areas and to pursue the protection of biodiversity with a view to establish, by 2012, a network of marine protected areas, including on the high seas, in accordance with the relevant international legal framework and the objectives of the World Summit on Sustainable Development (UNEP/MAP 2009b).

In 2009, the Contracting Parties to the Barcelona Convention also adopted the "Regional working programme for the coastal and marine protected areas in the Mediterranean including the high seas", which aims to support the establishment of a comprehensive and coherent Mediterranean network of coastal and marine protected areas (UNEP/MAP 2009a).

To achieve that objective, the regional working programme provides a three-step hierarchical planning approach:

1 – At the widest scale, that of the Mediterranean basin, the first stage recommended when designing an ecological network is the identification of large-scale ecological units. The aim is to recognise the ecological distinctions between the different parts of the Mediterranean Sea.

2 – At the next level, priority conservation areas must be identified within each ecological unit; these areas do not constitute MPAs as such, but are focal areas for networks of individual MPAs. These areas can present high biodiversity or marine species of conservation concern

(vulnerable or rare species or species with high marine value) or can offer a unique or unusual combination of marine habitats.

3 – Once these priority conservation areas have been identified, it is possible to start the task of identifying sites to develop real ecological networks. The individual MPAs within these networks must protect what is ecologically most important, and must highlight habitats in which a concentration of ecological processes leads to high species diversity. To become a network, it is not only necessary to create MPAs to protect these key areas, but also to maintain the ecological links between them.

Within this framework, MAP-RAC/SPA's activities of its biennium programme of work consist in: (i) assisting the countries to create MPA(s), (ii) organizing training activities, and (iii) supporting the inventories of sites conservation interest.

Moreover, through two complementary projects, the MAP-RAC-SPA provides technical and financial support to the development of a Mediterranean Marine Protected Areas network in coastal and open sea waters:

The MedMPAnet project, which aims to develop Mediterranean Marine and Coastal Protected Areas network through the boosting of Mediterranean MPAs creation and management,

The project for supporting the creation of SPAMIs in open seas, including the deep seas.

3. THE MEDMAPNET PROJECT

3.1 CONTEXT

The MedMPAnet project is part of the MedPartnership GEF full size project "Strategic Partnership for the Mediterranean Sea Large Ecosystem" led by UNEP. The objective of the MedPartnership project, which includes 4 components, is to leverage reforms and investments to address marine and coastal biodiversity conservation priorities for the Mediterranean.

Component 3 specifically addresses the decline of biodiversity and the decline of fisheries in the Mediterranean and further branches off in 2 subcomponents: sub-component 3.1, conservation of coastal and marine diversity through the development of a Mediterranean MPA network and sub-component 3.2: Promotion of the sustainable use of fisheries resources through the application of ecosystem-based management approaches.

Specifically, the component 3.1 is implemented through two complementary projects, the MedMPAnet project led by UNEP-MAP-RAC/SPA and the MedPAN South Project led by WWF Mediterranean Programme.

3.2 OBJECTIVE

The overall objective of the MedMPAnet project, which starts by the end of 2009 and will last 5 years, consists in enhancing the effective conservation of regionally important coastal and

marine biodiversity features, through the creation of an ecologically coherent MPA network in the Mediterranean region, as required by Barcelona Convention's Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD Protocol).

This will effectively provide assistance to the country partners to implement several prioritized elements of the Strategic Action Programme for the Conservation of Biological Diversity (SAP BIO) in the Mediterranean Region (UNEP/MAP/RAC-SPA 2003) through the provision of a series of enabling activities at the national, sub-regional and regional levels and will also expand the existing Network of MPA managers in the Mediterranean to include the rest of the Mediterranean.

3.3 BENEFICIARY COUNTRIES AND TARGET GROUP(S)

12 Mediterranean riparian countries are involved in the project, namely Albania, Algeria, Bosnia and Herzegovina, Croatia, Egypt, Lebanon, Libya, Morocco, Montenegro, Syria, Tunisia and Turkey. The Palestinian Authority is also intended to be involved.

The main target groups are MPAs managers, practitioners and relevant authorities in the above-mentioned beneficiary countries.

3.4 MAIN ACTIVITIES

A set of activities will be implemented around 4 action categories:

- Demonstration projects on MPAs creation, financial analysis and sustainability mechanism in Albania, Croatia, Libya, Tunisia and Montenegro,
- Establishment of priority activities to create MPAs, identification of stakeholders & potential partnership required and characterization of marine sites suitable to become MPAs,
- Exchange of experience and training to improve new/existing MPAs management,
- Communication on the results and achievements of the project and public awareness.

3.5 EXPECTED RESULTS

- Implementation of several actions prioritized by the SAP BIO project.
- Existing and proposed MPAs will coalesce to form part of a coherent and geographically balanced network that exists at both institutional and ecological levels.
- Greater representation of the Mediterranean's vulnerable and critical coastal and marine habitats brought under statutory protection.
- Tools and capacity for the management of recognized Mediterranean coastal and marine biodiversity sites improved.
- Permanent coordination, monitoring, evaluation and support mechanisms for regional coastal and marine biodiversity conservation.
- Innovative approaches to the funding of regionally important existing and future coastal and marine biodiversity conservation initiatives in place.

4. THE PROJECT FOR SUPPORTING THE CREATION OF SPAMIS IN OPEN SEA, INCLUDING THE DEEP SEAS

4.1 PRESENTATION

The long term objective of this project implemented since 2008 is to assist the Contracting Parties to the Barcelona Convention to promote, through the SPAMI system, the setting-up of a representative network of marine protected areas in the Mediterranean open seas, including the deep seas.

The implementation of the project is under the guidance of a Steering Committee consisting of international and regional organizations:

- UNEP's Division for Environmental Policy Implementation - Regional Seas, Programme (UNEP/DEPI) and Division for Environmental Law and Conventions (UNEP/DELC),
- Coordinating Unit for the Mediterranean Action Plan (MEDU, UNEP/MAP),
- European Commission,
- Food and Agriculture Organization of the United Nations (UN-FAO),
- General Fisheries Commission for the Mediterranean (GFCM),
- Secretariat of the OSPAR Convention,
- International Maritime Organization (IMO),
- Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC),
- Secretariat of the Agreement on the Conservation of Cetaceans of the Black Sea, the Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS),
- Secretariat of the Pelagos Sanctuary,
- International Union for the Conservation of Nature's Centre for Mediterranean Cooperation (IUCN Med),
- Mediterranean Science Commission (CIESM),
- World Wide Fund for Nature's Mediterranean Programme Office (WWF MedPO).

The project is financially supported by the European Commission and the Mediterranean Trust Funds (MFT) according to a two-phase process.

4.2 FIRST PHASE – IDENTIFICATION OF PRIORITY CONSERVATION AREAS IN THE MEDITERRANEAN OPEN SEAS, INCLUDING THE DEEP SEAS (2009-2010)

The first phase was completed in 2009 and included an assessment based on the available scientific knowledge to identify priority conservation areas in the open seas, including the deep seas, likely to contain sites that could be candidates for the SPAMI List.

The identification of the areas was conducted through different studies taking into consideration the geological features of the seabed (seamounts, mud volcanoes, dries, canyons, hydrothermal vents), oceanographic features (fronts, upwelling), ecological features of certain

habitats (coralligenous facies, white coral communities) and biogeographic features of certain species.

An Extraordinary Meeting of the SPA/BD Focal Points, held on the 1st June 2010 in Istanbul (Turkey), revised a list of priority conservation areas located in the open seas, including the deep seas, and retained 12 areas (Figure 1) as likely to contain sites that could be candidates for the SPAMI List (UNEP/MAP/RAC-SPA 2010).

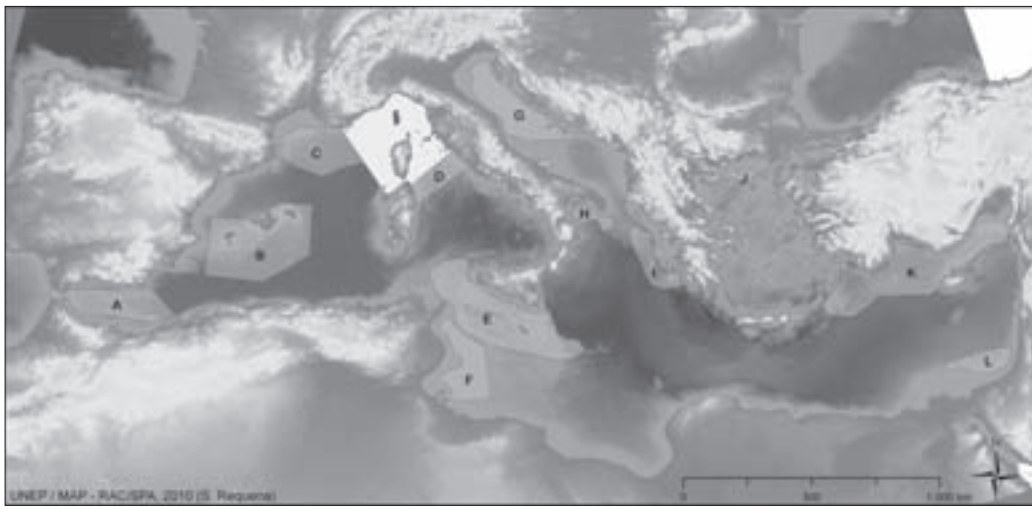

Figure 1: Priority conservation areas in the open seas, including the deep seas, likely to contain sites that could be candidates for the SPAMI List.
A: Alborán Seamounts; B: Southern Balearic; C: Gulf of Lions shelf and slope; D: Central Tyrrhenian; E: Northern Strait of Sicily (including Adventure and nearby banks); F: Southern Strait of Sicily; G: Northern and Central Adriatic; H: Santa Maria di Leuca; I: Northeastern Ionian; J: Thracian Sea; K: Northeastern Levantine Sea and Rhodes Gyre; L: Nile Delta Region (§: Pelagos Sanctuary declared as SPAMI in 2001)
Slika 1: Prednostna naravovarstvena območja na odprtih morjih, ki bi lahko zajemala lokalitete, primerne za vključitev na seznam SPAMI-jev.
A: Alborán Seamounts; B: Southern Balearic; C: Gulf of Lions shelf and slope; D: Central Tyrrhenian; E: Northern Strait of Sicily (including Adventure and nearby banks); F: Southern Strait of Sicily; G: Northern and Central Adriatic; H: Santa Maria di Leuca; I: Northeastern Ionian; J: Thracian Sea; K: Northeastern Levantine Sea and Rhodes Gyre; L: Nile Delta Region (§: Pelagos Sanctuary declared as SPAMI in 2001)

4.3 SECOND PHASE – SUPPORT TO THE PARTIES TO THE BARCELONA CONVENTION FOR THE ESTABLISHMENT OF SPAMIS IN OPEN SEA AREAS, INCLUDING THE DEEP SEAS (2010-2011)

The Project's second phase begins in 2010 and aims to facilitate the process of designating as SPAMIs sites included in the areas identified in the first phase as areas for conservation interest in the open seas, including the deep seas.

In its Article 9, the SPA/BD Protocol states that proposals for the SPAMI List may be submitted by two or more neighbouring Parties, if the area lies wholly or partially in the high sea and that the neighbouring Parties must consult one another to ensure that the proposed protection and management measures, and means of implementation, are consistent.

Furthermore, the Parties that are making the proposal for the SPAMI List provide the RAC/SPA with a presentation report containing information on the area's geographic location, its physical and ecological features, its legal status, its management plan and the means of implementing this, and a statement justifying the area's Mediterranean importance.

The activities of the Project's second phase aim at accompanying the area's neighbouring Parties in a process of consultation and coordination. Thus, for each considered site, it is suggested that an *ad hoc* work group be set up, made up of representatives from the countries neighbouring on the concerned area, in order to support the preparation of the presentation reports.

The operational aims of these work groups are:

- Ensuring coordination and monitoring of activities to be carried out in order to prepare the SPAMI presentation reports,
- Initiating sustainable consultation dynamics between the concerned neighbouring Parties,
- Developing a pilot experience in the Mediterranean that can be replicated in other priority conservation areas that lie in the open seas and have been identified during the first phase.

On the basis of the declarations made by some countries' representatives during the Istanbul meeting (1st June 2010), the MAP-RAC/SPA works to organize the first consultation meetings with the concerned countries (UNEP/MAP/RAC-SPA 2010).

5. CONCLUSIONS

The two projects implemented by the MAP-RAC/SPA pursue the same overall objective of creating an ecologically representative marine protected areas network in the Mediterranean region, addressing both coastal and open-sea ecosystems.

The MedMPAnet activities would lead to the boosting of Mediterranean MPAs creation and management in the countries involved (Albania, Algeria, Bosnia & Herzegovina, Croatia, Egypt, Lebanon, Libya, Morocco, Montenegro, Syria, Tunisia and Turkey). These areas would then benefit national status of protection, whereas the open sea project will require the approval of more than one Party to establish the SPAMI in an open-sea area.

By developing coordination and consultation processes between involved countries, both projects contribute to improve the governance of the Mediterranean Sea in order to ensure the conservation of the biodiversity of these areas and guarantee the sustainable use of their marine resources.

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ESTABLISHING A COHERENT NETWORK OF MARINE PROTECTED AREAS IN THE MEDITERRANEAN: THE ROLE OF WWF MEDITERRANEAN IN THE ADRIATIC SEA

USTVARJANJE KOHERENTNE MREŽE MORSKIH ZAVAROVANIH OBMOČIJ V SREDOZEMLJU: VLOGA USTANOVE WWF SREDOZEMLJE V JADRANSKEM MORJU

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Key words: Marine Protected Areas, Network of Marine Protected Areas, World Wildlife Fund - WWF, Mediterranean Sea, Adriatic Sea

Ključne besede: morska zavarovana območja (MPA-ji), mreža morskih zavarovanih območij, World Wildlife Fund - WWF, Sredozemsko morje, Jadransko morje

ABSTRACT

In recent years, governments have acknowledged the need and urgency for a more holistic approach to marine conservation. In particular, the establishment of an ecological and representative network of effective Marine Protected Areas (MPAs) has been recognised as an effective tool to protect the biodiversity at the ecoregional level, so that its coastal and marine ecosystems can continue to provide critical services to coastal societies. To achieve this target, WWF Mediterranean is providing support to countries in establishing coherent networks of MPAs by 2012. At the global level, WWF Mediterranean works together with WWF International in its lobbying effort to influence policy for the establishment of ecological networks of MPAs, including areas beyond national jurisdiction. At the Mediterranean level, WWF Mediterranean promotes actively the establishment of new MPAs and a more effective management of existing ones. To achieve this, WWF Mediterranean is investing in building the capacity of MPAs managers, practitioners, governmental institutions and NGOs and by implementing on-the-ground conservation projects. WWF Mediterranean operates within the Mediterranean Initiative – a long-term conservation strategy developed by six WWF Mediterranean offices to address the trends of biodiversity loss in the Mediterranean basin – and in close collaboration with the MedPAN network of MPAs managers. In the Adriatic Sea, WWF Mediterranean has contributed to the creation of a network of MPAs managers and practitioners (AdriaPAN) in 2008; through the MedPAN South project, it is currently strengthening the network of Croatian MPAs; and more in general, it encourages bottom up initiatives that can lead to the establishment of a strong constituency of MPAs practitioners capable to influence decision-makers on marine issues.

IZVLEČEK

V zadnjih nekaj letih so vlade mnogih držav že priznale potrebo po nujnem in bolj celostnem pristopu k varovanju morskega sveta. Še posebej je bilo ustanavljanje ekološke in reprezentativne mreže učinkovitih morskih zavarovanih območij (MPA-jev) priznano kot učinkovito orodje za zaščito biotske pestrosti na ekoregionalni ravni, tako da obalni in morski ekosistemi lahko še naprej zagotavljajo vitalne storitve družbam v obalnem pasu. Da bi bil ta cilj resnično dosežen, ustanova WWF Sredozemlje zagotavlja

pomoč državam pri njihovem ustvarjanju koherentnih mrež MPA-jev do leta 2012. WWF Sredozemlje sodeluje na globalni ravni z ustanovo WWF International pri njenih poskusih vplivati na politiko, ki zadeva ustanavljanje ekoloških mrež MPA-jev, vključno z območji, ki so zunaj pristojnosti nacionalnih sodnih oblasti. Na ravni Sredozemlja se WWF Sredozemlje aktivno zavzema za osnovanje novih MPA-jev in za učinkovitejše upravljanje že obstoječih MPA-jev. V ta namen WWF Sredozemlje vlaga sredstva v povečevanje kapacitet MPA-jevih upravljalcev, praktikantov, vladnih inštitucij in nevladnih organizacij, in sicer z uresničevanjem različnih naravovarstvenih projektov. WWF Sredozemlje deluje v okviru tako imenovane Sredozemske iniciative – dolgoročne naravovarstvene strategije, ki so jo z namenom, da se spopade s trendi padanja ali izgube biotske raznovrstnosti v sredozemskem bazenu, razvili v šestih podružnicah ustanove WWF Sredozemlje – in v tesnem sodelovanju z mrežo MedPAN MPA-jevih upravljalcev. V Jadranskem morju je ustanova WWF Sredozemlje prispevala k ustvarjanju mreže MPA-jevih upravljalcev in praktikantov (AdriaPAN) v letu 2008; v okviru projekta MedPAN South trenutno konsolidira mrežo hrvaških MPA-jev; in bolj na splošno opogumlja pobude "od spodaj navzgor", kar bi lahko pripeljalo do osnovanja močne "klientele" MPA-jevih praktikantov, ki bi bili sposobni vplivati na odločevalce v morskih naravovarstvenih zadevah.

1. INTRODUCTION

In recent years, governments have acknowledged scientists' recommendations on the need and urgency to apply a more holistic approach to marine conservation (UNEP 2010a, Ehler *et* Douvere 2009). The Ecosystem Approach (EA) to marine resources management accounts for the different linkages and scales of ecosystems, the values of ecosystem services, and human as an integral part of ecosystems (Arkema *et al*. 2006). In particular, the establishment of an ecological and representative network of effective Marine Protected Areas (MPAs) has been recognised as a valid tool to protect the biodiversity and the ecosystems of an ecoregion and the services provided and for the well-being of its inhabitants (Roberts et al.. 2003, IUCN-WCPA 2008). However, at the last Conference of the Parties in Nagoya, signatory countries have just recognised the slow progress being made towards achieving the Convention of Biological Diversity (CBD) target to establish a coherent network of MPAs by 2012. WWF welcomed the Nagoya protocol and the fact that Governments reaffirmed the fundamental need to conserve marine resources by ending overfishing and protecting at least the 10 percent of marine and coastal areas, including high seas. While WWF recognises the important step to boost protection 10 times more than what the world has currently achieved, the target is still only half of what scientists recommend.

WWF identified the Mediterranean region as a global priority area where ecological integrity must be conserved to contribute to a more secure and sustainable future for the planet (WWF 2007). Together with other five WWF national offices in the region, WWF Mediterranean Programme office (hereafter "WWF Mediterranean") has recently launched the Mediterranean Initiative, a common strategy that scales up WWF's conservation efforts in the basin. Safeguarding marine ecosystems through the establishment of coherent networks of MPAs is one of the four goals of the Mediterranean Initiative.

Currently, the level of protection of the Mediterranean Sea is largely inadequate. In particular, MPAs are too few, not ecologically representative of the Mediterranean biodiversity

and not effectively managed (Coll *et al*. 2010, UNEP 2010a, Abdulla *et al*. 2008a, 2008b). Through the Mediterranean Initiative, WWF addresses these challenges by pushing actors involved in marine protection towards a threshold where marine biodiversity conservation becomes a political, economic and social priority and MPAs become key tool of choice to ensure the sustainable management of marine ecosystems.

This paper reports on recent contributions of WWF Mediterranean to the establishment of an ecological network of effective MPAs in the Mediterranean through 1) its support to WWF International policy work on the establishment of networks of MPAs, including areas beyond jurisdiction, and 2) its efforts in improving the representativeness and management effectiveness of MPAs in the Mediterranean and Adriatic Seas.

2. WWF CONTRIBUTION

2.1 ECOLOGICAL NETWORK OF MPAS, INCLUDING AREAS BEYOND NATIONAL JURISDICTION

WWF has recently produced a progress review on the identification and establishment of high seas MPAs to provide an overview of the approaches used in the different regional seas, as well as to contribute to the policy work that WWF is conducting on high sea conservation (WWF 2010). The Antarctic waters under the Convention of the Conservation of the Antarctic Marine Living Resources (CCAMLR), the North-East Atlantic under the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), together with the Mediterranean Sea under the Barcelona Convention are among the few regional seas that feature legal instruments in support to the establishment of networks of MPAs including Areas Beyond National Jurisdiction (ABNJ). Each region, though, applies different approaches. From the very beginning of the process, on 2005, contracting parties of the Antarctic treaty agreed to apply a systematic conservation planning approaches (Margules *et* Pressey 2000), while the Mediterranean and North-East Atlantic countries started a national or multinational nomination of the Pelagos Sanctuary as a Specially Protected Areas of Mediterranean Interest (SPAMI) in 2000, and of the Charlie Gibbs fracture zone in 2010 respectively. Again, a different stepwise process was agreed and implemented by the contracting parties within each regional sea (Tab. 1).

For decades, the pioneer experience in the Mediterranean of the Pelagos Sanctuary for Cetaceans has been considered a reference and innovative example (WWF 2010, Game *et al*. 2009, Ardon *et al*. 2008). However, the credibility of this process risks now to be undermined due to the inadequate management of the Pelagos Sanctuary, which still lacks a strong and clear mandate for the management plan and its Secretariat (Notarbartolo di Sciara *et al*. 2008, 2009). Aside from these issues, the example of this pilot site and the effort of France, Italy and Monaco can still be considered instrumental to enhance regional cooperation and dialogue between Regional Conventions and Competent regional authorities.

Table 1: Main steps leading to the establishment of MPAs beyond national jurisdiction implemented in three UNEP's Regional Seas (WWF 2010). See text for acronyms.
Tabela 1: Glavni koraki, ki vodijo k ustanavljanju MPA-jev zunaj pristojnosti nacionalnih sodnih oblasti, uresničeni v treh UNEP-ovih regionalnih morjih (WWF 2010). Akronimi so pojasnjeni v besedilu samem.

Steps	**North-East Atlantic (OSPAR)**	**Mediterranean Sea (Barcelona Convention)**	**Antarctic (CCAMLR)**
Establishing an ecological network of MPAs in ABNJ – Start	2003 (Ministerial Meeting; Rec 2003/3)	1995-2003 (SAP-BIO) 2008 (Almeria Declaration)	2005 CCAMLR First Meeting on MPAs
Assessment of ecological coherence	From 2006 annual assessment (1% in 2010)	2008 IUCN, MedPAN, WWF (4% in 2008)	
Bioregionalisation	2006	2010	2007
Identifying Important Ecological areas		2010 RAC/SPA (12 Priority conservation areas)	2008 CCAMLR; (11 Priority areas)
First formal proposition	2006 Charlie Gibbs fracture zone (WWF)	1999 Multilateral agreement Pelagos Sanctuary	
Review of the nomination process	2008-09 Road map (i.e. legal issues, stakeholders)	2008 Road map (i.e. legal issues, designing criteria)	2009 Systematic conservation planning
First nomination	2010 Charlie Gibbs fracture zone	2001 Pelagos Sanctuary as SPAMI	2009 South Orkneys Island MPA

Following the Almeria 2008 declaration (UNEP-DEPI/MED IG.17/10), the Mediterranean countries agreed to revitalise the commitment of establishing a coherent network of MPAs, including high and deep seas. Soon after, the UNEP-MAP "Regional Activity Centre for Specially Protected Areas" (RAC/SPA) received the mandated to implement a project to identify ecologically or biologically significant areas (EBSA) in ABNJ based on CBD criteria and facilitate the designation of priority conservation areas as SPAMI through a coordinated consultation among neighbouring countries (UNEP 2010b). The approach applied by RAC/SPA for the identification of EBSA is remarkable and is the sole example at the global level, which is in line with the road map recently adopted at the last CBD Conference of the Parties (UNEP 2010a).

In this respect, WWF has put forward a number of recommendations at different international fora (WWF 2010) to be applied in the Adriatic Sea sub-region. To overcome current legal and governance uncertainties in high seas, WWF urges Member States to show stronger commitment to collaborate, cooperate and take responsibility in order to move forward the protection of high and deep sea areas. WWF encourages Regional Seas Conventions and Action Plans to engage more the Contracting Parties, facilitate the clarification of their mandate in the designation and regulation of the activities and strengthen the cooperation with International Competent Authorities (particularly with FAO/ General Fisheries Commission for the Mediterranean).

2.2 ENHANCING MANAGEMENT EFFECTIVENESS OF EXISTING MPAS

Along with the scant ecological representativeness of the existing network of MPAs, the Mediterranean features on average low management effectiveness of its MPAs. This holds particularly true for the countries of the south and east of the Mediterranean, where MPAs are subjected to little or no management and many of them can be considered "paper parks" (Abdulla *et al*. 2008a). As a result, the actual contribution to halt the loss of biodiversity is lower than the potential capacity of the whole Mediterranean region.

Several social, economic, cultural, and institutional factors play a central role in ensuring the success of an MPA (Charles *et* Wilson 2009, Abdulla *et al*. 2008b). In the Mediterranean, the inadequate technical, human and/or financial capacities and insufficiently trained personnel have been identified as the main drivers of the overall low management effectiveness of the MPAs (Abdulla *et al*. 2008a, Lopez Ornat 1997). Moreover, insufficient public involvement, limited awareness on marine conservation issues, and inadequate consultation processes with relevant actors have created the conditions for a poor level of compliance (Badalamenti *et al*. 2000, Guidetti *et al*. 2008).

Over the last 10 years, WWF Mediterranean has contributed to the improvement of the management effectiveness of existing MPAs by building the capacity of MPAs managers, practitioners, institutions and NGOs through the implementation of on-the-ground conservation projects. This efforts fall within the long-term strategy of the Mediterranean initiative, where WWF offices in the region work towards strengthening regional, sub-regional and national social networks of MPA managers. WWF recognises that the shift from an individualistic to a more holistic approach to MPA management can also be achieved through social networks (Laffoley 2009). For a single MPAs, being part of a network, means benefiting from peer experiences extending the possible range of exchange with scientist and experts from different countries, and accessing financial and technical resources. This ultimately supports a bottom up approach, which contributes to build a constituency of practitioners able to influence decision-makers on the conservation of marine resources. To this end, WWF Mediterranean works in partnership with the regional network of MPAs managers (MedPAN), it contributed to the creation of a network of MPAs managers in the Adriatic (AdriaPAN), and it is currently strengthening the network of Croatian MPAs.

Together with more than 20 among governmental, non-governmental and inter-governmental institutions of the southern and eastern Mediterranean countries, WWF Mediterranean is currently implementing the MedPAN South project (www.panda.org/msp). This four-year project is designed around a number of coordinated regional, national and site-based actions geared towards increasing the technical capacity of key marine conservation actors and reaching an effective management of existing MPAs. This is being achieved through five pilot projects in Algeria, Croatia, Libya, Tunisia, and Turkey and a capacity building program on MPA management both at the national and regional levels.

In the Adriatic Sea, the main effort is concentrated in Croatia, where a specific project is assisting the managers of the National Parks Brijuni, Kornati, and Mljet and the Nature Park of Lastovo Archipelago and Telascica in developing their management plans through a

participatory step-by-step approach, involving local stakeholders and national governmental institutions. The governance structure of the project is robust and designed to ensure the long-term sustainability of project results. At the local level, the project is implemented together with Sunce, the Association for Nature, Environment and Sustainable Development. The official partners are the Ministry of Culture, the State Institute for Nature Protection, and the relevant authorities at the County level. A Focal Point was appointed at the level of the Ministry of Culture, while a Steering Committee including all responsible institutions and stakeholders was established as reference body to address legal and institutional uncertainties about MPA implementation in Croatia. As the Croatian MPAs share similar ecological features, problems, needs, as well as most of the key stakeholders, a common planning approach has been applied. This approach has provided the opportunity to shift from the planning within individual MPAs to planning as a network of MPAs. A series of capacity building training workshops are currently organised by WWF and Sunce to provide managers the proper know-how for the step-by-step development of their management plans and to foster the consultation with local and national stakeholders. International and national experts, as well as key Mediterranean case studies, are brought in to train and work together with managers and responsible authorities on legal framework, site characterisation, stakeholders' engagement, zoning, monitoring and evaluation, and business planning.

Beyond building national capacity, WWF has in place a region-wide Capacity Building (CB) Programme, which builds and strengthens the capacity of MPAs practitioners from 11 countries of the south and east of the Mediterranean, including Albania, Croatia, and Montenegro. This is the first capacity building program of this scope and importance proposed in the Mediterranean, which is implemented together with UNEP-MAP RAC/SPA and with the technical support of the National Oceanic and Atmospheric Administration (NOAA), to enhance the effectiveness and relevance of deliveries, a key target audience was identified at the outset of the project and includes MPAs managers, practitioners and officials of relevant authorities/administrations, as well as researchers and key stakeholders in the eligible countries. The capacity building programme is designed on three main actions. A Mentor Programme that entails a series of training workshops aimed at building the skills of the Mentors as professional trainers; three regional training workshops on MPA Management Planning, Planning for Sustainable Fisheries and Planning for Sustainable Tourism in MPAs; and a follow-up programme, which allows to bring the skills and knowledge acquired in the classroom through regional trainings into effective applications in the field.

3. CONCLUSION

The establishment of an ecological network of effective MPA requires a multidisciplinary and multilevel approach with the contribution and strong commitment of regional and national governmental and non-governmental institutions as well as the scientific community. Despite the fact that governance and legal challenges have halted the implementation of transboundary environmental policies in the Mediterranean, international cooperation among

all actors involved in marine conservation is a significant opportunity to achieve critical marine conservation targets. WWF Mediterranean is moving in this direction in partnership with national and local public institutions, with civil society and the scientific community and the important result we obtain should be considered a shared accomplishment, particularly for our local partners.

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LARGE SCALE MARINE HABITAT AND SPECIES MAPPING ON THE CROATIAN SIDE OF THE ADRIATIC SEA

KARTIRANJE MORSKIH HABITATOV IN VRST V VELIKEM MERILU NA HRVAŠKI STRANI JADRANSKEGA MORJA

Zrinka JAKL

Key words: Adriatic Sea, benthic habitats and species, mapping, large scale, scuba diving, volunteers, GIS, methodology, Brijuni National Park, Lastovo Islands Nature Park, northwestern part of Dugi otok, Pakleni Islands

Ključne besede: Jadransko morje, bentoški habitati in vrste, kartiranje, v velikem merilu, potapljanje s potapljaško opremo, prostovoljci, GIS, metodologija, Narodni park Brioni, Naravni park Lastovsko otočje, severozahodni del Dugega otoka, Peklenski otoki

ABSTRACT

Croatian side of the Adriatic Sea is featured by over 1000 islands. This complex landscape continues underwater, providing conditions for diversity of habitats and species. Distribution maps of marine habitats and species are necessary for the identification and management of priority conservation areas. Due to the complexity of underwater features and lack of human and financial resources, both protected and unprotected marine areas still lack large scale habitat and species distribution maps. The existing maps have been developed based on mathematical modelling; they cover only few habitat types and are on small scales (1:100,000) with significant errors on scales necessary for management (1:25,000 and larger).

In 2005, the Association Sunce engaged in the process of large scale marine habitats and species mapping with the objective of collecting information necessary for the identification of new marine protected areas and improving management of the existing ones. Prerequisite for such mapping was to develop methodology that suits Croatian capacities and to invest in building capacity of network of partners, trained biologists that can collect data.

Until 2010, Sunce engaged in the mapping process by over 60 scuba divers, biologists and biology students, who mapped over 300 locations in the Adriatic. Most systematic mapping was conducted in the area of Brijuni National Park, Lastovo Islands Nature Park, northwestern part of Dugi otok and Pakleni Islands. The mapped area within these sites covers about 200 km^2. Our paper presents the used methods, the attained results and lessons learned in developing and implementing habitat and species mapping.

IZVLEČEK

Hrvaška stran Jadranskega morja se lahko pohvali s prek tisoč otoki. Ta kompleksna krajina se nadaljuje tudi pod morjem, kar zagotavlja ugodne razmere za veliko pestrost tamkajšnjih habitatov in vrst. Za identifikacijo in upravljanje prednostnih naravovarstvenih območij so zato nujno potrebne karte razširjenosti morskih habitatov in vrst. Toda zaradi kompleksnosti podvodnih posebnosti in pomanjkanja človeških in finančnih virov še vedno niso bile izdelane karte razširjenosti morskih habitatov in vrst tako za zavarovana kot nezavarovana območja. Obstoječe karte so bile razvite na

osnovi matematičnega modeliranja; pokrivajo le nekaj habitatnih tipov in so v majhnem merilu (1:100.000), se pravi z večjimi napakami na lestvicah, ki so pomembne za upravljanje območij (1:25.000 in večje).
Leta 2005 se je združenje Sunce vključilo v proces kartiranja morskih habitatov in vrst v velikem merilu, in sicer z namenom, da zbere podatke, potrebne za identifikacijo novih morskih zavarovanih območij in da hkrati izboljša upravljanje že obstoječih območij. Toda pogoj za takšno kartiranje je bil razvoj metodologije, ki bi ustrezala hrvaškim zmožnostim, kot tudi naložba v povečevanje kapacitete mreže partnerjev, predvsem izurjenih biologov, ki bi bili sposobni zbirati potrebne podatke.
Do leta 2010 je bilo združenje Sunce zaposleno v procesu kartiranja že z več kot 60 potapljači (s potapljaško opremo), biologi in študenti biologije, ki so izrisali več kot 300 lokacij v Jadranskem morju. Najbolj sistematično kartiranje je bilo opravljeno v območjih Narodnega parka Brioni, Naravnega parka Lastovsko otočje, severozahodnega dela Dugega otoka in Peklenskih otokov, in sicer na skupni površini kakih 200 km^2. Pričujoči članek opisuje uporabljene metode, pridobljene rezultate in tudi lekcije, ki so se jih sodelujoči naučili pri razvijanju in samem opravljanju kartiranja morskih habitatov in vrst.

1. INTRODUCTION

Croatian side of the Adriatic Sea is featured by over a thousand islands, rocks and reefs. This complex landscape continues underwater, providing suitable conditions for diversity of habitats and species.

Distribution maps of marine habitats and species are necessary for the identification and future management of priority conservation areas. Due to the complexity of underwater features and lack of human and financial resources, both protected and unprotected marine areas in Croatia still lack large scale habitats and species distribution maps. National marine habitats maps were developed in 2004 by mathematical modelling (OIKON d.o.o. 2004). These maps do not provide sufficient information for management purposes, as they include only few habitat types and are on small scales (1:100,000) with significant errors on scales necessary for management purposes (1:25,000 and larger).

In 2005, the Association Sunce from Split, Croatia, engaged in the process of large scale marine habitats and species mapping with the objective of collecting information necessary for the identification of new marine protected areas and improving management of the existing ones.

Habitats and species mapping was based on building procedures, methodologies and tools how to map species and habitats by amateur divers biologists and building a network of partners among scientists, diving clubs and centres and protected area management institutions.

Since 2005, over 350 locations in the Adriatic have been mapped covering wider areas of Brijuni, Lošinj, Dugi otok, Kornati, Murter, Rogoznica, Lastovo, Vis, Brač, Pakleni Islands and Šolta. Most systematic mapping was conducted in 2009 and 2010 in the areas of Brijuni, Dugi otok, Pakleni Islands, Brač and Lastovo Islands, allowing development of detailed 1:25,000 habitats and species distribution maps.

2. METHODS

In the 2005-2008 period, the Association Sunce developed a system for marine habitats and species mapping by amateur divers - biologists. It included development of mapping data collection protocols, diving slates, diving profiles, GPS data collection system and management, Excel and GIS data management system, and educational material necessary for the training of volunteers.

Over the period, the Association Sunce trained and engaged over 60 volunteer scuba divers in the species and habitats identification and mapping, with each year at least 4 new volunteers joining the group. Volunteers were biology students or graduated biologists. Trainings and networking allowed the Association Sunce to reach enough capacity to conduct series of systematic species and habitat mapping over the Croatian Adriatic and to gain enough experience to usefully store, manage and interpret the collected data. It also increased relevance and respectability of the organisation in field mapping among relevant institutions and donors.

Main strength of the network and the organisation is the ability to recruit and motivate several people that can map large areas in a limited c time.

2.1 HABITATS AND SPECIES MAPPING

Mapping of habitats and species was conducted through scuba diving transects, focused on covering depth and surface distribution of coastal marine habitats and marking presence/absence of benthic species. During each dive, profiles were usually made first vertically, then at maximum depth parallel to the coastline. Profiles depended a great deal on the morphology of the area and were designed in a way to cover large areas in order to get best possible insight into present species and habitats distribution.

An important step before the actual field mapping was to compile the existing information, on which dive profiles are planned in advance. Information compiling included collection of available digital and paper maps of the area; the existing scientific and local knowledge on present habitats, species, significant locations, diving locations. The objective was to have as few dive profiles as possible, through which most data could be retrieved in the field. Both in field mapping and later habitat map development various maps had to be combined. Maps usually included 1:100,000 nautical maps, 1:25,000 topographic maps, 1:5,000 orthophoto maps, when possible digital and georeferenced. Orthophoto maps gave indication of the habitats' borders within depth range of up to 10 m and topographic maps for deeper areas.

Field mapping diving was conducted in groups of 3 to 5 divers, in which one diver was handling reel and rope with a GPS device fixed to a diving buoy, while others were marking habitats, species and photo documenting the area. Diving was conducted to maximum depths of 40-50 m or less, depending on the morphology of the area.

Depth distribution of habitats was mapped by marking on a diving slate average habitat depth distribution, meaning the upper and lower habitat depth distribution. Spatial distribution of habitat was identified by marking time on positions where changes of dominant habitats were

registered. Time on diving computers and GPS device were previously synchronized and GPS data were later transported into ArcGIS 9.3. Habitat depth distribution information was used for extrapolating habitats coverage during habitats maps development process. Information from GPS time points was used to precisely define habitat borders, especially in areas where less quality bathymetric maps are available or where habitat change is not strictly connected to depth.

During each dive profile, marine benthic species were mapped by marking on a pre-printed diving slates presence/absence of 170 predefined benthic species. Species abundance was not quantified, facies or association of significant species were drawn on a dive profile and textually described in the excel database. Species included in the mapping were chosen based on following criteria: easy to identify under the sea (no need for sampling or specific taxonomic experts), rare, endangered, protected, listed on Natura 2000 and SPAMI lists, indicator of certain habitat, potential indicator of changes, low range of movement (benthic species), plus some rather common species were added. In Annex 1, species included in the mapping are listed. Presence of other rare or invasive species, such as *Caulerpa racemosa*, was also marked within special notes of the excel database.

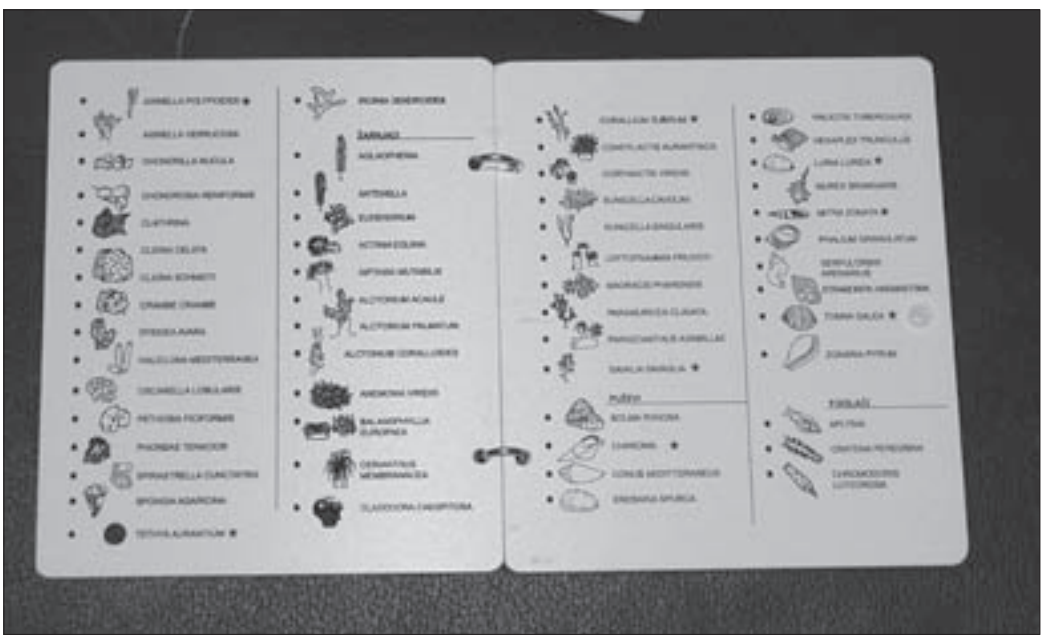

Figure 1: Underwater diving slate for the identification and mapping of benthic species and habitats
Slike 1: Podvodna potapljaška tablica za identifikacijo in kartiranje bentoških habitatov in vrst

Habitats were identified using Handbook for Inventarisation and Monitoring of Marine Habitats (Bakran-Petricioli 2007), and species using Handbook for Inventarisation of Adriatic Marine Species (Jakl et al. 2008).

The collected data were entered into MO Excel database, which was then integrated, through MO Access, into the GIS system (ArcGIS 9.3 program), allowing search of habitats

and species distribution through mapped locations and development of habitat maps. Dive profiles were also described by text, generalised dive profile drawings and photo and video documented that are all part of the database.

Database contains data as well as information on data collection: date, project and funding of data collection, organisation implementing mapping, contact, name of the area and the location, GPS, people implementing mapping, existing photo and video documentation, special notes, description of the location, upper and lower depth border of habitats, presence/absence of 170 benthic species.

2.2 *POSIDONIA OCEANICA* MEADOWS SAMPLING

Data on the baseline state of *Posidonia oceanica* meadows was also collected in addition to species and habitats mapping. Sampling was conducted by scuba diving, counting number of posidonia shoots within standard 40 x 40 cm quadrates and meadow coverage estimation at each 5 m depth. At each sampling depth, triple measurement was made in order to ensure that sample was statistically representative.

Additional data on length and width of posidonia leaves were also collected. At each 5 m depth, 3 posidonia shoots were sampled, all leaves were measured as to their length and width, and necrosis coverage. The collected data were inserted into MO Excel, assessed using standard statistical methods and compared with UNEP RAC/SPA (2007) standard posidonia meadow classes: abnormal (A), subnormal (S-), normal (N), supra-normal (S+).

2.3 HABITAT MAPS PRODUCTION

Habitat maps were developed based on information collected during filed mapping and by using available orthophoto, topographic and bathymetric maps. In addition to field data, bathymetry and underwater terrain slope were used as main factors of habitat distribution. Based on these factors, field data were extrapolated from dive profiles to wider areas and habitats mapped in ArcGIS 9.3. Mapping was conducted to scuba diving maximum safety depths of 40 to 50 m. For all areas deeper that 50 m that were not mapped, an assumption was made that they were composed of coastal detritus bottoms, habitat widely distributed on Croatian side of the Adriatic at greater depths. It is very likely that this habitat is combined with other deep water habitats and therefore covers much less surfaces than mapped.

Habitat maps were made in GIS shapefiles; they include information on main habitat types, information on association/facies where possible, bottom type and codes according to the Croatian National Habitat Classification (NKS), Natura 2000 and Corine.

2.4 SPECIES DISTRIBUTION MAPS

For the purpose of visualisation of species distribution, all dive profiles were stored in the GIS database in the form of point shapefiles. Distribution of each of the 170 mapped species can be retrieved from the database and visualised in maps.

3. RESULTS

Since 2005, over 350 locations in the Adriatic were mapped by using this methodology, covering wider areas of Brijuni, Lošinj, Dugi otok, Kornati, Murter, Rogoznica, Lastovo, Vis, Brač, Pakleni Islands and Šolta. Most systematic mapping was conducted in 2009 and 2010 in the areas of Brijuni, Dugi otok, Pakleni Islands, Brač and Lastovo Islands, where mapping was a continuation of the work initiated in 2005. Systematic mapping allowed point and line data to be extrapolated and used for the development of detailed 1:25,000 habitats maps, while for other sites only point habitat and species information is available.

Figure 2: Areas of systematic habitat and species mapping
Slika 2: Območja, kjer je bilo opravljeno sistematsko kartiranje habitatov in vrst

3.1 BRIJUNI NATIONAL PARK

Brijuni National Park is located in the northern Adriatic. It was established in 1983 and covers a total land area of 33.97 km^2 and a total sea area of 26.51 km^2. Its coastline is 44.83 km long. It is also part of the Ecological Network and a potential future Natura 2000 site. It is composed of 14 islands; it is a rather shallow area, with coastal depths usually not greater than 20 m and with maximum depths of around 30 m. Field mapping was conducted in May 2010,

with total duration of 10 days. In total, 60 locations were mapped; the state of posidonia was not assessed, as only small patches with indication of larger meadow were detected during the last days of survey. Through this survey, the existing marine species list expanded for over 50 benthic species. In total, 11 people participated in the survey, out of which 9 were volunteers. Work was done in close cooperation and logistical support of the protected area management authority and funds of the MedPAN South pilot project in Croatia. Additional information on coastal habitats (beaches) was collected in the summer 2010 by the national park authority. Data interpretation and map production is in progress. In 2011, an additional mapping of the area of Mali Brijun is planned to be carried out.

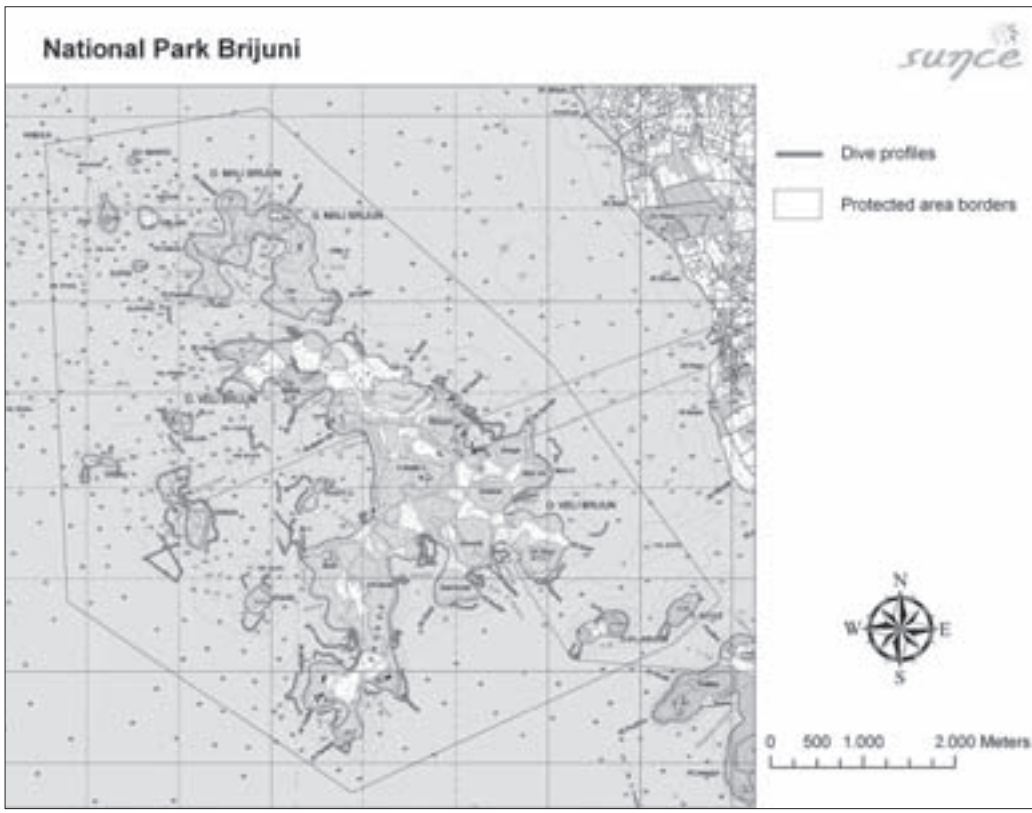

Figure 3: National Park Brijuni – dive profiles
Slika 3: Narodni park Brioni – profili potopov

3.2 NORTH-WESTERN PART OF DUGI OTOK

The north-western part of Dugi otok is situated in the central Adriatic. The wider project area covers a total surface of around 54 km^2 and the mapped sea surface a total of 41.2 km^2. Its coastline is 58.89 km long. The area contains several Ecological Network marine sites that are also potential future Natura 2000 sites, as well as a wide range of marine habitats and coastal

depths ranging from 50 to 60 m. Field mapping was conducted in June and September 2009, with a total duration of 16 days. In total, 44 locations were mapped and state of posidonia meadows assessed on 14 locations. Additional information was collected by snap surveys from the coast and the boat, and apnea diving. In total, 11 people participated in the survey, out of which 9 were volunteers. The work was performed for the Public Institution for the Protected Areas of Zadar County Management, with international funds provided by the European Union and GEF (UNDP project Coast). Full report with maps and recommendations was completed in 2009.

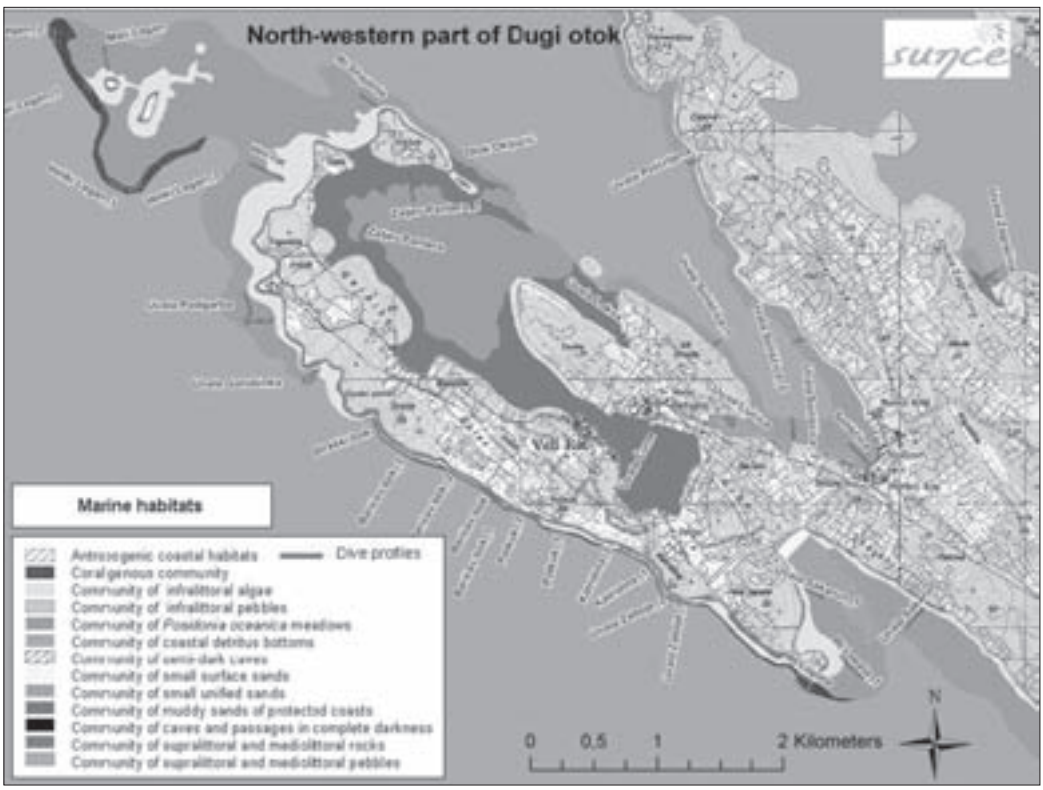

Figure 4: North-western part of Dugi otok - dive profiles and map of habitats
Slika 4: Severozahodni del Dugega otoka – profili potopov in karta habitatov

3.3 PAKLENI ISLANDS (PAKLENI OTOCI)

Pakleni Islands constitute a small archipelago of around 20 islets and reefs, situated south of the town of Hvar (Hvar Island). The area is an Ecological Network marine site and also a potential future Natura 2000 site. The Ecological Network covers an area of 26.98 km^2: its sea surface measures 19.81 km^2, while its coastline is 53.32 km long. The area consists of a wide range of marine habitats and coastal depths of up to 70 m. Field mapping was conducted in July 2010, with a total duration of 11 days. In total, 49 locations were mapped and the state of posidonia meadows assessed on 12 locations. In total, 13 participants attended the survey,

out of which 10 were volunteers. The work was done within the Matra funded project "Marine Natura 2000 Sites of Split-Dalmatia County" and with support of the Public Institution for the f Protected Areas of Split-Dalmatia County Management. Data interpretation and map production are in progress.

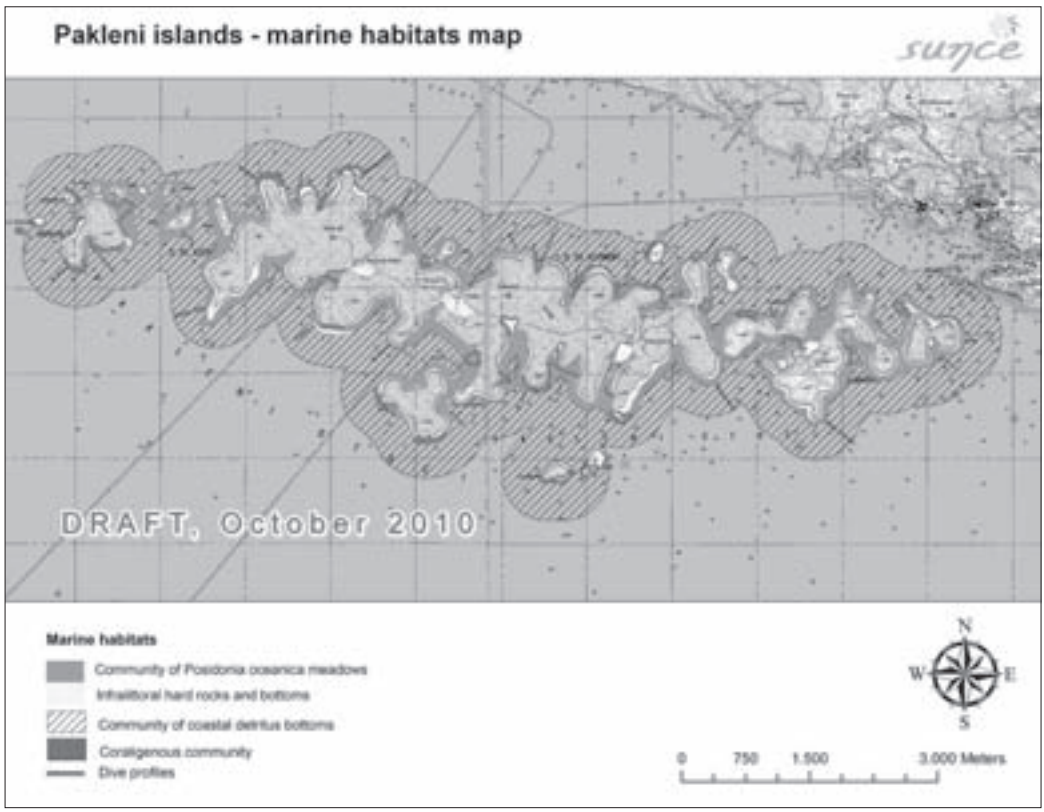

Figure 5: Pakleni Islands – dive profiles and map of habitats
Slika 5: Peklenski otoki - profili potopov in karta habitatov

3.4 LASTOVO ISLANDS NATURE PARK

Lastovo Islands Nature Park is located in the southern Adriatic. It was established in 2006, with a total land area of 195.83 km^2 and a total sea area of 143.12 km^2; its coastline is 132 km long. It is an Ecological Network marine site and a potential future Natura 2000 site. The area is composed of 46 islands and islets, complex underwater morphology and rather deep waters surrounding the area. Along the coastline, depths very quickly reach 50 m and, in many areas, even up to 100 m. As the Association Sunce was involved in the protected area establishment, we started developing methodology of habitats and species mapping within this area in 2005. Over the years, 113 locations have been mapped; out of these, 37 are GPS line profiles collected in 2010, whereas all other are GPS point data. In 2010, the state of posidonia was assessed on 8 locations. This is the area, where most of the volunteers were suitably trained and where we

began to develop the network of our associates, with Bius – Biology Students Association from Zagreb – among them. Until now, a systematic mapping has been completed for the central Lastovo Island. The Park area is large, complex and distant, with poor basline maps, making the mapping very challenging. The mapping has been conducted by the support of several donors, although most of it has been funded by WWF MedPO and 2010 mapping by the MedPAN South project. Data interpretation and map production is in progress.

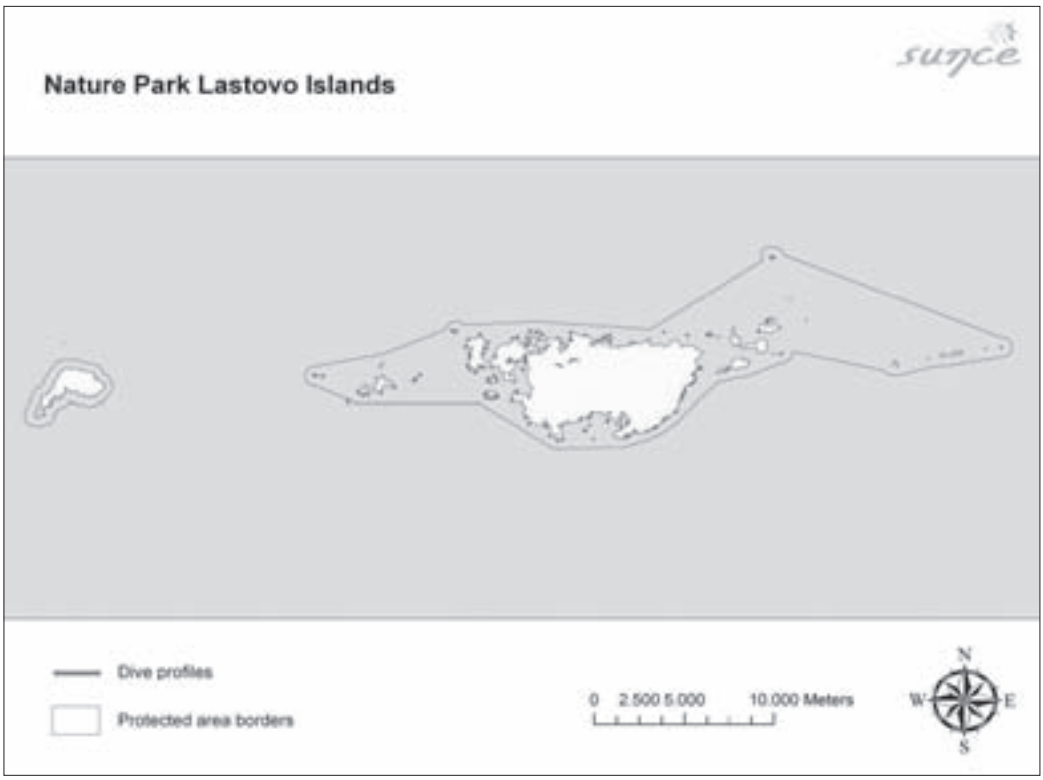

Figure 6: Lastovo Islands Nature Park – dive profiles
Slika 6: Naravni park Lastovsko otočje – profili potopov

4. DISCUSSION

4.1 METHODOLOGY

The methodology used in species and habitat mapping was developed after several trials as well as errors made during field mapping. When developing the methodology, several constraints needed to be taken in consideration, most of them related to human capacities and difficulties of working under the sea.

In order to properly identify the habitats and species, the people involved in mapping had to receive suitable training and, even more important, to gain experience in diving, underwater

orientation, identification of species and habitats, and filling in the mapping protocols. Considering these constraints, habitats and especially species included in the mapping could only be those that could easily be identified under the sea.

In order to decrease any chance of errors, mapped species were limited to a predefined list of easily identifiable 170 benthic species, which would further demand sampling, laboratory work and experts in various taxonomic groups. Number and availability of such experts in Croatia is, however, very limited, so this approach was discarded early in the process. There was also a lack of motivation of volunteers for laboratory work and certain difficulties regarding the access to a suitable laboratory.

Density of populations of dominant species was described textually as a part of location description. Some attempts were made to estimate species populations, but this was shown to be very subjective, connected to experience, and therefore unnecessary for this scale of mapping.

Combination of horizontal and vertical georeferenced dive profiles was used for habitat mapping. Experience from the first mapping attempts showed that standard vertical or horizontal rope measured profiles were logistically demanding for implementation. They gave very detailed information for one small area, but with high probability of missing habitats and species in the very vicinity of the profiles. Such profiles provided more precise scientific data, but less information necessary for the production of maps. Therefore a trade off was made between the detail of the information and the possibility of covering large areas necessary for producing maps.

Georeferencing data were also a challenge since standard GPS devices do not work under the sea. Using diving buoy with GPS connected to a diver by a rope and a reel was shown to be most cost effective method for georeferencing dive profiles. When testing dive profiles with orthophoto maps, there were some errors in accuracy due to depth, sea currents and waves. Errors were of only several meters, a scale we considered irrelevant for this type of mapping.

4.2 HABITAT MAP PRECISION

When interpreting produced habitat maps and using data in further research, several limitation factors needed to be taken in mind:

- In nature, habitats gradually transform from one into another and there are no clear and strict borders between two habitats. Maps are generalised representation of reality.
- Habitats in sea are distributed in 3D, while on maps they are visualised in 2D. Such visualisation may be adequate for more horizontal habitats such as *Posidonia oceanica* meadows and infralittoral algae but questionable in respect of vertically distributed habitats as well as those developed within cracks, caverns and caves.
- Surface of habitats that are in sea more vertically distributed (such as coralligenous community or community of semi-dark caves) can adequately be presented only in more complex 3D format or estimated by multiplying length distribution with depth distribution.

Taking into account all listed difficulties, we may say that habitat maps developed under this methodology are still of greater precision than any other currently available marine habitat maps in Croatia. This is especially true in respect of habitats such as coralligenous community,

community of semi-dark caves, community of caves and passages in complete darkness. Habitat maps also include information on associations/facies of significant species such as gorgonians (*Eunicella cavolini*, *Paramuricea clavata*). Quality of produced habitat maps is much related to the quality of available baseline topographic maps and orthophoto maps. Habitat maps are expected to be most accurate around dive profiles with possible error increasing with the distance from the dive profiles. Maps accuracy percentage should be assessed by additional field work, checking control points defined by standardised statistical methods of map accuracy assessment. Funding for such assessment still needs to be provided.

National 1:100,000 marine habitat maps were produced based on mathematical modelling with final output maps with estimated precision of 76%. National marine habitat maps compared to maps produced by this direct field mapping take into consideration fewer habitats, have errors in habitat coverage, errors in habitat position, overestimation and underestimation of the habitats' surface area. These differences can be observed by comparing habitats coverage between two different source marine habitat maps of one part of Lastovo Islands Nature Park (Figures 7 and 8).

4.3 SPECIES DISTRIBUTION MAPS

Figure 7: Marine habitat map produced by direct field mapping (Sunce)
Slika 7: Karta morskih habitatov, izdelana na osnovi neposrednega terenskega kartiranja (Sunce)

Spatial distribution of each of the 170 species can be extracted from the GIS database. It is point data providing information only on the presence/absence of a species and no information on the population sizes. Such information can only partially be extracted from the textual description of locations. Nevertheless, currently there is no other similar information source on benthic species distribution in Croatia.

Figure 8: National marine habitat map produced through mathematical modelling (Oikon d.o.o.)
Slika 8: Nacionalna karta morskih habitatov, izdelana na osnovi matematičnega modeliranja (Oikon d.o.o.)

4.4 CAPACITIES

Main strength of the used methodology is that large areas can be mapped in a relatively short time. Using volunteers significantly decreases mapping costs, allows development of social bonds, local involvement, exchanges of experiences and knowledge. Estimation is that 8 trained divers can collect in 1 day enough information to map in detail approximately 4 km of coastline. This estimation varies a great deal, depending on the morphology of the area, bathymetry, available baseline maps and logistical support.

Methodology also has it weaknesses. When working with volunteers, there is a need for continuous education, data quality control, motivation and leadership. It also increases workload in respect of planning, communication, logistics and equipment management. This

type of data collection involves scuba diving, which is a higher risk level activity so significant efforts are spent in ensuring security measures, mentorship and assessment of diving skills of volunteers involved. Important part of preparation is compiling suitable mapping teams that include people skilled both in diving and in species/habitats recognition, while still allowing new volunteers to get engaged.

Coordination, planning, data management and interpretation represents significant part of the work and it cannot be implemented in volunteer way, as it demands another level of knowledge, skills and motivation.

5. SUMMARY

In the 2005-2008 period, the Association Sunce developed a system for marine habitat and species mapping by amateur divers - biologists. It included development of mapping data collection protocols, diving slates, diving profiles, GPS data collection system and management, Excel and GIS data management system, and educational material necessary for the training of volunteers. Over the period, the Association Sunce trained and engaged over 60 volunteer scuba divers in the species and habitat identification and mapping. Since 2005, over 350 locations in the Adriatic were mapped, covering the wider areas of Brijuni, Lošinj, Dugi otok, Kornati, Murter, Rogoznica, Lastovo, Vis, Brač, Pakleni Islands and Šolta. Most systematic mapping was conducted in 2009 and 2010 in the areas of Brijuni, Dugi otok, Pakleni Islands and Lastovo Islands, allowing data extrapolation and development of detailed 1:25,000 habitats and species distribution maps. On 34 sites of the same area, baseline data on the state of *Posidonia oceanica* meadows was also collected. Maps produced by the proposed methodology lack precision of maps produced by modern technologies such as sonar, but are substantially more precise that current available maps, cheaper to produce and detailed enough for basic management planning. It has been shown that volunteers can significantly contribute to marine data collection, but only when suitably trained, guided and motivated. In order to insure data quality and usage, planning, filed work coordination, data interpretation and compilation should be done by professionals.

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ANNEX 1: Marine Benthic Species Included in the Mapping Methodology
PRILOGA 1: Morske bentoške vrste vključene v metodologijo kartiranja

Zelene alge (Chlorophyta)
1. *Acetabularia acetabulum* (L., 1952), klobučić
2. *Codium bursa* ((L.), C.Agardh, 1822)
3. *Codium effusum* ((Rafinesque), delle Chiaje)
4. *Codium fragile* ((Suringar) Hariot, 1889)
5. *Flabellia petiolata* ((Turra), Nizamuddin)
6. *Halimeda tuna* (Elis et Sol.J.V.Lamouroux, 1816)
7. *Palmophyllum crassum* ((Naccari), Rabenhorst 1868)
8. *Ulva* spp.
9. *Valonia macrophysa* (Kuetz, 1843)
10. *Valonia utricularis* ((Roth) C.Agardh, 1823)

Smeđe alge (Phaeophyta)
1. *Cystoseira* spp.
2. *Fucus virsoides* (J. Agardh), jadranski bračić
3. *Padina pavonica* ((L.) Thivy, 1960)
4. *Sargassum* spp.

Crvene alge (Rodophyta)
1. *Lithophyllum* spp.
2. *Lithophyllum frondosum*
3. *Osmundaria volubilis* ((L.), R.E. Norris, 1991)
4. *Peyssonnelia* spp.

MORSKE CVJETNICE (Magnoliophyta)
1. *Cymodocea nodosa* ((Ucria), Ascherson)
2. *Posidonia oceanica* ((L.), Delile)
3. *Zostera marina* (L., 1753)
4. *Zostera noltii* (Hornemann)

SPUŽVE (Porifera)
1. *Agelas oroides* (Schmidt, 1864)
2. *Aplysina aerophoba* (Nardo, 1843), žuta sumporača
3. *Aplysina cavernicola* (Vacelet, 1959)
4. *Axinella cannabina* (Esper, 1794)
5. *Axinella damicornis* (Esper, 1794)
6. *Axinella polypoides* (Schmidt, 1862)
7. *Axinella verrucosa* (Esper, 1794)
8. *Chondrilla nucula* (Schmidt, 1862)
9. *Chondrosia reniformis* (Nardo, 1847)
10. *Clathrina* spp.
11. *Cliona celata* (Grant, 1826)
12. *Cliona schmidti* (Ridley, 1881)
13. *Crambe crambe* (Schmidt, 1862)
14. *Dysidea avara* (Schmidt, 1862)
15. *Haliclona mediterranea* (Griessinger, 1971)
16. *Ircinia dendroides* (Schmidt, 1862)
17. *Oscarella lobularis* (Schmidt, 1862)
18. *Petrosia ficiformis* (Poiret, 1798)
19. *Phorbas tenacior* (Topsent, 1925)
20. *Spirastrella cunctatrix* (Schmidt, 1868)
21. *Spongia agaricina* (Pallas, 1766), slonovo uho
22. *Tethya aurantium* (Pallas, 1766), morska naranča

ŽARNJACI (Cnidaria)
Obrubnjaci (Hydrozoa)
1. *Aglaophenia* spp., morsko perce
2. *Antenella* spp.
3. *Eudendrium* spp.

Koralji (Anthozoa)
1. *Actinia equina* (L., 1758), crvena moruzgva
2. *Aiptasia mutabilis* (Gravenhorst, 1831), staklena moruzgva

3. *Alcyonium acaule* (Marion, 1878), crvena ručica
4. *Alcyonium corralloides* (Pallas, 1766), lažni koralj
5. *Alcyonium palmatum* (Pallas 1766), morska ručica
6. *Anemonia viridis* (Forsskål, 1775), smeđa vlasulja
7. *Balanophyllia europaea* (Risso, 1826), široka čaška
8. *Cerianthus membranacea* (Spallanzani, 1784), opnena voskovica
9. *Cladocora caespitosa* (L., 1758), busenasti koralj
10. *Condylactis aurantiaca* (delle Chiaje, 1825), zlatna moruzgva
11. *Corallium rubrum* (L., 1758), crveni koralj
12. *Corynactis viridis* (Allman, 1846), draguljarka
13. *Eunicella cavolini* (Koch, 1887), žuta rožnjača
14. *Eunicella singularis* (Esper, 1791), uspravna rožnjača
15. *Leptopsammia pruvoti* (Lacaze-Duthiers, 1897), žuta čaška
16. *Madracis pharensis* (Heller, 1868), hvarski koralj
17. *Paramuricea clavata* (Risso, 1826), velika rožnjača
18. *Parazoanthus axinellae* (Schmidt, 1862), žuta korasta moruzgva
19. *Savalia savaglia* (Bertholoni, 1819), žuta Savalia

MEKUŠCI (Mollusca)

Puževi (Gastropoda)

1. *Bolma rugosa* (L., 1767), turban
2. *Charonia* spp., tritonova truba
3. *Conus meditteraneus* (Hwass in Bruguiere, 1792), stožac
4. *Erosaria spurca* (L., 1758), venerin puž
5. *Haliotis tuberculata* (L., 1758), velika puzlatka, Petrovo uho
6. *Hexaplex trunculus* (L., 1758), kvrgavi volak
7. *Luria lurida* (L.,1758), zupka
8. *Murex brandaris* (L., 1758), bodljikavi volak
9. *Mitra zonata* (Marryat, 1818), prugasta mitra
10. *Phalium granulatum* (Born, 1778), izbrazdani šljem
11. *Serpulorbis arenarius* (L., 1767)
12. *Stramonita haemastoma* (L., 1766), crvenousna purpura
13. *Tonna galea* (L., 1758), puž bačvaš
14. *Umbraculum mediterraneum* (Lamarc, 1819)
15. *Zonaria pyrum* (Gmelin, 1791), kruška

PUŽEVI „GOLAĆI“

1. *Aplysia* spp., morski zekan
2. *Chromodoris luteorosa* (Rapp, 1827)
3. *Cratena peregrina* (Gmelin, 1791)
4. *Discodoris atromaculata* (Bergh, 1880), puž dalmatiner
5. *Flabellina affinis* (Gmelin, 1791)
6. *Hypselodoris* spp.
7. *Hypselodoris elegans* (Cantraine, 1835)
8. *Janolus cristatus* (delle Chiaje, 1841)
9. *Phyllidia flava* (Aradas, 1847)
10. *Thuridilla hopei* (Vérany, 1853)

Školjkaši (Bivalvia)

1. *Arca noae* (L., 1758), kunjka
2. *Barbatia barbata* (L., 1758)
3. *Gastrochaena dubia* (Pennant, 1777), otvoreni klinčić
4. *Lithophaga lithophaga* (L., 1758), prstac
5. *Mytilus galloprovincialis* (Lamarck, 1819), dagnja
6. *Ostrea* spp., kamenica

7. *Pecten jacobeus* (L., 1758), Jakobova kapica
8. *Pinna nobilis* (L., 1758), plemenita periska
9. *Spondylus gaederopus* (L., 1758), kopito
10. *Venus verrucosa* (L., 1758), prnjavica

Glavonošci (Cephalopoda)
1. *Octopus vulgaris* (Cuvier, 1797), hobotnica
2. *Sepia officinalis* (L., 1758), sipa

Mnogoljušturaši (Polyplacophora)
1. *Chiton* spp.

ZVJEZDANI (Echiuroidea)
1. *Bonellia viridis* (Rolando, 1821), zeleni zvjezdan

MNOGOČETINAŠI (Polychaeta)
1. *Bispira volucatornis* (Montagu, 1804)
2. *Eupolymnia nebulosa* (Montagu, 1818)
3. *Filograna* spp.
4. *Hermodice carunculata* (Pallas, 1776)
5. *Myxicola infundibulum* (Renier, 1804), pješčani perjaničar
6. *Sabella spallanzanii* (Viviani, 1805)
7. *abella pavonina* (Savigny, 1820)

MAHOVNJACI (Bryozoa)
1. *Hornera frondiculata* (Lamouroux, 1821)
2. *Margaretta cereoides* (Ellis & Solander, 1786)
3. *Myriapora truncata* (Pallas, 1766)
4. *Reteporella* spp., morska čipka

BODLJIKAŠI (Echinodermata)
Ježinci (Echinoidea)
1. *Arbacia lixula* (L., 1758)
2. *Centrostephanus longispinus* (L., 1845), igličasti ježinac
3. *Paracentrotus lividus* (Lamarck, 1816)
4. *Spatangus purpureus* (OF Müller, 1776)
5. *Sphaerechinus granularis* (Lamarck, 1816)

Stapčari (Crinoidea)
1. *Antedon mediterranea* (Lamarck, 1816), Sredozemna dlakavica

Zvjezdače (Asteroidea)
1. *Astropecten aranciacus* (L., 1758), narančasta križalina
2. *Coscinasterias tenuispina* (Lamarck, 1816)
3. *Echinaster sepositus* (Retzius, 1783)
4. *Hacelia atenuata* (Gray, 1840)
5. *Luida ciliaris* (Philippi, 1837)
6. *Marthasterias glacialis* (L., 1758)
7. *Ophidiaster ophidianus* (Lamarck, 1816)
8. *Peltaster placenta* (Müller - Troschel, 1842), pločasta zvjezdača

Trpovi (Holothuroidea)
1. *Holothuria* spp.

Zmijače (Ophiuroidea)
1. *Ophioderma longicauda* (Retzius, 1805), velika zmijača
2. *Ophiotrix fragilis* (Abildgaard, 1789)

PLAŠTENJACI (Tunicata)
Mješčićnice (Ascidiacea)
1. *Clavelina* spp.
2. *Halocynthia papillosa* (L., 1767), crvena bradavičarka
3. *Microcosmus* spp., morsko jaje
4. *Phallusia mammilata* (Cuvier, 1815)

RAKOVI (Crustacea)
1. *Dromia personata* (L., 1758)
2. *Homarus gammarus* (L., 1758), hlap
3. *Maja squinado* (Herbst, 1788), velika rakovica

4. *Maja verrucosa* (Milne Edwards), mala rakovica
5. *Palinurus elephas* (Fabricius, 1787), jastog
6. *Scyllarides arctus* (L., 1758), zezavac
7. *Scyllarides latus* (Latreille, 1803), kuka
8. *Stenopus spinosus* (Risso, 1826), antenska kozica

RIBE (Fish)

1. *Scyliorhinus* spp. (L., 1758), morska mačka
2. *Anthias anthias* (L., 1758), jera
3. *Apogon imberbis* (L., 1758), matulić
4. *Chromis chromis* (L., 1758), crnej
5. *Conger conger* (L., 1758), ugor
6. *Coris julis* (L., 1758), knez
7. *Dentex dentex* (L., 1758), zubatac
8. *Diplodus annularis* (L., 1758), špar
9. *Diplodus sargus* (L., 1758), šarag
10. *Diplodus vulgaris* (Geofr., 1817), fratar
11. *Diplodus puntazzo* (Cetti, 1777), pic
12. *Epinephelus marginatus* (Lowe, 1834), kirnja
13. *Gobius cruentatus* (Gmelin, 1789), glavoč krvoust
14. *Hippocampus* spp., morski konjić
15. *Labrus bimaculatus* (L., 1758), smokva
16. *Labrus viridis* (L., 1758), drozd
17. *Mullus* spp., trlja
18. *Muraena helena* (L., 1758), murina
19. *Oblada melanura* (L., 1758), ušata
20. *Parablennius gattorugine* (L., 1758), velika babica
12. *Phycis phycis* (L., 1766), tabinja mrkulja
22. Sarpa salpa (L., 1758), salpa
23. Sciaena umbra (L., 1758), kavala
24. *Scorpaena scrofa* (L., 1758), škrpina
25. *Serranus cabrilla* (L., 1758), kanjac
26. *Serranus scriba* (L., 1758), pirka
27. *Sparisoma cretense* (L., 1758), papigača
28. *Sparus aurata* (L., 1758), komarča
29. *Symphodus tinca* (L., 1758), lumbrak
30. *Sygnathus* spp., šilo
31. *Thalassoma pavo* (L., 1758), vladika
32. *Zeus faber* (L., 1758), kovač

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THE EFFECTIVENESS OF A NATIONAL NETWORK OF MPAS - THE EXPERIENCE ACQUIRED IN ITALY AND THE ROLE THE TRANSNATIONAL NETWORK SUCH AS ADRIAPAN COULD PLAY

UČINKOVITOST NACIONALNE MREŽE MORSKIH ZAVAROVANIH OBMOČIJ – IZKUŠNJE, PRIDOBLJENE V ITALIJI, IN VLOGA, KI BI JO LAHKO IGRALE NADNACIONALNE MREŽE, KAKRŠNA JE ADRIAPAN

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Key words: Marine Protected Areas; Management Effectiveness; Ecological Network

Ključne besede: morska zavarovana območja, učinkovitost upravljanja, ekološke mreže

ABSTRACT

In 2005, WWF Italy and Federparchi started - with the assistance of the Ministry of Environment – an initiative aiming at spreading the tools for a management effectiveness evaluation.
The project was led by Miramare MPA, together with 4 other MPAs (Torre Guaceto, Isole Ciclopi, Torpaterno and Penisola del Sinis). The objectives – defined in further text – were stipulated in view of the relevant indicators and management priorities. The data were collected in a specific document, which accompanies the translation of the IUCN-WWF guidebook "How is your MPA doing?".
The results describe the capability of fulfilling the tasks assigned by each institutional decree, specifically in the fields of use of the maritime public domain, the environmental conservation, the communication/information, the management of resources, the local development.
Facilities for visitors, communication and information systems are the most developed; on the other hand, most of MPAs complain a low level of monitoring, control and management of tourist flows.
The 5 MPAs have a suitable range of tools and expertise, such as a cartographic GIS, studies running on the biological communities, and are compliant to the European "EMAS" environmental certification standards. Finally, the help provided in encouraging sustainable local productions is fairly good, while resources management is poor, same as the programs for the development of green energy, the adoption of waste separation schemes and garbage management.
The AdriaPAN network may enable monitoring of efficiency indicators among MPAs, as part of a shared method to evaluate the results of the management efforts.

IZVLEČEK

Leta 2005 sta italijanski WWF in Federparchi ob pomoči nacionalnega Ministrstva za okolje sprožila idejo o uporabi orodja za ocenjevanje učinkovitost upravljanja.
Projekt je vodilo MPA (morsko zavarovano območje) Miramare MPA ob pomoči še štirih MPA-jev (Torre Guaceto, Isole Ciclopi, Torpaterno in Penisola del Sinis). Cilji projekta – opisani v nadaljnjem besedilu – so bili začrtani glede na obstoječe indikatorje in prioritete upravljanja. Potrebni podatki so bili

zbrani v posebnem dokumentu, ki je nastal ob prevodu vodnika svetovnih organizacij IUCN in WWF z naslovom »How is your MPA doing?« (Kako pa kaj vaš MPA?).
Rezultati kažejo na zmožnosti uresničevanja nalog, ki jih nalaga vsak predpisani odlok, specifično na področjih uporabe javnega morskega območja, okoljevarstva, komuniciranja/informiranja, upravljanja z viri in lokalnega razvoja.
Medtem ko je razvitost objektov in naprav za goste, komunikacijo in informacijski sistem na visoki ravni, pa se v večini MPA-jev pritožujejo o nizki ravni monitoringa in nadzorovanja turističnih tokov. Pet MPA-jev ima sicer ustrezna orodja in strokovno znanje, kot na primer kartografski GIS in tekoče študije o bioloških združbah, ki so v skladu z evropskimi okoljskimi standardi "EMAS". Kar dobra je tudi pomoč za spodbujanje lokalne trajnostne proizvodnje, medtem ko je upravljanje z viri revno, tako kot so tudi programi za razvoj zelene energije, vpeljavo shem za ločevanje odpadkov in upravljanje z njimi. Mreža AdriaPAN bi lahko omogočila monitoring kazalcev učinkovitosti med MPA-ji kot del skupne metode za ocenjevanje rezultatov upravljalskih naporov.

1. INTRODUCTION

In 2000, the IUCN's World Commission on Protected Areas-Marine (WCPA-Marine) and the World Wide Fund for Nature (WWF) initiated the MPA Management Effectiveness Initiative (MEI) to provide MPA managers and practitioners with a simple instrument to conduct an evaluation. A major product of this initiative is the guidebook "How is your MPA Doing? A Guidebook of Natural and Social Indicators for Evaluating Marine Protected Area Management Effectiveness" (Pomeroy et al. 2004).

The Miramare MPA has been taking part since the beginning to the field-testing process of this methodology (Costantini et al. 2003). In 2004, its staff brought the experience outlined in the guidebook to the attention of the Italian Ministry of Environment. This started a project where the first set of 5 MPA has been evaluated, aiming at spreading this practice to the whole set of national MPAs.

→ This initiative represented a first opportunity to share work methods among managers, and to discuss on goals, objectives and priorities among peers which have the same institutional framework, with its opportunities and constraints, in common.

→ A transnational network such as AdriaPAN is therefore useful to share the above mentioned experience in a broader context - but which has in common the same biogeographical region - in order to be more effective towards overall environmental conservation and help in finding the gaps in the common efforts.

2. METHODS

In 2005, WWF Italy and Federparchi (Italian Federation of Parks and Nature Reserves) embarked on the project on behalf of the Ministry of Environment. It involved 5 MPAs: Miramare (northern Adriatic), Torre Guaceto (southern Adriatic), Isole Ciclopi (Sicily), Secche di Tor Paterno (Tyrrhenian sea) and Penisola del Sinis (Sardinia). All activities have been funded by the Ministry in full.

Figure 1: The 5 MPAs taking part in the effectiveness evaluation
Slika 1: Pet MPA-jev, ki sodelujejo pri ocenjevanju učinkovitosti upravljanja

The first steps of the project were a preliminary review of the available methodologies for estimating the effectiveness of conservation activities in marine-coastal environment (Franzosini 2009, Stern 2006), then to start the Italian translation of the IUCN's »How Is Your MPA Doing ?« guidebook.

The operational activity started in June 2005: it involved a scientific reference committee with the purpose to help focusing on indicators pursuant to the national situation. This was a group of 8 academic people encompassing competences from ecology to marine biology to economics and to social sciences, plus 2 directors of MPAs. It adapted the 3 types of indicators (biophysical, socio-economic and governance) described in the guidebook to the Italian context, as the original manual puts a certain emphasis on specific aspects concerning countries in the developing world, while the current local situation is characterized by increased human pressure and tourism, as well as a higher level of welfare of the population living close to the MPAs.

In 2006, the stage of field trials started, and lasted until the end of 2007.

Data collection and writing of the report took place in coordination with the director of each MPA, thanks to the support of local collaborators and under the supervision of Miramare MPA's staff, which tutored the whole initiative.

For each of the 5 MPAs participating in the initiative, objectives, targets and indicators were defined according to their priorities and management needs. Accordingly, the use of indicators for assessing the effectiveness of management started on each site; the data collection and report drafting took place jointly with the directors of each area and their local collaborators, with the support of Miramare MPA's tutors. The data and results are published in a book (Various 2008), which includes the translation of IUCN's original guidebook.

3. RESULTS

The discussion with the referee resulted in some substantive changes to the original texts. As far as the socio-economic goals "Food security enhanced or maintained" and "Livelihoods enhanced or maintained" are concerned, they have been replaced by "Food quality enhanced or maintained" and " Quality of life enhanced or maintained". This is to highlight how, at the national level, one can talk of MPAs as a promoter of local products with a view to greater wholesomeness of the food chain, as well as an instrument to improve the welfare of the local residents, all within a framework aiming at improving the quality of life instead of focusing on the livelihood.

Specifically, the analysis of the biophysical goals, objectives and indicators showed that the objectives proposed were consistent with the institutional purposes of MPAs and how the objectives and indicators were conceptually appropriate for the purpose. The set of indicators proposed in the manual is the result of a synthetic approach that connects existence, intensity and spatial distribution of pressures as they are transmitted through the levels of ecological hierarchy: it follows that no indicator can be considered irrelevant. However, the contextualization of some of the indicators required a redefinition of the operational concepts.

Through changes of this nature, extended also to other goals and objectives, it has been possible to obtain an appropriate selection of pertinent indicators, in a comprehensible and functional way.

A scale of priorities has also been set up for each protected area, showing several convergences, as the Socio-economic Goal 6 - "Environmental awareness and knowledge enhanced", which is the most significant, and Goal 1 - "Food security enhanced or maintained", which is at the lowest level among the management priorities of the MPAs.

Similarly, the Governance priority goals have been listed: Goal 1 - "Effective management structures and strategies maintained", which is a priority goal for all the MPAs taking part in this project and, in further detail, what is recalled in the Objective 1A - "Management planning implemented and process effective", the Management Plan itself, which has been emphasized as the major planning, regulation and management tool. With regard to the Governance Indicators, a new indicator has been proposed by the group of referees: G17- "Coordination and integration with local plans".

The analysis of the biophysical section has identified some priority indicators after their information content and the relative simplicity and availability of inherent data. The priority indicators are:

- B3 - Habitat distribution and complexity
- B1 – Focal species abundance
- B2 - Focal species population structure
- B4 - Composition and structure of the community

First observation comes by comparing the goals and objectives selected by the 5 MPAs. Indeed, they are following the indications given in the institutional decrees and the management guidelines of each individual area, identified in accordance with its management plan and / or annual (or three-years) action plan, thereby giving an indication of what are presently the major management efforts and the destiny of public financial resources linked to them.

Management goals and objectives are assessed through appropriate indicators of management efficiency.

3.1 BIOPHYSICAL GOALS AND OBJECTIVES

In the chapter concerning biophysical evaluation, the IUCN's guidebook, revised and adapted to the Italian situation, shows, 26 objectives grouped into 5 goals. The set of 5 MPAs produced the following percentages for the total of their choices:

Goal 1 - Marine resources sustained or protected: 52.78 %
Goal 2 - Biological diversity protected: 25 %
Goal 3 - Individual species protected: 16.67 %
Goal 4 - Habitat protected: 5.55 %
Goal 5 - Degraded areas restored: 0 %

Table 1: Biophysical objectives (1 = extremely low – 5 = extremely high)
Tabela 1: Biofizični cilji (1 = izjemno nizki, 5 = izjemno visoki)

MPA's biophysical objectives (according to IUCN)	Ciclopi	Mira-mare	Sinis	Tor Paterno	Torre Guaceto
1A Populations of target species for extractive or non-extractive use restored to or maintained at	**3**	**4**	**5**	**4**	**5**
desired reference points					**3**
1B Losses to biodiversity and ecosystem functioning and structure prevented	**5**		**5**		**5**
1C Populations of target species for extractive or non-extractive use protected from harvest at	**2**	**3**	**4**	**5**	
sites and/or life history stages where they become vulnerable		**5**		**4**	**3**
1D Over-exploitation of living and/or non-living marine resources minimized, prevented or	**3**		**4**		
prohibited entirely	**3**				
1E Catch yields improved or sustained in fishing areas adjacent to the MPA					
1F Replenishment rate of fishery stocks increased or sustained within the MPA				**4**	
2A Resident ecosystems, communities, habitats, species, and gene pools adequately represented	**2**		**3**		

MPA's biophysical objectives (according to IUCN)	Ciclopi	Mira-mare	Sinis	Tor Paterno	Torre Guaceto
and protected	**4**	**4**	**3**	**3**	
2B Ecosystem functions maintained					**4**
2C Rare, localized or endemic species protected					
2D Areas protected that are essential for life history phases of species	**2**		**5**	**4**	
2E Unnatural threats and human impacts eliminated or minimized inside and/or outside the MPA					
2F Risk from unmanageable disturbances adequately spread across the MPA	**3**		**3**	**4**	
2G Alien and invasive species and genotypes removed or prevented from becoming established					
3A Focal species abundance increased or maintained		**3**			
3B Habitat and ecosystem functions required for focal species' survival restored or maintained					
3C Unnatural threats and human impacts eliminated or minimized inside and/or outside the MPA				**3**	
3D Alien and invasive species and genotypes removed from area or prevented from becoming					
established					
4A Habitat quality and/or quantity restored or maintained					
4B Ecological processes essential to habitat existence protected					
4C Unnatural threats and human impacts eliminated or minimized inside and/or outside the MPA					
4D Alien and invasive species and genotypes removed or prevented from becoming established					
5A Populations of native species restored to desired reference points					
5B Ecosystem functions restored					
5C Habitat quality and/or quantity restored or rehabilitated					
5D Unnatural threats and human impacts eliminated or minimized inside and/or outside the MPA					
5E Alien and invasive species and genotypes removed or prevented from becoming established					

In the biophysical field of management, 15 objectives are most responsive of the actions undertaken by the MPAs, as the 77.78% of them are encompassed within Goals 1 and 2. Target species protection and conservation of resources are very important, as MPAs choose primarily Objectives 1A - "Populations of target species for extractive or non-extractive use restored to or maintained at desired reference points" and 1D - "Over-exploitation of living and/or non-living marine resources minimized, prevented or prohibited entirely". Much attention is also focused on the control and management of human impact, as three areas chosen Objective 2E "Unnatural threats and human impacts eliminated or minimized inside and/or outside the MPA".

Some emphasis is also given to Goal 3 - "Individual species protected", while only two areas (Secche di Tor Paterno and Miramare) choose one of the objectives suggested by Goal 4, and no one opts for the "Degraded areas restored" (Goal 5), perhaps because this is not a priority in our management actions, at present.

3.2 BIOPHYSICAL INDICATORS

Among 10 biophysical indicators suggested by the IUCN's guidebook, the 5 protected areas chose to operate in 9 of them:

Table 2: Biophysical indicators applied in the 5 MPAs
Tabela 2: Biofizični kazalci, uporabljeni v petih MPA-jih

	Ciclopi	Miramare	Sinis	Tor Paterno	Torre Guaceto
B1 – Focal species abundance	•	•	•	•	•
B2 - Focal species population structure	•		•		•
B3 - Habitat distribution and complexity	•	•			•
B4 - Composition and structure of the community					•
B5 - Recruitment success within the community	•				
B6 - Food web integrity		•			
B7 - Type, level and return on fishing effort	•	•	•	•	•
B8 - Water quality	•		•		
B9 - Area showing signs of recovery					
B10 - Area under no or reduced human impact		•	•		•

There is a clear preference for the use of Indicators B1 and B7, which have been selected from all five areas: they are B1 - "Focal species abundance" and B7 - "Type, level and return on fishing effort". Conversely indicator B9 - "Area showing signs of recovery" was not assessed by any of the areas, probably due to the lack of earlier data for a comparison with any prior environmental situation.

3.3 SOCIO-ECONOMIC GOALS AND OBJECTIVES

Following the guidebook's indications, the chapter concerning the socio-economic evaluation encompasses 20 objectives grouped into 6 goals. The MPAs produced the following percentages for the total of their choices:

- Goal 1 Food security enhanced or maintained (**0 %**)
- Goal 2: Livelihoods enhanced or maintained (**0 %**)
- Goal 3: Non-monetary benefits to society enhanced or maintained (**45.45 %**)
- Goal 4: Benefits from the MPA equitably distributed (**3.03 %**)
- Goal 5: Compatibility between management and local culture maximized (**12.13 %**)
- Goal 6: Environmental awareness and knowledge enhanced (**39.39 %**)

Table 3: Socio-economic objectives (1 = extremely low – 5 = extremely high)
Tabela 3: Socio-ekonomski cilji (1 = izjemno nizki, 5 = izjemno visoki)

MPA's socio-economic objectives (according to IUCN)	Ciclopi	Mira-mare	Sinis	Tor Paterno	Torre Guaceto
1A Nutritional needs of coastal residents met or improved					
1B Improved availability of locally caught seafood for public consumption					
2A Economic status and relative wealth of coastal residents and/or resource users improved					
2B Household occupational and income structure stabilized or diversified through reduced marine resources dependency					
2C Local access to markets and capital improved					
2D Health of coastal residents and/or resource users improved					
3A Aesthetic value enhanced or maintained	**3**		**3**		**3**
3B Existence value enhanced or maintained	**2**		**4**		
3C Wilderness value enhanced or maintained	**1**		**4**		
3D Recreation opportunities enhanced or maintained		**2**		**3**	
3E Cultural value enhanced or maintained	**3**	**4**	**4**		
3F Ecological services values enhanced or maintained	**1**		**3**		**4**
4A Monetary benefits distributed equitably to and through coastal communities					
4B Non-monetary benefits distributed equitably to and through coastal communities	**1**				
4C Equity within social structures and between social groups improved and fair					
5A Adverse effects on traditional practices and relationships or social systems avoided or minimized	**2**	**4**	**3**		
5B Cultural features or historical sites and monuments linked to coastal resources protected			**5**		
6A Respect for and/or understanding of local knowledge enhanced	**5**	**5**	**4**	**3**	
6B Public's understanding of environmental and social 'sustainability' improved	**4**		**3**	**3**	**4**
6C Level of scientific knowledge held by the public increased			**4**	**3**	**4**
6D Scientific understanding expanded through research and monitoring			**3**	**3**	

The analysis shows that 13 among 20 objectives are corresponding to the activities ongoing in the test MPAs; these 13 objectives are pursuant to Goals 3, 5 and 6. Four of the five areas chose, as important, the Objective 6A - "Respect for and/or understanding of local knowledge enhanced" and 6B - "Public's understanding of environmental and social 'sustainability' improved", whereas only one area (Isole Ciclopi) chose one of the objectives of Goal 4 (4B - "Non-monetary benefits distributed equitably to and through coastal communities"). "Food security enhanced or maintained" (Goal 1) and "Livelihoods enhanced or maintained" (Goal 2) are not in the current management priorities of MPAs taking part in the initiative.

3.4 SOCIO-ECONOMIC INDICATORS

Among 16 socio-economic indicators, 6 have been assessed in the test areas:

Table 4: Socio-economic indicators applied in the 5 MPAs
Table 4: Socio-ekonomski kazalci, uporabljeni v petih MPA-jih

	Ciclopi	Miramare	Sinis	Tor Paterno	Torre Guaceto
S1 - Local marine resource use patterns	•	•	•		
S2 - Local values and beliefs about marine resources			•	•	•
S3 - Level of understanding of human impacts on resources	•			•	•
S4 - Perceptions of seafood availability					
S5 - Perceptions of local resource harvest					
S6 - Perceptions of non-market and non-use value	•	•	•	•	•
S7 - Material style of life					
S8 - Quality of human health					
S9 - Household income distribution by source					
S10 - Household occupational structure					
S11 - Community infrastructure and business					
S12 - Number and nature of markets					
S13 - Stakeholder knowledge of natural history	•	•	•	•	
S14 - Distribution of formal knowledge to community			•	•	•
S15 - Percentage of stakeholder group in leadership positions					
S16 - Changes in conditions of ancestral and historical sites/features/monuments					

One indicator, among 16, has been assessed at the same time in all 5 MPAs: S6 - “Perceptions of non-market and non-use value”, which provides information on a non-monetary basis upon the value that the local community and users give to the marine protected area.

Four of five areas then chose to assess the indicator S13 - “Stakeholder knowledge of natural history”.

3.5 GOVERNANCE GOALS AND OBJECTIVES

Following the indications given in the guidebook, the chapter concerning Governance in the MPAs considered 5 Goals associated with 21 objectives. Managers’ activities have been considering all the suggested Goals:

- Goal 1 - “Effective management structures and strategies maintained”: 58.62 %
- Goal 2 - “Effective legal structures and strategies for management maintained”: 3.45 %
- Goal 3 - “Effective stakeholder participation and representation ensured”: 3.45 %
- Goal 4 - “Management plan compliance by resource users enhanced”: 31.03 %
- Goal 5 - “Resource use conflicts managed and reduced”: 3.45 %

Table 5: Governance objectives (1 = extremely low – 5 = extremely high)
Tabela 5: Cilji nadzora (1 = izjemno nizki, 5 = izjemno visoki)

MPA's governance objectives (according to IUCN)	Ciclopi	Mira-mare	Sinis	Tor Paterno	Torre Guaceto
1A Management planning implemented and process effective	**4**		**4**	**5**	
1B Rules for resource use and access clearly defined and socially acceptable		**2**	**3**		**3**
1C Decision-making and management bodies present, effective, and accountable	**1**		**5**	**5**	**3**
1D Human and financial resources sufficient and used efficiently and effectively			**5**	**5**	
1E Local and/or informal governance system recognised and strategically incorporated into management planning			**3**		
1F Periodic monitoring, evaluation, and effective adaptation of management plan ensured	**2**		**4**		**5**
2A Existence of adequate legislation ensured	**1**				
2B Compatibility between legal (formal) and local (informal) arrangements maximized or ensured					
2C National and/or local legislation effectively incorporates rights and obligations set out in international legal instruments					
2D Compatibility between international, national, state, and local rights and obligations maximized or ensured					
2E Enforceability of arrangements ensured					
3A Representativeness, equity, and efficacy of collaborative management systems ensured					
3B Resource user capacity effectively built to participate in co-management				**4**	
3C Community organizing and participation strengthened and enhanced					
4A Surveillance and monitoring of coastal areas improved		**2**			
4B Willingness and acceptance of people increased to behave in ways that allow for sustainable management	**4**	**4**	**4**		**3**
4C Local ability and capacity built to use resources sustainably		**5**			
4D User participation in surveillance, monitoring, and enforcement increased					
4E Application of law and regulations adequately maintained or improved	**2**		**3**		
4F Access to and transparency and simplicity of management plan ensured and compliance fostered			**3**		
5A User conflicts managed and/or reduced: 1) within and between user groups, and/or 2) between user groups and the local community or between the community and people outside it			**3**		

Among the 21 overall objectives, much emphasis is given to those related to Goal 1, since the objectives included in it have been of interest to all MPAs. In particular, five areas have been following Objective 1C - “Decision-making and management bodies present, effective, and accountable”, as much importance is aimed at Goal 4 and in particular to its Objective 4B

- “Willingness and acceptance of people increased to behave in ways that allow for sustainable management”. Goals 2 and 3 have been selected, respectively, from one area through Objective 2A - “Existence of adequate legislation ensured” (Isole Ciclopi) and Objective 3B - “Resource user capacity effectively built to participate in co-management” (Secche di Tor Paterno).

3.6 GOVERNANCE INDICATORS

The use of governance indicators is rather more diverse, as 12 of 17 have been applied by the 5 marine protected areas:

Table 6: Governance indicators applied in the 5 MPAs
Tabela 6: Kazalci nadzora, uporabljeni v petih MPA-jih

	Ciclopi	**Miramare**	**Sinis**	**Torre Guceto**	**Tor Paterno**
G1 - Level of resource conflict			•		
G2 - Existence of a decision-making and management body	•	•	•	•	•
G3 - Existence and adoption of a management plan	•		•		•
G4 - Local understanding of MPA rules and regulations		•	•	•	
G5 - Existence and adequacy of enabling legislation	•				
G6 - Availability and allocation of MPA administrative resources			•		•
G7 - Existence and application of scientific research and input	•		•	•	
G8 - Existence and activity level of community organization(s)					
G9 - Degree of interaction between managers and stakeholders				•	•
G10 - Proportion of stakeholders trained in sustainable use					
G11 - Level of training provided to stakeholders in participation		•			•
G12 - Level of stakeholder participation and satisfaction in management processes and activities					
G13 - Level of stakeholder involvement in surveillance, monitoring and enforcement		•			
G14 - Clearly defined enforcement procedures					
G15 - Enforcement coverage					
G16 - Degree of information dissemination to encourage stakeholder compliance	•	•	•		
G17 (*) Coordination and integration with local plans of the Public bodies			•		

(*) G17 is a governance indicator set up and defined on purpose for the specific local (national) situation

One indicator, G2 - “Existence of a decision-making and management body”, was chosen unanimously, since the presence of an institutional body responsible for managing the area is

of primary importance, at the stage presently reached by the network of MPAs taking part to this initiative, and cannot be ignored. Four indicators were then selected by 3 MPAs, i.e.: G3 - "Existence and adoption of a management plan", G4 - "Local understanding of MPA rules and regulations", G7 - "Existence and application of scientific research and input", and G16 - "Degree of information dissemination to encourage stakeholder compliance".

4. DISCUSSION

4.1 BIOPHYSICS, SOCIO ECONOMIC AND GOVERNANCE GOALS AND OBJECTIVES FOR THE 5 MPAS

Isole Ciclopi MPA gives equal importance to the biophysical and socio-economic categories of management actions (38% both), while the governance issues have less weight (25%).

We recorded a rather different situation in Penisola del Sinis, where management is more focused towards socio-economic (38%) and governance objectives (34%); the biophysical ones reach 28%.

Secche di Tor Paterno follows with greater attention given to the biophysical targets (47%), then gives similar weight to socio-economic (29%) and governance (24%) issues.

A similar situation is observed in Torre Guaceto where, however, the differences in the percentages are less evident: the socio-economic and the governance indicators have the same weight (31%).

Miramare MPA highlights biophysical and governance matters (36%), while slightly lower importance is given to the socio-economic (29%) issues.

4.2 PRIORITY LEVELS IN PURSUING MANAGEMENT GOALS AND OBJECTIVES

After ending the assessment of indicators, the Directors of the 5 MPAs provided a personal assessment of the priority levels, on a scale of increasing importance from 0 to 5, for each of the objectives pursued in their area. The following table presents, in a schematic way, the opinions expressed, providing an average value for each priority:

Table 7: Priority level of the management goals in five Italian MPAs (average values)
Tabela 7: Prioritetna raven upravljalskih ciljev v petih italijanskih MPA-jih (povprečne vrednosti)

Category	Management goals in five Italian MPAs	Average value	Ranking
B	1A Populations of target species for extractive or non-extractive use restored to or maintained at desired reference points	4,2	1
S	6A Respect for and/or understanding of local knowledge enhanced	3,4	2
B	1C Populations of target species for extractive or non-extractive use protected from harvest at sites and/or life history stages where they become vulnerable	3	3
G	1C Decision-making and management bodies present, effective, and accountable	3	3

Category	Management goals in five Italian MPAs	Average value	Ranking
G	4B Willingness and acceptance of people increased to behave in ways that allow for sustainable management	3	3
B	1D Over-exploitation of living and/or non-living marine resources minimized, prevented or prohibited entirely	2,8	4
B	2E Unnatural threats and human impacts eliminated or minimized inside and/or outside the MPA	2,8	4
S	6B Public's understanding of environmental and social 'sustainability' improved	2,8	4
G	1A Management planning implemented and process effective	2,6	5
B	1E Catch yields improved or sustained in fishing areas adjacent to the MPA	2,4	6
B	3A Focal species abundance increased or maintained	2,2	7
S	3E Cultural value enhanced or maintained	2,2	7
S	6C Level of scientific knowledge held by the public increased	2,2	7
G	1F Periodic monitoring, evaluation, and effective adaptation of management plan ensured	2,2	7
B	3C Unnatural threats and human impacts eliminated or minimized inside and/or outside the MPA	2	8
G	1D Human and financial resources sufficient and used efficiently and effectively	2	9
S	3A Aesthetic value enhanced or maintained	1,8	10
S	5A Adverse effects on traditional practices and relationships or social systems avoided or minimized	1,8	10
S	3F Ecological services values enhanced or maintained	1,6	11
G	1B Rules for resource use and access clearly defined and socially acceptable	1,6	11
B	1F Replenishment rate of fishery stocks increased or sustained within the MPA	1,4	12
S	3B Existence value enhanced or maintained	1,2	13
S	6D Scientific understanding expanded through research and monitoring	1,2	14
B	2D Areas protected that are essential for life history phases of species	1	15
S	3C Wilderness value enhanced or maintained	1	15
S	3D Recreation opportunities enhanced or maintained	1	15
S	5B Cultural features or historical sites and monuments linked to coastal resources protected	1	15
G	4C Local ability and capacity built to use resources sustainably	1	15
G	4E Application of law and regulations adequately maintained or improved	1	15
B	2C Rare, localized or endemic species protected	0,8	16
B	2F Risk from unmanageable disturbances adequately spread across the MPA	0,8	17
G	3B Resource user capacity effectively built to participate in co-management	0,8	17
B	1B Losses to biodiversity and ecosystem functioning and structure prevented	0,6	18
B	2A Resident ecosystems, communities, habitats, species, and gene pools adequately represented and protected	0,6	19
B	4A Habitat quality and/or quantity restored or maintained	0,6	19
B	4C Unnatural threats and human impacts eliminated or minimized inside and/or outside the MPA	0,6	20
G	1E Local and/or informal governance system recognised and strategically incorporated into management planning	0,6	20
G	4F Access to and transparency and simplicity of management plan ensured and compliance fostered	0,6	20

Category	Management goals in five Italian MPAs	Average value	Ranking
G	5A User conflicts managed and/or reduced: 1) within and between user groups, and/or 2) between user groups and the local community or between the community and people outside it	0,6	20
G	4A Surveillance and monitoring of coastal areas improved	0,4	21
G	2A Existence of adequate legislation ensured	0,2	21

Objectives: B = Biophysical, S = Socio-economic, G = Governance

Ranking of the priority management objectives according to their decreasing score is a way to express and to describe the commitment, accountability and awareness of MPA's managers to:

- the conservation of natural marine resources,
- make the local population accept and understand the institutional purpose of the MPA through the sustainable use of marine resources (prohibitions, regulations and monitoring) and through techniques of public participation and environmental education,
- pursue the adequacy of local administrative structures and management practice in relation to the objectives pursued.

This result is in line with the institutional purposes - issued by the Ministry of Environment - of each marine protected areas taking part to this network.

The choice of priorities is then calculated as a percentage of its single weight towards the overall weight of all objectives (set to 66.6). This shows that 38.74% of priority objectives are among the biophysical ones (total weight 25,8); 31.83% of priority objectives are within the socio-economic area (total weight 21.2) and that the remaining 29.43% priority objectives are related to the governance (total weight 19.6).

4.3 LESSONS LEARNT

The benefit of implementing an evaluation program lies in the setting up of a control system for the overall work done by the management body. But this system has to be objective, standardised, measurable, and has to be already valuated, approved and recognised by peers. This was the case in using the IUCN's guidebook, the methodology of which was already field-tested in 2004 in 18 pilot MPAs around the world.

The following table provides, in a graphical way, the results obtained in the 5 MPAs after assessing the efficiency indicators:

Table 8: Efficiency indicators assessed in the 5 MPAs
Tabela 8: Kazalci učinkovitosti, ocenjene v petih MPA-jih

	Indicators	Torre Guaceto	Sinis	Ciclopi	Tor Paterno	Miramare
	Biophysical indicators					
B1	Focal species abundance	☑	☑	☑	☑ □□□	☑
B2	Focal species population structure	☑	□□□	☑ □□□		

	Indicators	Torre Guaceto	Sinis	Ciclopi	Tor Paterno	Miramare
B3	Habitat distribution and complexity	☑		☒ ☑		☑ □□□
B4	Composition and structure of the community	☑				
B5	Recruitment success within the community			□□□		
B6	Food web integrity					□□□
B7	Type, level and return on fishing effort	☑		☑ □□□	☑	
B8	Water quality		□□□ ☒	☑		
B10	Area under no or reduced human impact	≈	☑ □□□		□□□ ☒	≈ □□□
	Socio-economic indicators					
S1	Local marine resource use patterns		□□□	☑		
S2	Local values and beliefs about marine resources	☑	≈ □□□		☑	
S3	Level of understanding of human impacts on resources	☑		≈	☑	
S6	Perceptions of non-market and non-use value	≈	☑ □□□	☑	□□□	☑ □□□
S13	Stakeholder knowledge of natural history		□□□	☑	☑	☑
S14	Distribution of formal knowledge to community	☑	□□□		□□□	
	Governance indicators					
G1	Level of resource conflict		≈			
G2	Existence of a decision-making and management body	☑ □□□		☑	☑	
G3	Existence and adoption of a management plan			☑	☑	
G4	Local understanding of MPA rules and regulations	☑	≈			≈
G5	Existence and adequacy of enabling legislation			☒ ☑		
G6	Availability and allocation of MPA administrative resources				□□□	
G7	Existence and application of scientific research and input	☑	☑	☑		
G9	Degree of interaction between managers and stakeholders	☑			☒ ☑	
G11	Level of training provided to stakeholders in participation				☑	
G13	Level of stakeholder involvement in surveillance,, ...					
G16	Degree of information dissemination to encourage ...		≈	☑ □□□		□□□
G17	Coordination and integration with local plans of the Public bodies		☑			

☑ Positive trend **≈ No changes** **☒ Negative trend** **□□□ No data – poor significativity**

G17 is a Governance indicator set up and defined on purpose for the specific local (national) situation

4.4 CONCLUSION

The results assessed in the 5 MPAs describe the capability of fulfilling the tasks assigned by each institutional decree, specifically in the fields of use of the maritime public domain, the environmental conservation, the communication/information, the management of resources, the local development.

Facilities for visitors, communication and information systems (i.e. visitor centers, educational workshops, displays, mooring fields, nature trails, exhibition material, website, etc..) are the most developed taking into account that 75% of fruition possibilities usually used in the MPAs surveyed have been implemented and are fully operational. On the other hand, most of MPAs complain a low level of monitoring, control and management of tourist flows (e.g. disposal of waste on beaches and at sea).

With regard to environment conservation, the 5 MPAs have a suitable range of tools and expertise: in the overall, they own 72.5% of the facilities nowadays available, such as a cartographic GIS, biological monitoring programs undergoing in the core and buffer areas, studies running on the biological communities, and are compliant to the European "EMAS" environmental certification standards. Finally, encouraging sustainable local productions is fairly good (66.7%), while resources management is poor (30%), same as the presence of programs aiming at the development of alternative energy sources, at the adoption of waste separation schemes along the coast and at sea, the management of garbage, and the activities that should be certainly encouraged through specific action plans.

4.5 MIRAMARE MPA

The management body of Miramare marine reserve has set 5 high priority objectives for the three-year period program 2005-2007:

1. Conservation of the specific diversity of the tidal zone.
2. Conservation of the naturalness of the underwater and terrestrial landscapes.
3. Conservation of the ecological integrity of the communities living in the Gulf of Trieste.
4. Part of the people attending the Reserve get acquainted with the marine environment and its management, in view of a participative protection of the area shared among all the economic categories, which are operating hereby.
5. To help the conversion of fishing activities and pleasure boating habits, which are no longer sustainable and/or lead their adaptation in the environmental directions.

After the results provided by the effectiveness evaluation, the following are the indications for its next edition of the management plan:

Objective 1 - "Conservation of the specific diversity of the tidal zone"

Monitoring of benthic species will be conducted simultaneously among animal and vegetal

species, in order to assess the sensitivity of plant populations exposed to the same type of stress as animal ones.

The management body has to keep within the current limits the disturbance towards this priority environment, while allowing its fruition for visiting and educational activities.

Objective 2 - "Conservation of the naturalness of the underwater and terrestrial landscapes"

Monitoring activity will be continued by visual census, both on native species (in order to control the disturbancy linked to visiting activities within the MPA) and on alien species, as an overall supervision of Miramare fish community.

The sightings of fish, communicated by scuba visitors to their guides at the end of each visit, will serve as starting input on which to set specific actions for environmental conservation, as well as to ascribe to each species (or group of species) a non-market value on which to base the environmental accounting of the MPA.

The areas close to sensitive zones shall be monitored for documenting any repopulation and spillover of the species hosted by the MPA.

The map of underwater noise sources shall be referred to the reception sensitivity of some common fish species in the Reserve.

Objective 3 - "Conservation of the ecological integrity of the communities living in the Gulf of Trieste"

The dialogue with fishermen (activated thanks the assessment of indicator B 7) could bring the MPA to contribute in increasing the value of local fish production and also to offer managerial insights to the management committee of the "Zona di Tutela Biologica" (the area for the conservation of fish stock).

The model of Miramare MPA food web showed that some knowledge is still lacking, as for some functional groups only abundance data are available (in this case the use of average weights causes an inaccurate estimation of biomass). Furthermore, only limited information is available for some sectors of the food web (especially for intermediate levels: macroinvertebrates and meiofauna), while specific assessment of primary production and food requirements are missing.

Thus the indication is to assess the flows of energy production and consumption as specifically and locally as possible, in order to allow a more precise description of the ecosystem through the food web model.

Objective 4 - "Part of the people attending the Reserve get acquainted with the marine environment..."

There is the need to continually update and involve teacher in order to stabilize the group and to avoid their excessive turnover, thus to keep the quality of educational activities at the highest level.

The platform of e-learning should always be active to allow anyone to download the information, as well as to allow MPA personnel to update the catalogue of educational initiatives.

The daily communication towards users proves to be a key element, to be kept active steadily. An operational indication is to distribute multilingual information leaflets to the parking plots attendants.

Objective 5 - "Conversion of fishing activities and pleasure boating habits..."

The management body of Miramare MPA considers of the utmost importance involvement of the maritime police authorities in order to coordinate their vigilance and to ensure most effective environmental protection.

An action will be undertaken in order to extend the influence of MPA in surrounding areas not directly included in the protected perimeter, thus spreading behaviours and habits for the sustainable use of marine environment.

5. FURTHER DEVELOPMENT

The Italian MPAs are making their first steps within an international/ biogeographic coordination framed by international conventions (UNEP's Barcelona convention) and networks of managers (MedPan, AdriaPan). In this context, it is hoped that the experiences gained in the evaluation of management effectiveness will be made available to all MPAs sharing the same sea, encompassed in such frameworks.

The AdriaPAN network, which was established in 2008 by the "Cerrano Charter", is presently only a coordinating body for managers of coastal and marine protected areas along the shores of the Adriatic Sea. Within this network, the presence of management bodies such as consortia, research institutes and associations is strategic. Their presence should help overcoming the weaknesses of the schemes presently driving the coastal zone management, strengthening the operativity, the spatial planning and the socio-economic development on a common basis of ecological sustainability.

The coordination of the AdriaPAN network thereby may enable monitoring of efficiency indicators among MPAs, as part of a shared method to evaluate the results of the management and conservation efforts. At first, the initiative has to retrieve a common funding tool such as EU's Instrument for Pre-Accession Assistance (IPA). IPA's aim is to strengthen institutional capacity, cross-border cooperation, economic and social development and rural development. In this context, Priority 2 - measure 2.1 "Protection and enhancement of the marine and coastal environment" seems one of the most suitable funding tools. Coastal and marine MPAs represent a tool potentially useful to avoid natural, economical and socio-cultural losses related to unsustainable uses of natural resources and/or to unregulated socio-economic development in the coastal and marine area. The use of MPAs, therefore, is especially recommended to properly balance conservation needs (of natural and cultural values) and economic sustainability, in the perspective of an ecologically sustainable use of natural resources and respect of traditional customs, activities and cultures.

Within AdriaPan – which is the tool to share and discuss common experience at ecoregional level - MPAs managers should be able to build a project together with local scientific institutions in order to collect data/information and set up proper measures to manage their territory in a sustainable perspective and to promote local productions. This project should provide the indication of one or more conservation objectives at ecoregional scale, already stated among MPA's objectives, otherwise proper objectives should be included in the plans of the partner

MPA. Following the methodological scheme, each objective should be linked to one or more indicators. Thus the experience presented herewith should result in some help in working with objectives and related indicators in a cluster of MPAs.

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A CALL FOR A TRANS-BOUNDARY MARINE PROTECTED AREA FOR THE NORTHERN ADRIATIC: CAN CONSERVATION SUCCEED WHERE POLITICS FAILED?

POZIV ZA ČEZMEJNO MORSKO ZAVAROVANO OBMOČJE V SEVERNEM JADRANU: ALI LAHKO NARAVOVARSTVU USPE TAM, KJER JE SPODLETELO POLITIKI?

Peter MACKELWORTH

Key Words: Peace Park; Marine Protected Area, Piran Bay, Adriatic Sea

Ključne besede: "park miru", morsko zavarovano območje, Piranski zaliv, Jadransko morje

ABSTRACT

Increasingly, protected areas are being developed for biodiversity, but with social, economic and political objectives. Provided these alternative inter-disciplinary objectives do not undermine biological aims, conservation professionals should support their development. Trans-boundary conservation areas (TBCAs) are normally implemented to coordinate two or more States to conserve a straddling ecosystem or protect migratory species. However, they may also serve to aid regional development and promote cooperation between countries. Specifically one category of TBCA, the 'peace park', has the explicit purpose of promoting peace and cooperation between opposing States.

The Northern Adriatic has been a region of conflict for millennia. This region is an inherently European space, where previously fluid boundaries have been fused and divided on numerous occasions with associated human population redistribution. The most recent border dispute in the region has been between Croatia and Slovenia over Piran Bay. The forthcoming arbitration process will be time consuming and expensive, with an outcome likely to fuel the dispute, given past performances. Yet, in the near future the two States will be partners in the European Union, with harmonised law and integrated economics. Bearing this in mind, the development of a trans-boundary marine protected area, utilising the Habitats Directive, could provide an opportunity to protect the disputed area and bring harmony to the region. In addition it would contribute to both countries commitments to the Natura 2000 network, improve the tarnished international image of the region and protect a representative site of the Northern Adriatic Sea utilised by internationally important migratory species.

IZVLEČEK

Zavarovana območja se v vse večji meri ustanavljajo za zaščito njihove biotske pestrosti, vendar z določenimi družbenimi, ekonomskimi in političnimi cilji. Pod pogojem, da ti alternativni interdisciplinarni cilji ne spodkopavajo bioloških ciljev, bi morali naravovarstveni strokovnjaki njihov razvoj vsekakor podpreti. Čezmejna naravovarstvena območja se navadno ustanavljajo z namenom usklajevanja dveh ali več držav pri varstvu čezconskega ekosistema ali zaščite selivskih vrst. Po drugi strani pa lahko tudi pripomorejo k regionalnemu razvoju in pospeševanju sodelovanja med državami. Prav poseben namen ene izmed kategorij čezmejnih naravovarstvenih območij, tako imenovanega "parka miru", pa je pospeševanje miru in sodelovanja med nasprotujočimi si državami.

Severni Jadran je območje konfliktov že nekaj tisoč let. Po naravi je del evropskega prostora, v katerem so bile predtem spremenljive meje ob neštetih priložnostih združevane in ločevane s prerazdelitvijo človeške populacije. Najnovejši mejni spor v območju zadeva Hrvaško in Slovenijo glede Piranskega zaliva. Bližajoči se arbitražni proces bo brez dvoma dolgotrajen in drag, izid glede na pretekle "predstave" pa po vsej verjetnosti takšen, da bo samo še prilil olja na ogenj. Toda v bližnji prihodnosti bosta državi vendarle partnerki v Evropski uniji, z vsemi usklajenimi zakoni in integriranim gospodarstvom vred. S tem v mislih bi razvoj čezmejnega morskega zavarovanega območja ob uveljavitvi Habitatne direktive lahko bil priložnost, da se zaščiti sporno območje in da v tem delu sveta zavlada složnost. Poleg tega bi v obeh državah prispeval k njuni zavezanosti do mreže Natura 2000, izboljšal omadeževano mednarodno podobo te regije in zaščitil to reprezentativno lokaliteto severnega Jadranskega morja, mednarodno pomembno za migratorne vrste.

'Love thy Neighbour; yet don't pull down your Hedge'
(Benjamin Franklin, 1754)

1. INTRODUCTION

In recent years, the concept of transboundary conservation areas (TBCAs) has been widely debated (Sandwith et al. 2001, Phillips 1998). The United Nations (UN) now recognises over 227 TBCAs, covering over 4.5 million square kilometres (Fig. 1) (Lysenko et al. 2007). Whilst there are numerous terms used in the literature to describe TBCAs, this paper specifically refers to the 'peace park' concept where both the political and environmental criteria are equally important (Westing 1998)[1]. The World Conservation Union (IUCN) defines peace parks as: 'transboundary protected areas that are formally dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources, and to the promotion of peace and cooperation'.

Peace parks have the possibility to affect human relations at all levels, of particular importance are local and institutional relationships. Local borderland communities often live their day to day life with little regard to border issues, in many cases identifying more with related communities across the border than with distant State capitals (Kaplan 2000). However, the politicisation of a border issue can create tensions where previously there was tolerance. The designation of a peace park may help to diffuse local tensions, mend communities, or maintain cultural integrity, by 'eliminating' the formal border between nations (Odegaard 1990, Wolmer 2003). Conversely, the top down imposition of a protected area (PA), or creation of the multiple borders related to the definition of a peace park, may cause local tension or add to the division of communities (Jones 2001, Fall 2002). However, what is fundamental is that the long-term sustainability of a peace park is largely determined by local participation (Conca et al. 2005).

[1] The term 'Peace Park' will be used throughout this paper where political cooperation is recognised as equally important to environmental protection. In other cases the term Transboundary Conservation Area (TBCA) will be used.

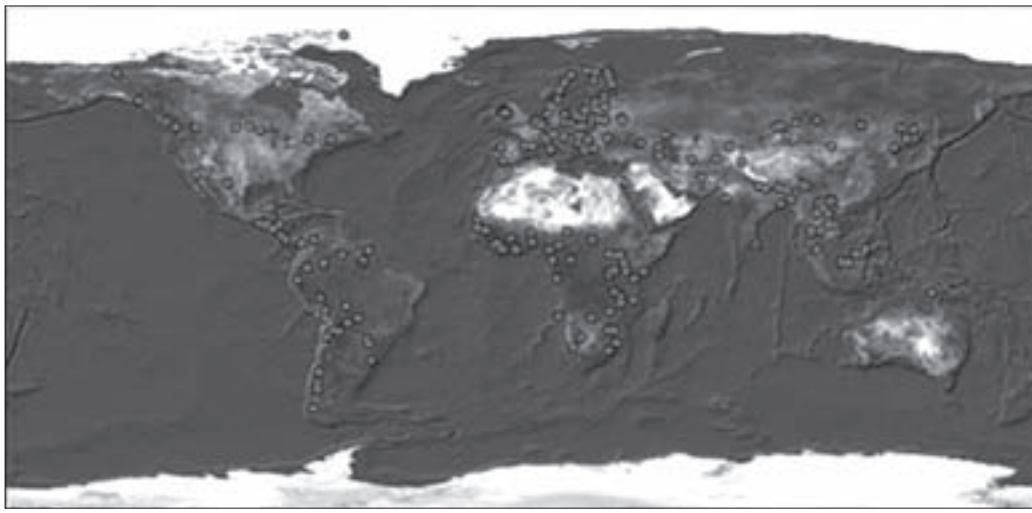

Figure 1: Transboundary Conservation Areas Worldwide
Slika 1: Čezmejna naravovarstvena območja sveta

Institutions evolve though the experiences of their constituent individuals. Officials working together with colleagues from neighbouring States, resolving issues of low political priority such as nature conservation, can help to develop institutional trust (Westing 1993). This trust can then be built upon to find other areas of cooperation and agreement, fostering understanding of other cultures, good relations and reinforcing confidence between States (Odegaard 1990). In some cases, where countries have been in active border conflicts, TBCAs have been used to concentrate attention on the concept of co-operation over a shared resource rather than identifying the border as a symbol of separation (Sandwith et Besançon 2007). This is important in areas such as fluid environments like semi-enclosed seas, lakes or river systems where cooperation among parties is even more vital. However, the form and the context of cooperation are critical, particularly where there may be an imbalance of power between the parties. Where conflict is fresh, the presence of an independent third party may help to facilitate negotiations (Akçali et Antonsich 2009). Cooperation may also be developed in international forums, particularly where States are signatories to the same agreements (Blake 1998, Westing 1998).

From a conservation perspective, the primary purpose of most TBCAs is either for the management of straddling natural systems or protection of habitats important for migratory species (Phillips 1998). The existence of international or regional environmental agreements is fundamental to provide a legal foundation for protection. The two global conventions of particular importance are the Convention on Biological Diversity (CBD) (1992) and the Convention on the Conservation of Migratory Species of Wild Animals (CMS) (1979). The importance of TBCAs is highlighted in goal 1.3 of the CBD protected areas programme of work which seeks to establish and strengthen by 2010/2012 TBCAs (Anonymous 2010). The CMS fulfils its obligations in two manners. Species identified as being in danger of extinction, under Appendix I, are protected directly by imposition of strict conservation objectives on

party States. Species that have an unfavourable conservation status or would benefit from international cooperation, listed under Appendix II, are protected by regional agreements convened under the convention (Lyster 1985).

2. MARINE CONTEXT

The designation of marine protected areas (MPAs) has lagged behind the development of the terrestrial PA system. In 2008, only 5.9% of territorial seas were protected by nationally designated PAs, and only 0.5% of the high seas (Coad et al. 2009). Multiple use MPAs are increasingly being used to assert some form of management over the multiple users and multiple jurisdictions of the coastal and marine zone. Over 54% of the total protected marine area is under the IUCN categories V and VI, compared to 30% for the total PA worldwide (Mulongoy et Chape 2004). Balancing conservation and sustainable use is a continuing problem, although the integrated multiple-use method can help to simplify management by developing a single coordinating institution (Kelleher et Kenchington 1991).

The CBD set ambitious targets for the establishment and management of PAs. For the oceans, the overall aim is to establish, by 2012, an effectively managed, representative, global system of MPAs covering 10% of all marine ecological regions (Coad et al. 2009). The dilatory development of MPAs was identified as a problem at the 2003 World Parks Congress. Delegates recognised the need to develop new methods to improve MPA coverage to the proposed target within the next decade (Wells et al. 2007). The increasing pressure to reach these targets has resulted in the development of innovative approaches. Whilst conservation shortcuts may be criticised, the cryptic and uncertain nature of the marine environment lends itself to creative conservation. For instance the use of 'flag-ship' species for habitat conservation may be better suited to the marine environment (Zacharias et Roff 2001).

3. EUROPEAN AND MEDITERRANEAN CONTEXT

Despite boasting the first formal peace park, Europe has only approximately 4% of the global coverage of TBCAs (Lysenko et al. 2007)[2]. The conclusion of the Second World War led to the development of new States, Federations and Unions many with borders defined with little historical, ecological or ethnic basis. Of particular importance was the divide of political philosophies along the Iron Curtain. The separation of the continent during the 'cold war' led to the creation of an ad hoc nature area in 'no man's land'. This area is now promoted as the European green belt an almost unbroken section of natural landscapes and habitats representing all the European bio-geographic regions (Fig. 2). Although the end of the cold war reunited some regions, others were divided. Associated with this break up has been an increase in nation-states in the region, many of whom possess ill defined and disputed borders (Arnaut 2002).

[2] Within Europe there is 188,153km^2 of TBCAs. Globally the figure is 4,626,601.85km^2

Figure 2: European Green Belt
Slika 2: Evropski zeleni pas

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1979) is the primary agreement to conserve biodiversity in the region. The main objectives of the Convention are to ensure conservation and protection of wild plant and animal species and their natural habitats, to increase cooperation between contracting parties, and to regulate the exploitation of those species, including migratory species. Although the Convention does not expressly refer to TBCAs, Article 1 highlights the need to protect those species and habitats whose conservation requires the cooperation of several States with particular emphasis on endangered and vulnerable migratory species. Council Directive 79/409/EEC on the Conservation of Wild Birds (Birds Directive, 1979) and Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive, 1992) transpose the Bern Convention into EU policy. These directives have been important in the development of consistent national policies in EU Member States and encouraging partnership with accession countries and other partners in the region. In the marine environment, the importance of the trans-border dimension is highlighted due to issues of connectivity (CEC 2007a).

Marine conservation in the Mediterranean is facilitated by the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona, 1976). Originally devised to monitor and control pollution, in recent years one of the major priorities has been to protect marine and coastal habitats and threatened species. The 1995 Specially Protected Areas (SPA) protocol of the convention provides the basis for the development of the Specially Protected Area of Mediterranean Importance (SPAMI) list. The SPAMI list constitutes the core of a protected area network aimed at the conservation of Mediterranean heritage. To fulfil this objective, Parties to the Convention are required to develop cooperation on bilateral and multilateral levels, notably through the establishment of transboundary SPAMIs (Lopez-Ornat 2006).

Until recently, the Mediterranean was considered an oligotrophic sea, low in nutrients and productivity. However, areas of high productivity have been identified in the Aegean, the coasts of Spain and France, and the Northern Adriatic (Fig. 3) (Notarbartolo di Sciara et al. 2008). Whilst these areas provide for the possibility of hotspots of biodiversity, they tend to be related to the terrestrial runoff of the major rivers of the region, thereby having the potential for high levels of contamination (European Environment Agency (EEA) 1999). The Northern Adriatic is one such area of threatened high productivity in the Mediterranean with a high profile ongoing border dispute.

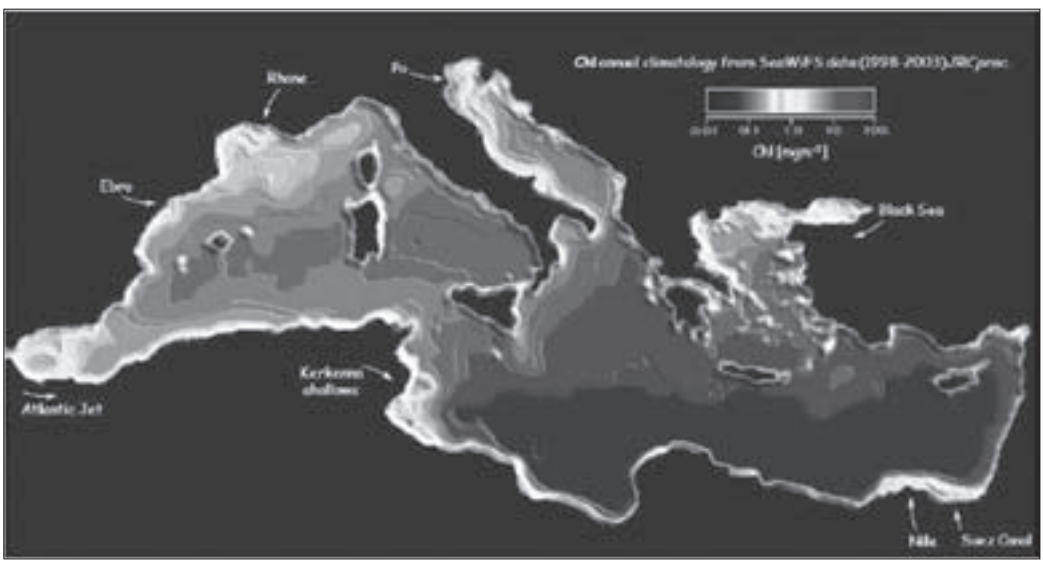

Figure 3: Areas of High Productivity in the Mediterranean (after Notarbartolo di Sciara et al. 2008)
Slika 3: Območja visoke produktivnosti v Sredozemlju (po Notarbartolu di Sciari et al. 2008)

4. THE NORTHERN ADRIATIC

The contested area lies in the Gulf of Trieste adjacent to the Istrian peninsula, a supranational region with Italian, Slovenian and Croatian territories (Fig. 2). Like many

borderland areas it is significantly influenced by regional identity. The region, regardless of State, is orientated to the sea and shares a common heritage. This paper focuses on the disputed marine border between Croatia and Slovenia initiating in the Bay of Piran. The absence of a solution to the border dispute has become a significant issue in the Croatian EU accession process (CEC 2006, 2007b). The development of a Northern Adriatic Peace Park is an initiative to relieve tensions in the political arena whilst conserving a representative area of the regional environment.

Figure 4: The disputed region in and around Piran Bay
Slika 4: Sporno ozemlje v Piranskem zalivu in okrog njega

5. POLITICAL CRITERIA

In 1965, Yugoslavia declared the Bay as part of the internal waters of the State, thus no federal boundary was defined between Croatia and Slovenia (Arnaut 2002, Klemenčić et Schofield 1996). Twenty-six years later, shortly after both countries declared independence, the centre line of the Bay was proposed as the border, with the initiation point being the current mouth of the river Dragonja. However, in 1992 Slovenia claimed sovereignty over the entire bay based on historic use. In 2001, the Prime Ministers of the two countries attempted to define the entire Croatia-Slovenia border including the marine boundary (Arnaut 2002). In

the region of Piran Bay the Drnovšek-Račan agreement proposed that Croatia would receive the disputed terrestrial area south of the Dragonja River, but concede the majority of the Bay to Slovenia (Pipan 2008). According to the agreement, Slovenia would receive approximately eighty percent of the Bay of Piran and a substantial portion of waters outside the Bay, an area of approximately 150 square kilometres (Fig. 4).

Whilst the Drnovšek-Račan agreement was adopted by the Slovenian Parliament, it was rejected by the Croatian Parliament. The absence of agreement on the border led Slovenia to veto Croatian accession to the EU. This was based on the argument that Croatia was using documents in negotiations that were prejudicial to the territorial dispute between the two countries (Mackelworth et al. in press). Whilst Slovenia blocked the accession process, from December 2008 to October 2009, the Croatian position was to take the issue to arbitration based on international law. Resolving this issue became a priority for the rotating Presidency of the Council of the European Union. The T2 Presidency trio of France, the Czech Republic and Sweden, from July 2008 to December 2009, sought to find a resolution between Croatia and Slovenia, including chaired negotiations by the Commissioner for EU enlargement. However, these were unsuccessful; it was only through a variety of undefined actions, including the appointment of a new Croatian Prime Minister and international pressure, that Slovenia agreed to the arbitration process in November 2009.

6. ENVIRONMENTAL CRITERIA

The Northern Adriatic is one of the largest continent shelf areas in the Mediterranean. It is also known to be frequented by straddling stocks of fish, cetaceans and sea turtles, of which the latter two are listed as species of conservation interest under numerous conventions and agreements. However, the Gulf of Trieste is also considered to be one of the most polluted areas in the Mediterranean Sea (Horvat et al. 1999). Productivity and pollution are related to terrestrial runoff (EEA 1999). This region is specific due to these bio-geographic features.

Nine cetacean species have been recorded in the shallow Northern Adriatic Sea, although the Bottlenose Dolphin (*Tursiops truncatus*) is now considered to be the only regularly sighted cetacean in the region (Bearzi et al. 2004). In recent years, there have been reports of a Fin Whale (*Balaenoptera physalus*) (Bearzi et al. 2009), Striped Dolphins (*Stenella coeruleoalba*) in the Gulf of Trieste (Francese et al. 2007), and a Humpback Whale (*Megaptera novaeangliae*) in the Bay of Piran (Genov et al. 2009). Since 2002, researchers have been working in and around the Bay of Piran, in Slovenian, Croatian and Italian waters, including the disputed border area (Genov et al. 2008). Although the study has not specifically targeted the disputed area sightings have been recorded over several years suggesting that this area is regionally representative. Dolphin distribution in the region is suggested to be negatively affected by the presence of recreational boats, whilst there is a positive correlation with industrial fishing practises suggesting an overlap of prey species of dolphins with target species for fishers (Genov et al. 2008). Problems of interactions between humans and dolphins suggest the need for the development of conservation actions. This is especially important considering that

Bottlenose Dolphins are listed as vulnerable in the Mediterranean with low density fragmented population units (Reeves et Notarbartolo di Sciara 2006).

In addition to cetaceans, Loggerhead Sea Turtles (*Caretta caretta*) are considered as resident in the Northern Adriatic region (Lazar 2010). The Mediterranean basin contains one of the largest populations of the endangered Loggerhead Sea Turtle, with Greece accounting for the largest nesting population in the region (Lazar et al. 2004, Margaritoulis et al. 2003). Although information on Loggerhead Turtles in the Mediterranean, beyond the nesting beaches, is sparse, tag recoveries and preliminary satellite tracking suggest the Northern Adriatic to be an important foraging area (Zbinden et al. 2008, AdriaWatch 2006 unpublished data, Lazar et al. 2004). Currently, conservation efforts have concentrated on nesting beaches, however incidental catch, boat strikes and pollution are major threats to sea turtles whilst at sea (Casale et Margaritoulis 2010). It is estimated that in the Adriatic over 6,000 turtles are caught in trawling nets each year, while there are no estimates available for catches related to long-lines and gill nets (Lazar et al. 2004). There is an urgent requirement for the development of MPAs to mitigate threats at sea for turtles (Casale et Margaritoulis 2010).

Croatia and Slovenia are both signatories to all the major international environmental agreements. Under the CMS, sea turtles are listed in Appendix I and cetaceans are protected at a regional level through the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS). In addition, at the regional level both the Barcelona Convention (1976) and the Bern Convention (1979) list cetaceans and sea turtles as species for conservation in their appendices. However, more important to EU Member States and accession countries is the Habitats Directive. This calls for Member States to encourage transboundary cooperative research, and to identify areas essential to the life, migration and reproduction of aquatic species which range over large areas[3]. This is particularly pertinent as when Croatia joins the EU both States should be utilising national nature protection legislation that is harmonised with the Directive. This would then enable both States to work together in harmony to protect this region.

7. DISCUSSION

In an ideal world, biological diversity would be a high political priority and conservationists would not need to seek short cuts to protect the common heritage of the Earth. However, rarely does conservation trump economics or politics (Carawardine et al. 2008). The ongoing border dispute between these two States provides an opportunity for conservationists to propose a solution to the problem removing the need for time consuming and expensive arbitration. The Bay of Piran dispute is an example where politics has taken a relatively minor regional dispute and made it into an international issue. It is important to place the dispute in context. Throughout the period of the Federation of Yugoslavia, the inter-related border populations of the two Republics cohabitated with little conflict. Even in the height of the Balkan wars of the 1990s, there was no direct conflict between the two States. Finally, in the near future when

[3] Habitats Directive: articles 4.1, 10, 18.2

both States will be part of the EU there is the potential that the border between them will cease to exist except on the map. The EU has the potential to play a fundamental role in the development of this concept. Institutionally, both States have a contractual commitment with the EU to protection species of international importance. In addition, the Union has finance available through one of its regional cooperative programmes to provide baseline scientific data and develop MPA management. But, perhaps most significant, is the potential role of the Committee of the Regions which has the right to insist on the principle of subsidiarity. Promoting the regional as the level through which management could be founded. Regionalism is a core concept in breaking down the role of the nation-state and the consolidation of the supranational EU (Urbanc 2007). The Istrian peninsula has always been one of the more regionally orientated areas of Croatia.

Ecologically, although this area is small compared to other TBCA or peace parks, the development of a local or regional management institution could bypass some of the complexity seen in the management of other TBCAs, such as the Pelagos Sanctuary. The development of a multiple use MPA could provide the opportunity to create internal bylaws for the definition of marine traffic, and the management of tourism and fishery. For the local communities on both sides of the border, these bylaws could be devised to allow equal use rights regardless of nationality. For the target species it provides the opportunity to test environmental mitigation techniques, such as speed limits to reduce the possibility of turtle strikes and cetacean disturbance, and turtle excluder devices on trawling nets. If successful, it could be expanded to include other areas of the important shallow waters of the Northern Adriatic building on the trust developed in this initial process.

8. CONCLUSIONS

Whilst many biologists may recoil at the idea of developing a PA based on a political void, the uncertainty that is inherent in marine research and conservation requires the application of precaution beyond that which is applied in terrestrial situations. PAs have been designated around prisons, military sites and demilitarised zones where there has been little biological research undertaken, but an opportunity has arisen to do something positive for the common good. As Ray (2004) points out, MPA establishment has been based on varying rationales including science, pragmatism, serendipity, and even without any clear reason. Furthermore, target-based conservation requires that experts be guided by socio-ecological context and stakeholder engagement provided good judgment is not over-ridden (Cowling et al. 2003). PAs have been declared on much less certainty than the current available biological knowledge of this region. Ultimately, it may be better to establish a PA than broaden the goals of management to incorporate entire ecosystems, rather than vainly attempt to create the 'perfect MPA' (Agardy 1994, Kelleher et Recchia 1998).

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ADRIAPAN: A NETWORK OF ADRIATIC'S COASTAL AND MARINE PROTECTED AREAS

ADRIAPAN: OMREŽJE JADRANSKIH OBREŽNIH IN MORSKIH ZAVAROVANIH OBMOČIJ

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Key words: Marine Protected Areas; Adriatic Environment; Nature Tourism; ICZM; Ecological Network

Ključne besede: morska zavarovana območja; jadransko okolje; turizem v naravi; ICZM; ekološke omrežje

ABSTRACT

Biodiversity conservation and sustainable use of resources are the topics in which hundreds of MPAs have already been involved along all the Adriatic coasts, in Italy, Slovenia, Croatia, Bosnia-Herzegovina, Montenegro, Albania and Greece.
During the 4th IUCN World Conservation Conference held on October 6th 2008 in Barcelona, the AdriaPAN, an Adriatic Protected Areas Network, which had been constituted on September 26th 2008 during the meeting organized for this purpose in Delta Po Veneto Regional Park, was recognized in the international events promoted by the International Union for Conservation of Nature.
Often, everywhere, special local administrations are created to take care of the delicate environment of a protected area. Protected Areas could become valuable places, where new local sustainable development forms could be implemented. In fact, Protected Areas authorities are the only official public bodies by which both missions can be carried out: the conservation of natural resources and the local economic development. They could become primary laboratories, where ordinary people, researchers, academic bodies and public administrators could be trained for sustainable form of tourism.

IZVLEČEK

Ohranjanje biotske pestrosti in trajnostna raba virov sta temi, s katerimi se ukvarja že na stotine morskih zavarovanih območij vzdolž celotne jadranske obale, se pravi v Italiji, Sloveniji, na Hrvaškem, v Bosni in Hercegovini, Črni gori, Albaniji in Grčiji.
Na 4. konferenci organizacije IUCN (Mednarodne unije za varstvo narave), ki je potekala 6. oktobra 2008 v Barceloni, je bila AdriaPAN (omrežje jadranskih zavarovanih območij) , ki je bila ustanovljena 26. septembra 2008 med sestankom, organiziranim v ta namen v Regionalnem parku delte Pad, sprejeta kot organizacija, sodelujoča v mednarodnih dogodkih pod promocijo IUCN.
Pogosto se marsikje ustanavljajo lokalna administrativna telesa, da bi poskrbela za izredno občutljivo okolje zavarovanega območja. Zavarovana območja bi lahko postala dragoceni kraji, kjer bi lahko bile uresničene nove lokalne trajnostne oblike razvoja. Pravzaprav so vodstva zavarovanih območij edina uradna javna telesa, ki lahko uresničujejo obe poslanstvi: ohranitev naravnih virov in razvoj lokalnega gospodarstva. Zavarovana območja bi lahko postala primarni laboratoriji, v katerih bi se lahko na področju trajnostne oblike turizma lahko urili navadni ljudje, raziskovalci, akademiki in javni administratorji.

1. EU CROSSBORDER COOPERATION WITHIN THE ADRIATIC REGION

l The entire Adriatic area comprehends a population of about 96million inhabitants and it is a very important economic area for Europe with a total GDP of about 1.8 million Euros.

The need of creating a unique strategy is felt by all stakeholders in the region for the promotion of a more homogeneous and sustainable development, for the reduction of economic and social differences that exist in the area and for fostering a progressive approach to the EU by the countries that are not its members as yet.

Notwithstanding its internal differences, the improved cooperation in many sectors is already making the area more homogeneous and fostering economic growth of the less developed areas. Comprehensive strategies that should establish instruments and objectives to be reached in the medium and long term would accelerate the development process of all countries involved.

The Adriatic Countries are associated in various form within a semi-closed sea basin as a relevant "policy area".

The first Intergovernmental Cooperation was established in May 2000 by the Adriatic-Ionian Initiative (AII)[1], which included all the Adriatic coastal countries plus Serbia. The aim of AII is to link the coastal countries of the two seas for the purpose of cooperating in the development and safety of the whole area.

A second formal association of governmental authorities was launched on February 2006 as Adriatic Euroregion (AE), for a continuous trans-border cooperation. It represents a model of co-operation that includes trans-national and inter-regional co-operation between regions of the Adriatic coastline. The AE is the institutional framework for jointly defining and solving important issues in the Adriatic area. It consists of 23 members - regional and local governments from Italy, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro and Albania (Coletti 2009).

The issue of environmental protection, which is central for socio-economic development in the region, is the high sensibility of t maritime and coastal areas of the Adriatic Sea.

One of the most interesting places and topics of convergence for the countries of the entire Adriatic region are exactly those that are associated with marine and coastal environment, with resource protection, and with the enhancement of locations.

The European Community and its Member States are contracting parties to the UN Convention on Biological Diversity, and EU Heads of State and Government undertook in 2001 to halt the decline of biodiversity in the EU by 2010 and to restore habitats and natural systems. In 2006, the EU Commission unveiled an Action Plan to halt biodiversity loss by 2010. In the EU, the policy framework is already largely in place, as "Natura 2000" - the EU-wide network of protected area - now covering some 18% of the territory of the EU-15 and is being extended to the EU-10 and seas. A significant number of Natura 2000 sites are designated in the marine environment, and nearly all of them are concentrated in coastal areas.

[1] The Adriatic-Ionian Intiative (AII) was formally established as a political initiative at a conference held in Ancona, Italy, in May 2000. Eight Countries cooperate within the framework of AII: Albania, Bosnia&Herzegovina, Croatia, Greece, Italy, Slovenia, Serbia and Montenegro.

For the Special Protection Areas (SPA):

- ca. 5,000 sites, ca. 10% in which a marine part is included
- ca. 500,000 km2, some 15% of which is in marine area

For the Sites of Community Importance (SCI):

- ca. 20,000 sites, 10% in which a marine part is included
- ca. 600,000 km2, some 15% of which is in marine area

More than 1,500 sites having a marine component are concentrated in the first 12 miles from the shore (Paixao 2007).

These facts brought the European Commission to publish, in 2007, the "Guidelines for the establishment of the Natura 2000 network in the marine environment - Application of the Habitats and Birds Directives". The establishment of a marine network of conservation areas under Natura 2000 should significantly contribute to the target of halting the loss of biodiversity in the EU and also to broader marine conservation and sustainable use objectives.

Concerning the need of merging the protected areas into a network, we notice that:

- the Action Plan (2006) identifies four priority areas, one of which, "Biodiversity in the EU", requires member states to propose, designate, protect and effectively manage sites protected under the Natura 2000 network;
- the approach developed for the "marine" network will lead to the implementation of a single, integrated and coherent set of measures for the conservation and protection of marine environment.

EU policy launched in 2007 seeks to enhance the compatibility between Natura 2000 and other marine networks established under regional agreements/conventions: OSPAR, HELCOM, Barcelona.

2. COASTAL REGION AND PROTECTED AREAS

To give a definition of "coastal region" we should have in mind the areas included in the maritime mid-level administrative units of the Mediterranean and Adriatic countries. Concepts of "coastal areas" or "costal zones" are defined by current literature with analysis centred on the following points:

- human pressure
- tourist pressure
- settlement system change
- industrial growth
- traffic growth
- land use and cover change
- spatial planning

Several studies are involved in the analysis of the economic development in the Mediterranean and Adriatic environment (Cori &t Lemmi 2002).

During the last IUCN World Conservation Conference held in October 2008 in Barcelona, Spain, the last definition of a Protected Area was adopted, i.e.: "A clearly defined geographical

space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values".

Marine protected areas (MPAs) have gained world recognition as effective tools to protect the marine environment, and are much in favour in the Mediterranean, where about a hundred of them have been declared during the recent decades to grant special protection to sites perceived to contain the most valuable marine habitats and species. Embattled by the complexities of saving their sea as a whole, the Mediterranean nations have resolved to carve out their remaining crown's jewels from the marine wasteland, and struggle to conserve them through MPA designations (Notarbartolo Di Sciara 2008).

Protected Areas are special local administrative bodies created to take care of this delicate environment. Protected Areas could become valuable places, where new local sustainable development forms could be implemented. In fact, Protected Areas authorities are the only official public bodies by which both missions are carried out: the conservation of natural resources and the local economic development. And, further, they are the only forms of public administration that extends its own action, planning and programming in both different geographic areas: at sea and on land.

Coastal and Marine Protected Areas (MPAs) could thus become primary laboratories, where ordinary people, researchers, academic bodies and public administrators could be trained in sustainable form of development.

On the subject of environment protection and sustainable use of sea resources, all the Mediterranean countries have already worked together since they signed, in 1995, the Barcelona Protocol concerning the biological diversity and specially protected areas in the Mediterranean Sea (SPAMI-Special Protected Areas of Mediterranean Importance).

The introduction, with the same protocol, of the ICZM (Integrated Coastal Zone Management), will be an important expedient to the integration of administrative and political forms of territorial planning in all Mediterranean countries. It could help integration within different cultures. And thanks to their similarity and capacity to govern the deep sea as well as coastal territories, protected areas became the best laboratories where this new planning and programming could be practiced.

Biodiversity conservation and sustainable use of resources are the topics in which have already been involved more than hundreds of MPAs along all the Adriatic coasts, in Italy, Slovenia, Croatia, Bosnia-Herzegovina, Montenegro, Albania and Greece.

3. A NETWORK OF ADRIATIC PROTECTED AREAS

In early June 2008, during a training workshop organized by the Italian Association of Protected Area managers (AIDAP), the idea of establishing a network of marine and coastal protected areas in the Adriatic was launched and its feasibility and relevance first discussed. Other meetings were organized shortly after, in order to define the objectives and content of such an initiative. A chart with ideas and objectives was created and named "Carta di Cerrano" in honour of the place where everything started.

On July 8th, 2008, the Carta di Cerrano (Cerrano Charter) was drafted and circulated to all Italian parties interested in commenting upon it: "AdriaPAN" (Adriatic Protected Areas Network) was selected as the official title of the newly born network. Almost all Italian Marine and Coastal Protected Areas along the Adriatic coast responded positively to this initiative and the Charter was finally signed on September 26th, 2008, during the meeting organized for this purpose in Delta Po Veneto Regional Park.

During the 4th International Union for Conservation of Nature World Conservation Conference held on October 6th 2008 in Barcelona, the AdriaPAN was recognized in international events promoted by IUCN and conducted by MedPAN, the existing network of Mediterranean Protected Areas Managers.

The AdriaPAN aims at initiating a technical process in support of all MPAs managers in the region that will speed up the achievement of the goal set during the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002 of halting marine and coastal biodiversity loss through the establishment of networks of marine protected areas by 2012. This initiative responds also to the main international provisions related to the conservation of marine environment, such as the Convention on Biological Diversity (CBD) and the European Commission's Directives.

The number of MPAs who have signed the Cerrano Charter is rising very quickly. AdriaPAN numbers 21 MPAs members from all Adriatic countries and has received request of collaboration from more than 25 organizations, such as universities, research institutes, NGO, associations, local agencies, etc.

On March 26, 2010, during a session by the Senior Committee of IAI & Adriatic-Ionian Initiative (a direct offshoot of the foreign ministries of countries bordering the Adriatic Sea[2]), the AdriaPAN network was officially recognized as a working body.

4. PROJECT AND DEVELOPMENT OF THE NETWORK

Several projects are being developed with the AdriaPAN's coordination. Some of them have already been created with strong partnership and detailed structure to apply for EU grants.

The first project, **PAEIAS** (Protected Areas Efficiency In Adriatic Sea), considers the ensemble of the historical, cultural and natural heritage of the Adriatic basin. As the Adriatic Sea needs urgent conservation and management measures to be set up that take into account local communities and stakeholders in the decision/management process, PAEIAS is exploring the use of innovative collaborative frameworks involving scientists, protected area's managers and stakeholders (i.e. fishermen). The project's objectives are : 1) preserving the natural heritage and biodiversity of marine systems (from single species to ecosystem functions), 2) preserving the economy related to small scale artisanal fisheries (enhancing or stabilizing yields, promoting local products), and 3) the cultural heritage and diversity connected to local traditions and knowledge of fishing communities. PAEIAS involves partners and associates

[2] See note n.4.

from 6 Adriatic countries (Italy, Slovenia, Croatia, Montenegro, Albania and Greece). Scientific institutions are called to strictly collaborate with PAs' authorities and fishermen to collect data/information and set up proper measures to manage fisheries in a sustainability perspective and promote local products.

Another project called **BiSEAcle** (Bicycle Intermobility System Ensuring Adriatic Coast's Leisure and Environment) aims to promote sustainable modes of transport and to develop a system of compatible and integrated fruition of Central Adriatic protected areas, focusing on bicycle use, supporting stable cooperation between economic operators and public administrations, to improve the economic sustainability of protected areas and competitiveness in eco-tourism.

Therefore the project aims at:

- Encouraging networking between the different areas involved in the project,
- Encouraging the emergence of tourist demand for the fruition of protected areas

The project **ChaMon** (*Charadrius Monachus*) has been created to study and support the ecological networks, between protected areas, for biodiversity conservation. The creation of a real ecological network is the first step towards biodiversity conservation and protection of endangered species. On the Adriatic coasts, the Mediterranean monk seal (*Monachus monachus*) and Kentish plover (*Charadrius alexandrinus*) have a potentially wide range of distribution by occupying the two more typical habitats of the Adriatic Sea: rocky and sand littoral.

Chamon has engaged in preparing a protection plan for these two species, through the creation of ecological network between marine protected areas (MPA) in the Adriatic. The project aims to achieve the creation of ecological network through a set of concerted actions, which will include plans for sustainable development and efforts to raise the awareness of the local communities.

The creation of ecological network is not simple and it needs a set of studies on the ecological characteristics of the species. The main objectives are:

- consolidating existing data on the status of these species and implementing a census where necessary,
- studying the dispersal of the species,
- conducting a study of habitat suitability models and a census of main suitable breeding habitats in the area,
- creating a map of distribution of the species and a map of their potential distribution,
- studying foraging area and the diet,
- establishing the MPA involved and the ecological corridor necessary,
- establishing a plan for sustainable development of the region, which takes into consideration and renders compatible habitat conservation, tourism and fishing activities.

In order to implement this project, participation by many MPAs would be necessary to sufficiently enlarge the ecological network to allow the areas to be used by these two endangered species.

5. CONCLUSION

Marine and coastal, the natural protected areas in the Adriatic may constitute a working basis to embark on an interesting experiment of directing cross-border and international cooperation.

The spontaneous initiative to build a network between the management bodies of marine and coastal protected areas, started by operators within the said bodies, bodes well.

The involvement of local authorities belonging to the administrative organisation of protected areas and of any stakeholders related to these authorities as a result may take place in a direct manner in any State of the 'crown' of Countries along the Adriatic Sea. The theme of the preservation of natural and cultural resources and their enhancement concerns any forms of local administration irrespective of their ethnic, religious, and social foundation of origin.

Both marine-environment protection programmes as defined in the new strategy put in place by the European Union with Directive No. 2008/56/EC, and the policies of cross-border Integrated Coastal Zone Management (ICZM) and the wide open-sea protected areas (SPAMI) call for the execution of a network action through coordination between the local situations of different countries and between various levels of administration and interests.

These are interesting governance forms, which in the Adriatic area would already find the organisations managing marine and coastal, natural protected areas.

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THE FIRST MPA IN ALBANIA, SAZANI ISLAND – KARABURUNI PENINSULA, AS A REGIONAL PRIORITY CONSERVATION AREA FOR MARINE BIODIVERSITY

OTOK SAZANI – POLOTOK KARABURUNI, PRVO MORSKO ZAVAROVANO OBMOČJE V ALBANIJI KOT PREDNOSTNO NARAVOVARSTVENO OBMOČJE ZA MORSKO BIOTSKO PESTROST

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Key words: Marine Protected Areas, Albania, Adriatic Sea, Ionian Sea

Ključne besede: morska zavarovana območja, Albanija, Jadransko morje, Jonsko morje

ABSTRACT

The coastal and marine area of Sazani Island – Karaburuni Peninsula has been recently proclaimed the first MPA in Albania. After a complex analysis, based on the existing data on marine biodiversity, field survey at the sea, historical, cultural and socio-economic values, this area has been recognised as meeting to the greatest extent the criteria of a MPA among the eight proposed areas as potential MPAs in Albania. The main features that make this area important at the national and regional levels are the presence of at least 36 marine species that are of international concern and appear on the lists of protected species of several conventions (Barcelona, Bern, Bonn, CITES), such as *Posidonia oceanica*, *Corallium rubrum, Lithophaga lithophaga*, as well as extended facies of Cystoseira, "trottoirs" of *Lithophyllum byssoides* and biocenosis of mediolittoral caves. Coralligenous biocenosis is also present with calcareous red seaweeds, gorgonians and bryozoans. The presence of the loggerhead turtle *Caretta caretta*, the common dolphin *Delphinus delphi*s, the bottlenose dolphin *Tursiops truncatus* and the Mediterranean monk seal *Monachus monachus* has also been recorded in marine waters of the relevant area. This area owns precious archaeological, historical and cultural values, too, with Grama Bay, a famous harbour built in antiquity, and the ancient town of Orikum, founded in 4th century BC, conserving traces of several antique and mediaeval civilizations. This area has also been identified as a priority area by many recent national and international environmental reports and can be considered a priority area for marine biodiversity conservation on a regional scale.

IZVLEČEK

Obalno in morsko območje otoka Sazani in polotoka Karaburuni je bilo nedavno razglašeno za prvo morsko zavarovano območje (MPA) v Albaniji. Po temeljiti analizi, temelječi na obstoječih podatkih o morski biotski raznovrstnosti, popisu morskih vrst, zgodovinskih, kulturnih in socio-ekonomskih vrednost je bilo ugotovljeno, da med osmimi predlaganimi potencialnimi MPA-ji v Albaniji prav to območje v največji meri izpolnjuje obstoječe kriterije. Poglavitni razlog, zaradi katerih je to območje pomembno tako na regionalni kot nacionalni ravni, je dejstvo, da ga naseljuje 36 morskih vrst mednarodnega naravovarstvenega pomena, ki jih najdemo na seznamih vrst, zaščitenih z različnimi konvencijami (barcelonsko, bernsko, bonsko, CITES), kot so na primer *Posidonia oceanica*, *Corallium rubrum* in *Lithophaga lithophaga*, kot tudi

močno razširjena asociacija s cistoziro, "trotoarji" z *Lithophyllum byssoides*, in biocenoze mediolitoralnih jam. V območju uspeva tudi prekoraligen z apnenčastimi rdečimi morskimi travami, koralami in briozoji, v teh vodah pa so bile zabeležene tudi vrste, kot so na primer glavata kareta *Caretta caretta*, navadni delfin *Delphinus delphi*s, velika pliskavka *Tursiops truncatus* in sredozemska medvedjica *Monachus monachus.* Hkrati je območje znano po svojih dragocenih arheoloških, zgodovinskih in kulturnih vrednotah, saj na primer zaliv Grama, slovito nekdanje prazgodovinsko pristanišče, in antično mestu Orikum, zgrajeno v 4. stoletju pr.n.št., še vedno hranita sledove več antičnih in srednjeveških civilizacij. Območje so v mnogih nedavnih nacionalnih in mednarodnih okoljskih poročilih nenazadnje razglasili za prednostno območje za zaščito morske biodiverzitete na regionalni ravni.

1. INTRODUCTION

The Albanian coastal area, situated in the south-eastern part of the Adriatic Sea and in the north-eastern part of the Ionian Sea, is about 427 km long; 273 km of it belong to the Adriatic and 154 km to the Ionian. Territorial waters extend 12 nautical miles offshore and include a wide range of water depths and substrate conditions.

River mouths and deltas, lagoon systems, dry old riverbeds, marshes, sandy beaches, dunes covered with vegetation, and dense forests are present in the Albanian littoral. According to various geological studies, the geomorphologic classification of the Albanian coastal area consists of two principal major zones: a) Adriatic Coastline of Peri-Adriatic Depression in the central and northwestern parts of Albania; b) Erosion coastline of Ionian tectonic zone in the southwestern part of Albania (Kabo 1990 - 1991).

Marine ecosystems and coastal wetlands of Albania are rich in habitat typologies, animal and plant communities and species. They constitute an important part of nature heritage not only for the country itself but also for the Mediterranean region as a whole (Anonimous 2002).

Despite the considerable coastline and the important role of marine ecosystem in the country's nature and biodiversity, history, culture, tourism and socio-economy in general, there were no marine protected areas in Albania until 2010. The existing coastal protected areas, including mainly coastal lagoons, river mouths and deltas, are supposed to imply also marine habitats close to them, although these habitats have never been stated and managed as MPAs. Legally, they were subjects to the IUCN categorization and had to be managed under the same categorization as stated for the coastal area.

Recently, together with the increasing interest in marine research in Albania, increasing awareness of Marine Protected Areas and marine conservation in general has been noted in the country. The National Biodiversity Strategy and Action Plan (NEA/AKM 1999) has proposed eight areas along the Albanian coast as potential areas for being proclaimed Marine Protected Areas. Several surveys and assessments have been focused on these areas in the recent years.

The present paper focuses on the first Albanian MPA, Sazani Island – Karaburuni Peninsula, proclaimed in April 2010. This proclamation was prepared by a recent project (Protected Areas Gap Assessment and Marine Protected Areas Development in Albania) that, besides

other objectives, was also aiming to identify and propose one single area as the most suitable for being stipulated the first MPA in Albania. This project has analyzed in a comparative way the eight potential areas as MPAs, based on the previously existing data, as well as on a rapid field survey in each of them during the project implementation, in order to update the current situation. Marine and coastal area Sazani Island – Karaburuni Peninsula has been distinguished and targeted to be proclaimed the first MPA. This paper describes the relevant area in a large context, including the natural and landscape values, considering the importance of habitats, communities and species, especially those of special importance as rare and/or endangered at the national and international levels, feeding and/or breeding grounds, as well as cultural, historical and socio-economic values and importance.

2. METHODS

The analysis and assessment of natural, biodiversity, historical, archaeological and socio-economic values of the area Sazani Island - Karaburuni Peninsula have been based on the previous collected and reported data in the recent years, as well as on a rapid survey carried out in 2009. Data sources are described in the following documents:

1. *Inventory of Posidonia oceanica meadows and coastal habitats along the Albanian coast* (Kashta et al. 2005, Kashta et al. 2007). This inventory was carried out by NGO Association for the Protection of Aquatic Wildlife of Albania (APAWA) and supported by the Ministry of Environment, Forests and Water Administration of Albania (MEFWA) in 2005. Inventory of Posidonia meadows, together with the assessment of their ecological state and associated macrofauna, was done for the whole Albanian coast, including two sites on Karaburuni Peninsula.
2. *Rapid assessment survey of the important habitats of marine turtles and monk seal in the coastal area of Albania*. This survey was supported by the RAC/SPA, GEF/SGP Albania, MEFWA, and implemented by the MEDASSET (Greece) and APAWA in 2005. Karaburuni Peninsula and Sazani Island were two main sites for this survey, especially for the monk seal habitats, due to their considerable number of suitable coastal caves and beaches for shelter and stranding, as well as the very limited human access.
3. The project *Technical Assistance for Establishment and Management of an International Centre for Marine Studies (CISM) in Albania* (CoNISMa 2008), implemented by ARPA Puglia (Italy), CoNISMa (Italy), IRPI-CNR (Italy), Faculty of Natural Sciences of the University of Tirana (Albania), Academy of Sciences of Albania and the MEFWA (Albania), and supported by the EU Program Interreg III Italy – Albania, 2006 - 2008. Vlora Bay, including Sazani Island and Karaburuni Peninsula, has been the case study of this project, implementing a complex and detailed study of the relevant area, implying benthos, plankton, nekton, ecotoxicology, hydrology, geology, sedimentology, coastal erosion, chemical oceanography and physical oceanography. Data collected from this study represent the largest data ever collected for any marine and coastal area in Albania.

4. The project *Protected Areas Gap Assessment and Marine Protected Areas Development in Albania*, implemented by the UNDP Albania and supported by GEF (USA) and MEFWA (Albania), 2008 – 2010. One of the main objectives of this project was to identify and propose one single area as the most suitable for being proclaimed the first MPA in Albania. This project has analyzed the eight potential areas as MPAs, proposed by the National Biodiversity Strategy and Action Plan, based on the previously existing data, as well as on a rapid field survey in each of them during the project implementation, in order to update the current situation (Kashta et Beqiraj 2009). Marine and coastal area Sazani Island – Karaburuni Peninsula has been distinguished and targeted to be proclaimed the first MPA. A more detailed survey has been carried out for this target area in July 2009 by national and international experts involved in the project. Snorkelling has also been used for this survey, aiming at a quick assessment of the state of benthic habitats in mediolittoral and upper infralittoral. Based on the analysis of the existing and new collected data, as well as on the analysis of legal and administrative framework related to marine conservation and protected areas, this project has also prepared the necessary documentation and organized the consultation process for proclaiming the area Sazani Island – Karaburuni Peninsula the first MPA in Albania.

a) b)

Figure 1: a) Map of Albania, showing the position of Sazani Island – Karaburuni Peninsula; b) Map of the area Sazani Island – Karaburuni Peninsula

Slika 1: a) Zemljevid Albanije z vrisano lego otoka Sazani - polotoka Karaburuni; b) Zemljevid območja otoka Sazani - polotoka Karaburuni

2.1 GENERAL DESCRIPTION OF THE AREA SAZANI ISLAND – KARABURUNI PENINSULA

Karaburuni Peninsula runs along the western part of Vlora Bay. It covers 62 km^2 and separates the Albanian coast of the Adriatic Sea from the Ionian Sea. A narrow

sea channel, named Mezokanali *(in English: middle channel)*, separates Karaburuni from Sazani Island.

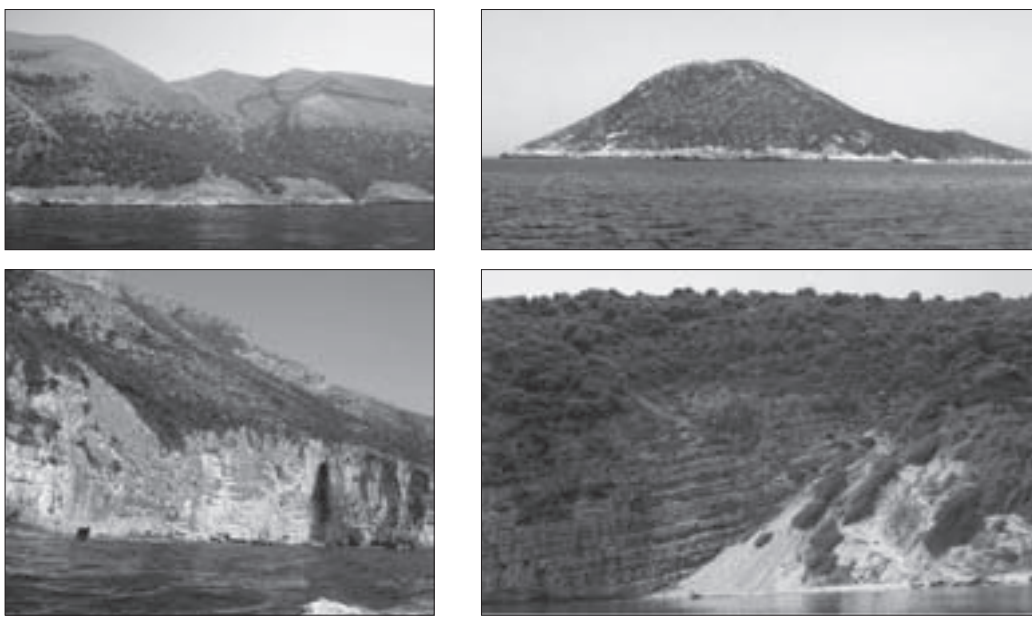
From the geological point of view, Karaburuni is made up of Cretaceous carbonic limestone, while in the north-western part, Bay of Shën Jani, it is composed of terrigenic deposits.

The relief comprises a number of hills, up to 800 m high. The highest peaks are Maja e Ilqes (733 m), Maja e Flamurit (826 m) and Çadëri (839 m).

The entire peninsula meets the sea with steep, inaccessible cliffs. The western shore is high, fragmented with many fissures, caves, gaps, and small beaches. The access to several coastal parts and beaches, especially on the western side of the peninsula, is very difficult and sometimes impossible unless using a boat, due to the cliffs at the seashore. The eastern shore is less fragmented. Cape Gjuhezes (Kepi i Gjuhezes) at the northwestern tip of the peninsula is the westernmost point of Albania. The area is practically devoid of woody vegetation, except for sparse maquis and wild grasses, and it has no freshwater sources.

Karaburun Peninsula embraces some small bays: the Bay of Raguza, the Bay of Shën Jan, The Bay of Bristan, the Bay of Dafina, etc.

Sazani Island is 4.8 km long, 2 km wide, and has a surface of 5.7 km^2. It is composed mainly of limestone rocks of Cretaceous era and in the eastern part partially of terrigenic and cleistogenic deposits. On its eastern coast, the largest bay is that of military harbour, while the western coast is more fragmented, steep, with high cliffs, fissures and small bays, where the best known are the Bay of Paradise (Gjiri i Parajses) and the Devil Gorge (Gryka e Djallit). Woody vegetation is scarce and the island is mainly covered by maquis and wild grasses.



a) b)

Figure 2: View of: a) Karaburuni Peninsula; b) Sazani Island (photos: Beqiraj et Kashta 2009)
Slika 2: Pogled na: a) polotok Karaburuni; b) otok Sazani (fotografije: Beqiraj et Kashta 2009)

3. RESULTS AND DISCUSSION

Description of habitats of Sazani Island – Karaburuni Peninsula and their values is based on the data collected from the projects already mentioned in the "Methods". Descriptions in the following are focused on marine habitats only, aiming at highlighting the most important habitats, species and associations.

3.1 MEDIOLITTORAL STAGE

3.1.1 Biocenosis of the lower mediolittoral rocks

Lithophyllum byssoides (= *L. lichenoides*), a characteristic species of the western Mediterranean and Adriatic Sea, is present on the mediolittoral of Sazani Island and Karaburuni Peninsula. This incrusting coralline alga grows slightly above mean sea level, in small caves, corridors and along cliffs. In this area it forms small cushions (hemispheric concretions) and rarely builds rims, usually known as "trottoirs".

3.1.2 Biocenosis of mediolittoral caves

Mediolittoral caves correspond to crevices or cave entrances that are partially out of the water. These formations are mainly situated along the western side of peninsula, where species like *Catenella caespitosa, Hildenbrandia prototypus*, *Phymatolithon lenormandii* can be found.

Figure 3: View of some caves on Karaburuni Peninsula (photos: Beqiraj et Tilot 2009)
Slika 3: Pogled na jame na polotoku Karaburuni (fotografije: Beqiraj et Tilot 2009)

3.2 INFRALITTORAL STAGE

3.2.1 *Posidonia oceanica* meadows

Seagrass communities often characterize sandy and muddy bottoms in Karaburuni coasts and Vlora Bay. On the western side, *Posidonia oceanica* grows generally on rocky substrates and rarely on sandy seabed, in front of small beaches.

Posidonia meadows, as a habitat, concern the Habitat Directive 92/43/EEC as priority habitat, whereas *P. oceanica* as a species concerns Annex II (List of the endangered or threatened species) of the Barcelona Convention (Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean).

Fragmented *Posidonia oceanica* meadows have been observed along the eastern coast of Karaburuni, in Vlora Bay. The beds with a coverage of 50% extend from 6 m to 15-18 m depth.

An inventory of Posidonia meadows has been implemented in Shen Vasil and Raguza Bay, along the eastern coast of Karaburuni. In Shen Vasil, the Posidonia meadows were very poor in benthic macrofauna. The commonest species in this site were sponges *Crambe crambe* and *Axinella canabina*; bryozoans *Myriapora truncata, Smittina cervicornis* and *Membranipora sp*., eunicid polychaetes (Fam. Eunicidae) and ascidian *Halocynthia papillosa*. It's worthy to emphasize the high abundance of *Halocynthia papillosa* and *Holothuria tubulosa* in the bare parts, without macrovegetation cover, between the patches of Posidonia.

In Raguza Bay, benthic macrofauna was slightly richer, compared to the first site. A very high abundance of *Holothuria tubulosa* was recorded, especially in the bare parts, without macrovegetation cover. A high species richness of sponges was also recorded, the commonest among them being *Aplysina aerophoba, Crambe crambe, Ircinia variabilis, Petrosia ficiformis* and *Axinella damicornis*. Other species with high abundance were the anthozoan *Cladocora caespitosa*, gastropod *Hexaplex trunculus*, bivalves *Venus verrucosa* and *Pseudochama gryphina*, and the ascidian *Botryllus schlosseri* with the anthozoan *Caryophyllia inornata* as epibiont.

Along with the regression of *Posidonia oceanica* beds, a mass growth of the invasive alga *Caulerpa racemosa*, developed mainly on "mattes morte" from 2 m to 15 m depth, has also been noted. After its first record in Albania in 2002, this invasive alga seems to be common in wide ranges of depths and substrata along the coast of Vlora Bay.

3.2.2 Biocenosis of infralittoral algae in hard bottoms

Perennial brown algae are dominant over extensive parts of shallow hard substrata in the western side of Karaburuni Peninsula and Sazani Island. The most important group is that of the brown algae Cystoseira, represented by 5 species (*Cystoseira amentacea var. spicata, C. barbata, C. compressa, C. crinita and C. spinosa*). The *Cystoseira* communities are, together with the *Posidonia* meadows, the main supporters of biodiversity in shallow water.

3.2.3 Association with *Cystoseira amentacea var. spicata*

This association is located in the first meter of the infralittoral (from 20 cm to 30 cm depth) and creates belts in the photophilic biotopes, where a strong wave action predominates and where the rocky substratum is subvertical. *Cystoseira amentacea* is an indicator of the upper limit of the infralittoral stage and represents a threatened species (after Barcelona Convention, Annex II). This association includes many strata and is characterized by a high species richness. It shelters epibiont organisms and other benthic organisms, mainly algae, polychaetes, molluscs and crustaceans.

Other associations to be mentioned among infralittoral algae in hard bottoms are: association with *Cystoseira crinita*, association with *Dictyopteris polypodioides,* association with *Corallina elongate*, and facies with *Cladocora caespitosa*.

Among the infralittoral algae recorded for the area (after Kashta 1987), some of species are very interesting from a biogeographical point of view, such as *Catenella caespitosa* with boreal affinity, *Polyphysa parvula* (Solms-Laubach) Schnetter et Bula-Meyer with tropical affinity, and the lessepsian seagrass *Halophila stipulacea* (Forskal) Ascherson. Until now, Vlora Bay has represented the northern limit of distribution of *Halophila stipulacea* in the Mediterranean (Kashta et Pizzuto 1995).

3.3 CORALLIGENOUS BIOCENOSIS

In the circalittoral zone, on hard substrata, the most important biocenosis is the coralligenous, with calcareous red seaweeds, gorgonians and bryozoans. This biocenosis is well developed on the western side of Sazani Island and Karaburuni Peninsula.

Other important biocoenosis is that of semi-obscure caves, where the red coral *Corallium rubrum* and some sponges live.

a) b)

Figure 4: a) *Ophidiaster ophidianus* and b) *Corallium rubrum* from Karaburuni Peninsula (photo: Kashta 2005, 2007)
Slika 4: a) Ophidiaster ophidianus in b) Corallium rubrum s polotoka Karaburuni (fotografiji: Kashta 2005, 2007)

The red coral is a species of the Annex-III of the Barcelona Convention, as a species whose exploitation is regulated and also a species of the Annex III of the Bern Convention, as a protected fauna species.

3.4 OTHER IMPORTANT MARINE BENTHIC MACROFAUNA

There are relatively richer data on marine fauna of this area, compared to many coastal areas of Albania. Most of the data belong to studies of specific groups, such as mollusks, crustaceans and echinoderms.

More than 150 mollusk species have been reported from this area, and new species for Albania and the relevant area itself are being published from almost every study on malacofauna and the macrozoobenthos in general (after Dhora et Salvini-Plawen 1997, Beqiraj et Kashta 2007, Beqiraj et al. 2008, Kasemi et al. 2008, Panneta et al. 2009).

About 50 species of decapod crustaceans have been reported from this area (after Vaso et Gjiknuri 1993, Kasemi et al. 2008), of which many species appear on the national red list (see Annex II).

From 46 echinoderm species reported for the Albanian coast, 32 have also been found in Vlora Bay, including Karaburuni Peninsula and Sazani Island (after Gjiknuri 1980). These species include 1 crinoid, 13 asterids, 4 ophiurids, 9 echinids and 5 holothuroids.

A recent study on macrozoobenthos of the shallow rocky coast of Vlora Bay (after Kasemi et al. 2008), in supralittoral, mediolittoral and upper limit of infralittoral, has also included the south-eastern coast of Karaburuni (Orikum). This study reports on about 140 species of benthic macroinvertebrates, including isopods, cirripeds, amphipods, annelids, cnidarians, nematodes, bryozoans and sipunculids (besides mollusks, crustaceans and echinoderms, which are mentioned above).

In the Red Book of Albanian Fauna (Misja 2006), 49 species from 64 species of marine benthic macroinvertebrates originate from Vlora Bay, of which 5 are sponges, 8 cnidarians, 1 annelid, 20 mollusks, 12 decapods and 3 are echinoderms (see Annex II).

Taking into account the Red List of Albanian Fauna 2007 (MMPAU 2007), too, about 160 species (75%) among 220 species of marine fauna involved in this list, have been reported also for Vlora area, including Karaburun – Sazan.

Some important crustaceans like lobster (*Homarus gammarus*), crawfish (*Palinurus elephas*), greater locust lobster (*Scyllarides latus*) and spiny spider crab (*Maja squinado*) live in this area. These species concern Annex III of the Barcelona Convention, as species whose exploitation is regulated.

Ophidiaster ophidianus, a sea star of international concern, is a characteristic echinoderm of precoralligenous biocenosis in this area.

At least 36 marine species, which are of international concern and appear on the lists of endangered and/or protected species of several conventions, are present in Sazani – Karaburuni area (see Annex I). They involve seagrasses, seaweeds, sponges, cnidarians, mollusks, crustaceans, echinoderms, fishes, reptiles, pinnipeds and cetaceans. These data show the importance of the relevant area in a regional and international context.

3.5 MARINE VERTEBRATES OF SPECIAL IMPORTANCE

The presence of the dolphins *Delphinus delphi*s and *Tursiops truncatus* and many other threatened species, protected by international conventions, has also been recorded in the

marine waters of Sazani – Karaburuni. The coastal waters of Karaburuni are also visited by the Mediterranean monk seal (*Monachus monachus*), one of the most threatened species in the world.

In the *Rapid assessment survey of the important habitats of marine turtles and monk seal in the coastal area of Albania (2005)* it was suggested that suitable (potential) monk seal habitats exist along the southern coast of Albania, stretching from Karaburuni and Rreza e Kanalit to the area around Butrint (White et al. 2006). From the fishermen's reports *in verbalis*, 1 – 2 monk seal individuals are seen every 4 – 5 years along the coast of Karaburuni Peninsula.

In another publication (Antolović et al. 2005), 17 caves that seemed to be of some importance as monk seal shelters were located between the small gulf of Grama and the northern tip of Karaburuni.

This area seems to be an important migrating corridor for the loggerhead turtle *Caretta caretta*, from its nesting site in Zakynthos Island in Greece in the Ionian Sea, to the Patoku coast in Albania along the Adriatic Sea, which has been recently identified as an important foraging site for this species (White et al. 2006).

Noteworthy fish species of Karaburuni waters, included in Annex III of the Barcelona Convention, are: dusky grouper (*Epinephellus marginatus*), Atlantic bluefin tuna (*Thunnus thynnus*) and swordfish (*Xiphias gladius*).

3.6 HISTORICAL AND CULTURAL VALUES

Karaburuni area and Vlora Bay are well-known for their historical and cultural values. In the south-eastern part of Karaburuni Peninsula, the ancient town of Orikum is situated, one of the most important Illyrian ports, founded in 4th century BC and mentioned as an important economic and cultural centre in the Mediterranean during the ancient Greek and Roman periods until the Mediaeval period.

Along the western coast of Karaburuni, Grama Bay is the only suitable and safety place for ship anchoring and it was a famous harbour in antiquity. On the rocks of Grama Bay, there are numerous ancient inscriptions in the old Greek and Latin languages. The series of caves have legends associated with them. Grama is considered the richest "rocky diary" in the Mediterranean.

In the underwater habitats of Karaburuni, a considerable number of wrecked ships and many archaeological objects bear witness to this area's relations with other civilizations of the Greek and Roman periods. Divers can also see traces of the two World Wars.

These values make this area of the Albanian coast one of the most potential tourist destinations in historic, cultural and archaeological aspects, besides the high variety of landscape from geomorphologic and environmental aspects. Underwater topography with interesting caves and very diverse microhabitats, as well as the presence of wrecked ships are additional tourist values, especially for divers.

3.7 OTHER IMPORTANT FEATURES

The Sazani Island – Karaburuni Peninsula area has additional values if considering terrestrial habitats in its coastal parts, with a great diversity of vegetation types. Among the most interesting habitats are: broad-leaved evergreen forests (Assoc. Orno –Quercetum ilicis), plant communities dominated by *Quercus coccifera* (Assoc. Orno- Quercetum cocciferae), plant communities dominated by *Euphorbia dendroides* and *Pistacia lentiscus* (Assoc. Pistacxio – Euphorbietum dendroides), the forests dominated by *Quercus ithaburensis* subsp. *macrolepsis* (known as Valona oak). Relict species like *Quercus ithaburensis subsp. macrolepis* and *Laurus nobilis* are found among them, as well as rare and threatened plant species like *Athamanta macedonica, Brassica oleracea subsp. oleracea, Brasica incana, Laurus nobilis, Origanum vulgare, Prunus webbii, Quercus ilex, Limonium anfractum, Lotus cytisoides, Desmazeria marina, Capparis spinosa, Prasium majus*, *Ephedra distachia, Orchis sp. diverse* and *Daphne gnidium.*

Some special and traditional old breeds of sheep graze in Karaburuni, feeding on the rich herb and shrub vegetation. They are famous for the quality of their meat and milk and may be considered the area's another potential for the development of rural and ecological tourism. High diversity of the topographic formations, with steep and inaccessible cliffs, canyons, tracks and plateaus (such as plateau of Ravena) are other potentials for the development of alpinism, horse riding and other sports, besides the various sea sports.

Limited access to Karaburuni and Sazani, mostly due to the lack of roads and steep rocky coast, has in fact protected and conserved their natural habitats. However, there are possibilities for controlled tourist and visitor access in the area, along h trails in the hills and forests and by boat in the small bays and beaches with mooring possibilities, such as the Bay of Raguza and the Bay of Shën Jan on the eastern coast, and the Bay of Bristan, the Bay of Dafina and the Bay of Grama on the western coast of Karaburuni.

Western side of the Sazani – Karaburuni area has been identified as a priority area by many recent environmental policy documents of the Government of Albania. The WWF Mediterranean Program has identified 10 Mediterranean marine and coastal areas that are vital for biodiversity. One of them includes the coasts and islands of the eastern part of the Ionian Sea (Albania and Greece). This is another reason to highlight the importance of the Sazani – Karaburuni area in a regional context.

The Sazani Island – Karaburuni Peninsula area has an important position on the eastern side of the Otranto Channel (Otranto Straight). As it is known, the water mass that flows in and out from this channel has a strong influence on the water regime of the entire Adriatic basin, also affecting the Ionian Sea. These effects are consequently reflected in the situations and state of marine populations, especially related to the species distribution and larvae recruitment in the whole Adriatic basin in general, and in the south Adriatic and north Ionian in particular. This is another feature that makes this area of a special importance at the regional level.

Based on the values commented above and after a long process of consultations with relevant institutions and stakeholders, the Council of Ministers of Albania has proclaimed

the marine and coastal area Sazani Island – Karaburuni Peninsula, an area of 12,570 ha, with the status of National Marine Park, on 28th April 2010 (see Fig. 5). This proclamation has also complemented the status of the whole terrestrial area of Llogora-Orikum-Karaburun-Sazan-Radhimë-Tragjas-Dukat (35,000 ha), situated in the east of the MPA, which has already a protected status as a Managed Nature Reserve and includes the National Park of Llogora.

Proclamation of the first MPA should be considered as a step forward in strengthening and enlargement of the protected areas system in Albania, which is one of the most important objectives of the Work Program and Action Plans of the Ministry of Environment, Forest and Water Administration. Within this framework it is aimed that the protected areas will cover 15% of the territory (currently about 12.5%) as a short term objective, and about 20% of the overall country's surface as a long term objective (year 2015). The bases for the enlargement of the protected area system are the proposals made within the National Biodiversity Strategy and Action Plan (NEA/AKM 1999), refined and improved by considering recent developments and natural processes.

Aiming to join the EU structures, Albania would need to improve its environmental quality, too. Regarding coastal and marine protected areas, the implementation of the Marine Strategy Framework Directive (2008/56/EC) and Water Framework Directive (2000/60/EC) would be important for meeting the international standards and requirements.

Figure 5: Map of the proclaimed MPA Sazani Island – Karaburuni Peninsula (MMPAU 2009)
Slika 5: Zemljevid razglašenega morskega zavarovanega območja (MPA) Otok Sazani – Polotok Karaburuni (MMPAU 2009)

Figure 6: Grama Bay along the Rreza e Kanalit Ridge (photo: Mato 2008)
Slika 6: Zaliv Grama vzdolž grebena Rreza e Kanalit (fotografiji: Mato 2008)

Figure 7: Remains of the ancient town Orikum (photo: Mato 2008)
Slika 7: Ostanki antičnega mesta Orikum (fotografija: Mato 2008)

4. SUMMARY

The first MPA in Albania was proclaimed on 28th April 2010. Embracing the coastal and marine area of Sazani Island – Karaburuni Peninsula with the National Marine Park status, it covers 12,570 ha,. This paper presents a synthetic description of natural and biodiversity values of this area, with additional information on archaeological, historical and socio-economic values.

The relevant area is characterized by high diversity of landscapes, with steep and inaccessible cliffs, fissures, caves, capes, small beaches and bays (Bays of Bristan, Dafina, Grama, etc.).

At the mediolittoral stage, biocenosis dominated by *Lithophyllum byssoides* is present on both Sazani Island and Karaburuni Peninsula. It has created small cushions and rims, known as "trottoirs". Another biocenosis in the mediolittoral is that of mediolittoral caves, which corresponds to crevices or cave entrances that are partially out of the water.

The most important biocenosis in the infralittoral stage is that of *Posidonia oceanica* meadows. On the western coast, *Posidonia oceanica* grows generally on rocky substrates and rarely on sandy seabeds, in front of small beaches.

On the hard beds and rocks of the infralittoral, perennial brown algae are dominant over extensive parts of shallow hard substrata on the western side of Karaburuni and Sazani. The most important group is that of the brown algae Cystoseira, represented by 5 species (*Cystoseira amentacea var. spicata, C. barbata, C. compressa, C. crinita and C. spinosa*). Other important associations are those of *Dictyopteris polypodioides, Corallina elongata* and *Cladocora caespitosa*.

Another important biocenosis is that of semi-obscure caves, where the red coral *Corallium rubrum* and several species of sponges live.

Coralligenous biocenosis is present in the circalittoral zone, on hard substrata, with calcareous red seaweeds, gorgonians and bryozoans. This biocenosis is well developed on the western side of Sazani Island and Karaburuni Peninsula.

In the presence of the loggerhead turtle *Caretta caretta*, the common dolphin *Delphinus delphi*s, the bottlenose dolphin *Tursiops truncatus* and the Mediterranean monk seal (*Monachus monachus*) have also been recorded in marine waters of this area. These are among the most threatened species on a global scale, protected by several international conventions (Barcelona, Bonn, CITES, Bern). This area seems to be an important migrating corridor for the loggerhead turtle *Caretta caretta*, from its nesting site on the Greek island of Zakynthos in the Ionian Sea to the Patoku coast in Albania in the Adritaic Sea, which has been recently identified as an important foraging site for this species.

At least 36 marine species, which are of international concern and belong to the lists of endangered and/or protected species of several conventions are present in the Sazani – Karaburuni area. They include seagrasses, seaweeds, sponges, cnidarians, mollusks, crustaceans, echinoderms, fishes, reptiles, pinnipeds and cetaceans. These data show the importance of the relevant area at the regional and international levels.

On a national scale, about 75% of endangered species of marine animals, mostly benthic macroinvertebrates, which are listed in the Red Book of Albanian Fauna (2006) and in the Red List of Albanian Fauna (2007), have been recorded in the Sazani – Karaburuni area.

This area has an important position on the eastern side of the Otranto Channel. The water mass that flows in and out from this channel has a strong influence on the water regime of the whole Adriatic basin, also affecting the Ionian Sea. These effects are consequently reflected in the situations and state of marine populations, especially related to the species distribution and larvae recruitment in the entire Adriatic basin in general and in the south Adriatic and north Ionian in particular. This is another feature that makes this area of a special importance at the regional level.

This area owns precious archaeological, historical and cultural values, too. Along the south-western coast of Karaburuni the bay of Grama is situated, a famous harbour built in antiquity. On the rocks of Grama Bay, numerous ancient inscriptions in the old Greek and Latin languages can be found, that have made this bay the richest "rocky diary" in the Mediterranean. In the south-eastern part of Karaburuni Peninsula, the ancient town of Orikum is situated, one of the most important Illyrian ports, founded in the 4th century BC and mentioned as an important economic and cultural centre in the Mediterranean during the ancient Greek and Roman periods until the Middle Ages. In the underwater habitats of Karaburuni, a considerable

number of wrecked ships and many archaeological objects bear witness to the relations of this area with other civilizations during the Greek and Roman periods. Divers can also see traces of the two World Wars.

The eastern part of the Ionian Sea, also including Albania, has been identified by the WWF Mediterranean Program as one of the ten Mediterranean marine and coastal areas that are vital for biodiversity. This is another reason to highlight the importance of the Sazani – Karaburuni area at the regional level.

Proclamation of the first MPA in Albania is a step forward in implementing the national environmental policies regarding strengthening and enlargement of the network of protected areas and in fulfilling the environmental policy criteria and standards for the country's accession in EU structures.

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ANNEX 1: Marine species of international concern in the Karaburun – Sazani area, listed in the most important Conventions

PRILOGA 1: Mednarodno pomembne morske vrste območja Karaburun – Sazani, ki so navedene v najpomembnejših konvencijah

Species name	Barcelona protocol (1996)		Bon (2006)		CITES (2006)	Bern (1993)
	Ann. II	Ann. III	App. 1	App. 2		
Magnoliophyta						
Posidonia oceanica	+					+
Cymodocea nodosa						+
Phaeophyta						
Cystoseira amentacea var. spicata	+					+
Rhodophyta						
Lithophyllum byssoides	+					
Lithophyllum trochanter	+					
Spongia						
Geodia cydonium	+					
Hippospongia communis		+				+
Spongia officinalis		+				+
Petrobiona massiliana						+
Cnidaria						
Corallium rubrum		+				+
Mollusca						
Ranella olearia	+					+
Tonna galea	+					+
Charonia tritonis	+					+
Zonaria pyrum	+					+
Pholas dactylus	+					+
Pinna nobilis	+					
Lithophaga lithophaga	+				+	+
Crustacea						
Homarus gammarus		+				+
Maja squinado		+				+
Scyllarides latus		+				+
Scyllarus arctus		+				+
Palinurus elephas		+				+

Echinodermata						
Paracentrotus lividus		+				+
Ophidiaster ophidianus	+					+
Centrostephanus longispinus	+					+
Pisces						
Anguilla anguilla		+				
Umbrina cirrhosa		+				+
Thunnus thynnus		+				
Sciaena umbra		+				+
Hippocampus guttulatus					+	
Epinephellus marginatus		+				+
Xiphias gladius		+				
Reptilia						
Caretta caretta	+		+	+		+
Pinnipedia						
Monachus monachus	+		+	+	+	+
Cetacea						
Tursiops truncatus	+			+	+	+
Delphinus delphis	+		+	+		+

ANNEX 2: Marine species of national concern in Karaburun – Sazani area (after Albanian Red Book 2006)

PRILOGA 2: Nacionalno pomembne morske vrste na območju Karaburun – Sazani (iz Rdeče knjige Albanije 2006)

Seagrasses
Posidonia oceanica
Cymodocea nodosa

Seaweeds (algae)
Cystoseira amentacea var. spicata
Lithophyllum byssoides
Lithophyllum trochanter
Tenarea tortuosa
Bornetia secundiflora
Catenella caespitosa
Digenea simplex
Polyphysa parvula

Sponges
Geodia cydonium
Spongia officinalis
Hippospongia communis
Raspailia viminalis
Petrobiona massiliana

Cnidarians
Aurelia aurita
Chrysaora hysoscella
Actinia cari
Bunodactis verrucosa
Cladocora cespitosa
Corallium rubrum
Eunicella singularis
Eunicella cavolinii

Annelids
Sabella spallanzani

Gastropods
Patella caerulea
Monodonta turbinata
Diodora graeca
Haliotis lamellosa
Aporrhais pespelecani
Ranella olearia
Charonia tritonis variegata
Zonaria pyrum
Tonna galea

Bivalvia
Mytilus galloprovincialis
Lithophaga lithophaga
Pinna nobilis
Pteria hirundo
Glossus humanus
Ostrea edulis
Pecten jacobaeus
Solen marginatus
Chamelea gallina
Tapes decussatus
Venus verrucosa

Crustaceans
Alpheus dentipes
Callianassa tyrrhena
Crangon crangon
Dardanus arrosor
Eriphia verrucosa
Galathea intermedia
Maja squinado
Paguristes oculatus
Palaemon serratus
Palinurus elephas
Penaeus kerathurus
Scyllarus arctus

Echinoderms
Paracentrotus lividus
Ophidiaster ophidianus
Centrostephanus longispinus

Fishes
Hippocampus guttulatus
Mola mola

Reptiles
Caretta caretta

Pinnipedia
Monachus monachus

Cetaceans
Delphinus delphis
Tursiops truncatus

***Note:** The Red List of Albanian Fauna 2007 includes about 220 species of marine fauna. About 75% of them have been reported also for the Vlora area, including Karaburun – Sazan.*

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MARINE PROTECTED AREAS IN SLOVENIA: HOW FAR ARE WE FROM THE 2012/2020 TARGET?

MORSKA ZAVAROVANA OBMOČJA V SLOVENIJI: KAKO DALEČ SMO OD CILJA, NAČRTOVANEGA ZA 2012/2020?

Barbara VIDMAR, Robert TURK

Key words: marine protected areas, network, 2012 target, Slovenia, coastal area, representativeness, management

Ključne besede: morska zavarovana območja, omrežje, cilj 2012, Slovenija, obalno območje, reprezentativnost, upravljanje

ABSTRACT

Slovenia, together with some 190 countries that have signed the Convention on Biological Diversity (CBD), has committed itself to a very specific target that reads: "*By 2012, a global network of comprehensive, representative and effectively managed national and regional protected area system is to be established in the marine area*". At the 10th COP of the CBD, it was very clearly stated that at the global level this very ambitious target could not be met, and the target was somehow shifted to the year 2020. What about our local, Slovenian level - are we on the right path, are we meeting the target? In their paper, its authors present the state of art of Slovenian marine protected areas (MPAs) in terms of the representativeness and management efficiency and discuss the possible activities and measures needed to reach the 2012/2020 target at the national level.

POVZETEK

Slovenija se je skupaj s 190 državami podpisnicami Konvencije o biotski raznovrstnosti (KBR) zavezala, da bo izpolnila nadvse specifičen cilj, ki se glasi: "*Do leta 2012 mora biti v morskih območjih osnovano globalno omrežje obsežnega, reprezentativnega in učinkovito upravljanega sistema nacionalnih in regionalnih zavarovanih območij.*".
Toda na 10. konferenci držav podpisnic KBR je bilo zelo jasno poudarjeno, da na globalni ravni ta zelo ambiciozni cilj ne bo dosežen, in tako je bil nekako pomaknjen v leto 2020. Kaj pa mi, Slovenci? Ali smo na pravi poti, ali bomo dosegli zastavljeni cilj? V pričujočem članku avtorja predstavljata stanje slovenskih morskih zavarovanih območij (MPA-jev) glede na njihovo reprezentativnost in učinkovitost upravljanja ter razpravljata o morebitnih dejavnostih in ukrepih, potrebnih, da se uresničiti cilj za leto 2012 (2020) na državni ravni.

1. INTRODUCTION

As a result of the under representation of marine ecosystems in the global network of protected areas, the Parties to the CBD adopted the 2012/20 target for MPAs that invites countries to achieve, by 2012/2020, a global network of comprehensive, representative and

effectively managed national and regional protected area system. In this context, during their 14th ordinary meeting held in November 2005 in Portorož, Slovenia, the Contracting Parties to the Barcelona Convention invited the Regional Activity Centre for Specially Protected Areas (RAC/SPA) to elaborate a programme of work aimed at supporting the Mediterranean countries to achieve the CBD's 2012/2020 target by establishing a representative network of MPAs in the Mediterranean Sea. The Contracting Parties to the Barcelona Convention adopted the Regional Working Programme for the Coastal and Marine Protected Areas in the Mediterranean Sea including the High Seas (referred hereafter as Programme of Work) during their 16th regular meeting in Marrakech in November 2009.

The Working Programme recommends the adoption of a three-step hierarchical planning approach, which begins at the large scale and focuses in on ever-smaller scales. At the widest scale, that is the Mediterranean Basin, the baseline for designing an ecological network would be the identification of large-scale ecological units. The second step would be the identification of priority conservation areas within the ecological units. Priority conservation areas would represent the focal areas for the third and last step – the identification of individual MPAs, forming an ecological network within the priority conservation area. Individual MPAs should protect what is ecologically most important –focusing on habitats where a concentration of ecological processes results in a high diversity of species.

The Slovenian story as far as MPAs are concerned started more than two decades ago, that is long before the above-mentioned Working Programme was adopted. However, the main idea was very much the same – conservation of specific (representative) habitats and habitat types of the Slovenian coastal area and contribution to the integrity of the marine and coastal ecosystem. The legal basis for the whole process lay in the former Law on Natural and Cultural Heritage, adopted in 1981 and replaced by the Nature Conservation Act in 1999.

2. MARINE AND COASTAL PROTECTED AREAS IN SLOVENIA – STATE OF THE ART

2.1 FROM NATURAL HERITAGE PROTECTION TO NATURE CONSERVATION

According to the provisions of the former Law on natural and cultural heritage, an exhaustive inventory of natural heritage sites along the Slovenian coastline was drafted in the mid eighties by Križan &t Svetličič (1985). Most of the sites were included in the decrees, adopted some years later (in 1990 and 1991), by the municipalities of Piran, Izola and Koper. Following that, the Škocjan Inlet was proclaimed a Nature Reserve directly by state law in 1998. Following the provisions of the new Nature Conservation Act (NCA), adopted in 1999, the two decrees adopted by the Municipalities of Piran and Izola on the Landscape parks Sečovlje Salina and Strunjan, were replaced by governmental decrees. Beside more suitable conservation measures, the new decrees included provisions concerning management of the two protected areas.

The Nature Conservation Act defined a new perspective concerning nature conservation in Slovenia, which from 1999 includes the protection of valuable natural features, former

natural heritage sites (governmental decree “Uredba o določitvi in varstvu naravnih vrednot, Off. Bull. 111/04, 70/06, 58/09 in 93/10) as well as the conservation of biodiversity through the protection of endangered animal and plant species (governmental decrees “Uredba o zavarovanih prostoživečih rastlinskih vrstah and Uredba o zavarovanih prostoživečih živalskih vrstah, Off. Bull.46/2004) through ecologically important areas (governmental decree “Uredba o ekološko pomembnih območjih”, Off. Bull. 48/04) and following the Habitat Directive, especially through Natura 2000 sites (governmental decree” Uredba o posebnih varstvenih območjih, območjih Natura 2000, Off. Bull. 49/04, 110/04, 59/07 in 43/08).

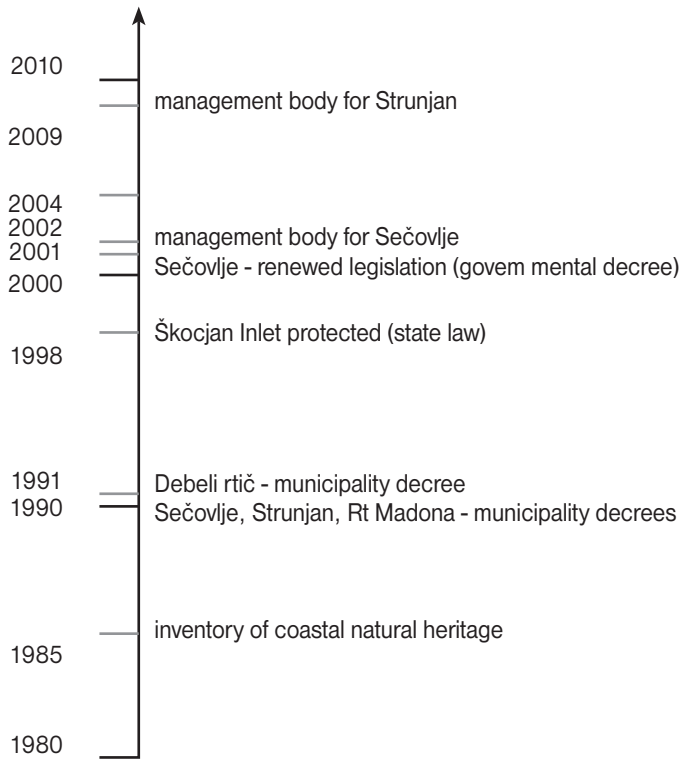

Figure 1: Slovenian coastal and marine PA’s milestones
Slika 1: Slovenski mejniki za obalna in morska zavarovana območja

2.2 AREAS AND SITES OF CONSERVATION INTEREST ALONG THE SLOVENIAN COAST

With the term Areas of Conservation Interest we are encompassing not only marine and coastal protected areas but also other areas and sites, which according to the Nature Conservation Act are important in terms of protection of valuable natural features, or in terms of biodiversity conservation or both. They can thus be single valuable natural features, habitats of endangered species, ecologically important areas, Natura 2000 sites, or protected areas. They all benefit from a certain degree of legal protection and general conservation measures.

It is, however, only in the case of protected areas that concrete conservation measures are included in the legal act, with which the single protected area is established.

The Slovenian coastal area is, in spite of its shortness, very rich in terms of biological and landscape diversity. Its natural characteristics comprise a great diversity of habitat types, animal and plant species and ecosystems scattered between the rocky shore and its flysch cliffs, the alluvial plains with wetlands, coastal lagoons and salt-pans and the shallow waters of the Slovenian sea.

2.2.1 Valuable natural features

In the Nature Conservation Act, valuable natural features (assets) are defined as rare, valuable or well-known natural phenomena, or any other valuable phenomena, components or parts of the living or non-living nature, nature area or part thereof, an ecosystem, natural or cultural landscape. In particular, they can be geological phenomena, minerals and fossils or mineral and fossil sites, surface and subsurface karst features, caves, gorges and other geomorphological phenomena, glaciers and glacial forms, springs, waterfalls, rapids, lakes, bogs, brooks and rivers, river banks, sea-shore, plant and animal species and exceptional specimens and habitats thereof, ecosystems, etc.

Most of the valuable natural features in the narrow coastal strip are on one hand linked to geomorphology and the great diversity of geomorphological phenomena of the flysch cliffs and, on the other hand, on endangered habitat types and habitats of endangered species. Both parks – Sečovlje and Strunjan (Fig. 2) – are among the areas where the density of valuable natural features is the greatest.

Figure 2: Valuable natural features inside Strunjan Natural Reserve
Slika 2: Dragocena naravna dediščina v Naravnem rezervatu Strunjan

2.2.2 Ecologically Important Areas and Natura 2000 sites

According to the Nature Conservation Act, Ecologically Important Areas are defined as areas of a habitat type, its part or large ecosystem units, which significantly contribute to biodiversity conservation. They represent the key areas in terms of biodiversity at the national level. The great diversity of coastal area is reflected in a number of Ecologically Important Areas: Zaliv Sv. Jerneja, Debeli rtič, Debeli rtič-Valdoltra, Sv. Nikolaj, Škocjanski zatok, Žusterna, Žusterna – Izola, Strunjanski klif, Strunjanske soline s Stjužo, Pacug – Fiesa, Strunjan – Pacug, Piranski klif, Rt Madona and Sečoveljske soline s Sečo and, last but not least, the Slovenian sea. They encompass habitats of endangered animal and plant species – birds in Škocjanski zatok or Sečoveljske soline or *Linum maritimum* in Sv. Nikolaj and endangered habitat types, as it is the case of the *Posidonia oceanic* meadow at Žusterna.

As it could be expected, most of the Ecologically Important Areas, mentioned above, turned out to be important not only at the national level but also for the conservation of European biodiversity. According to the Birds and Habitat Directives, almost all of them, the only exception being Zaliv sv. Jerneja, were declared in 2004 Special Areas of Conservation (SAC) or/and Specially Protected Areas (SPA). They encompass a wide range of marine and coastal habitat types and species (see Table 1); the list, however, is not complete yet. Data are being gathered in order to define in the near future SAC for two important marine species – the Bottlenose Dolphin and the Loggerhead Turtle.

2.2.3 Marine and coastal protected areas

To all the areas and sites, listed as Valuable Natural Features, Ecologically Important Areas or Natura 2000 sites, a certain degree of general protection and even management in the case of Natura 2000 sites should be granted in the process of physical planning, through environmental impact assessments, building permits, etc. However, when concrete issues are discussed numerous gaps occur in the general picture that prevent efficient protection. The advantage of protected areas lies in the fact that they have their own legal acts, which define conservation measures, management, monitoring and surveillance and thus leave less space to inconsistency and misinterpretation.

There are five coastal and marine protected areas along the Slovenian coast. Two nature parks - Sečovlje Salina Nature Park [1] and Strunjan Nature Park, which embrace two nature reserves - Stjuža and Strunjan[2], two natural monuments - Debeli rtič[3] and Rt Madona[4] and, last but not least, the Škocjan Inlet Natural Reserve[5].

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[1] Piran Municipality decree in 1990, replaced by a governmental decree "Uredba o krajinskem parku Sečoveljske soline" in 2001

[2] Piran and Izola Municipalities decrees in 1990, replaced by a governmental decree "Uredba o krajinskem parku Strunjan" in 2004

[3] Koper municipality decree "Odlok o razglasitvi naravnega spomenika Debeli rtič" from 1991

[4] Piran Municipality decree "Odlok o razglasitvi posameznih naravnih spomenikov in spomenikov oblikovane narave v občini Piran" from 1990

[5] governmental law "Zakon o naravnem rezervatu Škocjanski zatok" from 1998

2.2.4 Habitat types

Cliffs and mudflats[6] are the most representative habitat types along the Slovenian coastline and have been appropriately included in the marine and coastal protected areas listed above. Within the Strunjan Nature Park and the Natural Monument Debeli rtič, we found the most representative cliffs on Slovenian coast. The only two lagoons (Stjuža – marine and Škocjan Inlet - brackish) are also within protected areas – Strunjan Nature Park and Škocjan Inlet Nature Reserve. The situation in terms of sandbanks, Spartina swards, Mediterranean salt meadows, posidonia beds and reefs is less satisfying. So far, no protected areas have been established for the conservation of these rare and endangered habitat types. Some proposals were tabled concerning the sandbank on the promontory Debeli rtič and the Spartina sward in the area of Sv. Jernej. Proposals for the establishment of protected areas should be elaborated at least for the Mediterranean salt meadow of Sv. Nikolaj and the posidonia meadow at Žusterna and conservation measures proposed for the reef between Fiesa and Strunjan, the large sandbank Brajde outside Piran. The current situation concerning habitat types is presented in Table 1.

Table 1: List of representative marine and coastal habitat types in Slovenia
Tabela 1: Seznam reprezentativnih morskih in obalnih habitatnih tipov v Sloveniji

Name and FFH code	Legal protection (112/2003)	Presence in pSACs	Presence in MPAs?	Conservation status
Vegetated sea cliffs of the Mediterranean coasts with endemic *Limonium ssp.* 1240	YES	YES	YES(Debeli rtič, Strunjan) NO (Valdoltra, Fiesa; Piran.....)	☺
Sandbanks which are slightly and permanently covered by seawater 1110	NO	Proposed	YES (Debeli rtič) / NO (Brajde)	☹
Sea grass meadows with *Cimodocea* not ffh	YES	-	YES	☺
Sea grass meadows with *Zoostera marina*	NO	YES (not sufficient)	NO	☹
Sea grass meadows with *Zoostera noltii*	NO	YES (not sufficient)	YES (NR Strunjan)	☹
Algal beds (*Cystoseira*) not ffh	YES	-	YES	☺
Spartina swards (*Spartinion maritimae*) 1320	YES	YES and NO	YES(Sečovlje Saltpans) NO (Sv. Jernej bay)	☹
Mediterranean salt meadows (*Juncetalia maritimi)* 1410	YES	YES	YES and NO (St. Nikolaj)	☹
Mudflats and sandflats not covered by seawater at low tide1140	YES	YES	YES (majority)	☺
Salicornia and other annuals colonizing mud and sand 1310	YES	YES	YES	☺
Annual vegetation on drift lines 1210	NO	YES	YES	☺

6 Natura 2000 codes: 1240, 1140, 1310 and 1210

Name and FFH code	Legal protection (112/2003)	Presence in MPAs?	Presence in MPAs?	Conservation status
Posidonia beds (*Posidonion oceanicae)** 1120	YES	YES	NO	☹
Reefs 1170	NO	NO	NO	☹☹
Coastal lagoons*1150	YES	YES	YES 100%	☺☺

2.2.5 Species

The protection of species is often one of the main goals of protected areas. Some of the rare and endangered species present in the Slovenian coastal area are shown in Table 2, together with their presence within single coastal and marine protected areas. The situation looks fairly good; however, when we focus on marine areas, it is clear that due to their limited size they alone cannot guarantee good conservation status of the listed species in the long term. Besides, we can see that there are no protected areas, designated for the protection of some important species. The only meadow of *Posidonia oceanica* is not legally protected and there are no areas and/or conservation measures concerning the Loggerhead Turtle, the Bottlenose Dolphin or the two bird species listed in Table 2, the European Shag and the Mediterranean Shearwater. While it would be fairly easy to establish a protected area for the posidonia meadow, it is much more difficult to do the same for the four highly mobile species – in terms of gathering exact data and determine the area as well as in terms of defining proper conservation measures.

Table 2: List of rare and endangered coastal and marine species in Slovenia
Tabela 2: Seznam redkih in ogroženih obalnih in morskih vrst v Sloveniji

Name	Protected by decree 46/04	Bern convention	Barcelona convention	Present in M&CPA	Satisfactory state
Pholas dactylus	YES	Appendix II	Annex II	YES	☺
Pinna nobilis	YES		Annex II	YES	☺
Lithophaga lithophaga	YES	Appendix II	Annex II	YES	☺
Zostera marina	NO	Appendix I	Annex II	NO	☹
Zostera noltii	NO		Annex II	YES	☹
Cymodocea nodosa	NO	Appendix I	Annex II	YES	☺
Posidonia oceanica	YES	Appendix I	Annex II	NO	☹
Caretta caretta	YES	Appendix II	Annex II	NO	☹
Tursiops truncatus	YES	Appendix II	Annex II	NO	☹
Phalacrocorax aristotelis desmarestii	YES	Appendix II	Annex II	NO	☹
Puffinus yelkouan	YES	Appendix II	Annex II	NO	☹

3. MARINE AND COASTAL PROTECTED AREAS IN SLOVENIA - COMPREHENSIVE, REPRESENTATIVE AND EFFECTIVELY MANAGED?

3.1 COMPREHENSIVE AND REPRESENTATIVE?

Having in mind the 2012/2020 goal, that is a global network of comprehensive, representative and effectively managed national and regional protected area system, and considering the state of art of the areas and sites of conservation interest along the Slovenian coast, one could argue that Slovenia is well on the way to achieve its goal. The vast majority of rare and endangered habitat types and species of the coastal area are present in areas and sites that bear different nature conservation statuses – valuable natural features, ecologically important areas, Natura 2000 sites, protected areas. This is especially true for habitat types and species of the coastal wetlands, estuaries and cliffs. We could say that the list of areas is comprehensive ("*so large in scope or content as to include much*") and that most of the typical but also rare and endangered habitat types and species are represented in these areas. However, if we focus only on protected areas, i.e. areas with concrete conservation measures clearly defined in the legal acts on the establishment of a single protected area, we find that the situation is less satisfying. The list of coastal protected areas is neither comprehensive nor representative since it does not include some of the key areas in terms of the conservation of the Slovenian coastal biodiversity, specifically Zaliv sv. Jerneja with its Spartina swards or the Mediterranean salt meadow of sv. Nikolaj.

The situation is even less satisfying when we look at the marine environment. It is true that the entire Slovenian sea is defined as an ecologically important area; however, according to the current legislation, human pressures and activities in ecologically important areas are not supposed to be assessed in terms of nature conservation. Besides, there are only three protected areas with a marine component, and two of them are of very limited size. Consequently, there are almost no conservation measures that could be applied to the majority of sea grass meadows (including posidonia and eelgrass), algal beds with *Cystoseira* species and reefs with stony coral or to the open waters habitat types and species like the Bottlenose Dolphin or the Loggerhead Turtle. So in spite of the fact that Slovenian marine protected areas represent approximately 10% of the total length of the coastline, it can be easily seen that there is in fact no national comprehensive and representative system or network and that important habitat types and species have been left aside.

3.2 EFFECTIVELY MANAGED?

Most of the marine and coastal protected areas along the Slovenian coast were established in the early 90's, and according to the provisions of the former Law on Natural and Cultural Heritage no management was foreseen. So the two nature parks - Sečovlje and Strunjan as well as the two natural monuments – Debeli rtič and Rt Madona, were not managed suitably or, to be more precise, were not managed at all. The only exception at that time was the Škocjan Inlet Nature Reserve, for which the legal act on the establishment of the protected area included also provisions on its management.

Based on the general mandate of the Institute of the Republic of Slovenia for Nature Conservation, and before that of the Regional Institute for Natural and Cultural Heritage Protection, some management activities were carried out. Beside the regular activities for raising public awareness, buoys that mark the outer limit of the protected areas were put in place, explicative panels and leaflets were produced and some studies on species and habitat types carried out. Due to the scarce financial and personnel resources, the activities were carried out sporadically, depending more on available resources and less on systematically planned activities or management plans.

In the last decade, however, the situation concerning management improved radically in the two nature parks. The Sečovlje saltpans have been managed by a salt-producing company since 2003. Their activities are focused on the reconstruction of the saltpans' infrastructure and on water management in terms of salt production and habitat types and species conservation, on education and awareness raising activities, on monitoring the visitors' impact, monitoring of bird species, on the threats of possible future development of the area, and on a sustainable long-term strategy of the protected area. A public Institute with the sole purpose to manage the Strunjan Nature Park was established in 2008 and became operative in 2009. The managing team is currently working on the management plan, dealing with the usual problems concerning surveillance, monitoring etc. and seeking financial and personnel resources through project proposals. As stated above, the Škocjan Inlet Nature Reserve has been managed already since 1999, and despite many problems associated with the fact that it is located in an intensively urbanized area, with the city of Koper, the port, shopping, trade and business centers and the railway and highway at its borders, the protected area is well managed and is successfully achieving its goals in terms of nature conservation and public awareness raising. Indeed, in the near future the legal act on the establishment is supposed to be upgraded, the protected area slightly enlarged and a visitor center built.

The situation concerning management is completely opposite and unsatisfying on the seaward side of the coast, in the protected areas of Debeli rtič and Rt Madona, but also in the areas that should be but are not protected areas as yet - the posidonia meadow in Žusterna, the Mediterranean salt meadow at sv. Nikolaj, as well as the reefs between Fiesa and Strunjan. There are no concrete management activities and consequently very scarce possibilities to assure the achievement of the goals of the protected areas and a good conservation status for the habitat types and species therein in the long-term.

The protected area "Natural Monument Debeli rtič" was established in 1991, primarily for its exceptional natural features in terms of geology and geomorphology, and not for biodiversity conservation. The area of St. Jernej bay on the northern side of Debeli rtič that contains rare and endangered habitat types, such as Spartina swards and mudflats, would have to be included in a new, enlarged protected area, together with the cliff and coastal sea in the SE direction towards Ankaran. The same goes for the sandbank, covered by sea water, in front of the promontory, which has already been proposed as pSCI. The legal act establishing the protected area should be renewed and upgraded with provisions on extension, on species and habitat types conservation as well as with provisions regarding its management.

4. CONCLUSIONS

Going back to the question in the title of the present paper and the 2012/2020 target of a network of representative and efficiently managed marine protected areas, we can conclude that the goal of a network of comprehensive, representative and effectively managed national marine protected area system in the Slovenian sea is still out of reach. In spite of the fact that an important part of the typical marine and coastal habitat types are included in the existing protected areas, there are important elements of marine and coastal biodiversity that are still without protection and thus without suitable conservation measures. The percentage of the Slovenian sea covered by protected areas speaks for itself – 0.4%. Unfortunately it is in line with the numbers related to the Gulf of Trieste and to the Northern Adriatic, as well as to the whole Adriatic – whatever the area, the percentage does not exceed 0.5% (Turk et Odorico 2009).

According to the existing knowledge on the state of marine and coastal species and habitat types in the Slovenian sea, protection or suitable conservation measures should be granted at least for the following areas: the broader area of Debeli rtič, the salt meadows of sv. Nikolaj, the posidonia meadow in Žusterna, the stony coral reefs in front of Cape Ronek in Strunjan and the reef between Fiesa and Strunjan, the dead matte of posidonia outside the Bay of Piran. The last could be included in a broader area of open waters outside Piran, Strunjan and Izola, devoted to the conservation of the Bottlenose Dolphin and the Loggerhead Turtle and possibly to the endangered chondrichthyan species.

The second set of the activities, needed in the pursuit of the 2012/2020 target at the Slovenian national level, would have to tackle the management of the existing (and future) protected areas. The current situation could be defined as satisfactory as far as it concerns the terrestrial parts of the coastal protected areas, while it is completely unsatisfactory in the marine areas. There is no management at all in the two natural monuments of Debeli rtič and Rt Madona, while the management activities in Strunjan Nature Reserve are still at their very beginning. Due to the fact that the absence of management of the existing protected areas is coupled with the "development orientated" governance of the coastal area, there is a strong possibility of a further loss of marine coastal biodiversity. A major effort would be needed in the near future in order to define appropriate administrative, financial and technical solutions for the management of marine protected areas.

Beside the need for new, properly managed marine protected areas that would, together with the existing ones, encompass the great majority of the typical marine and coastal habitat types as well as habitats of rare and endangered species, there is a third field of activities or strategies that are equally crucial for the achievement of the 2012/2020 goal. The reduction of negative impacts of human activities, including the reclamation of degraded parts of the coastline, the sustainable use of resources and the integrated coastal zone management are not necessarily directly linked to the protected areas, but they do, however, play an important role in halting marine biodiversity loss. They will have to be tackled in parallel at two levels, through sectorial long-term strategies and through physical planning or, better, through the newly developed maritime spatial planning process.

5. SUMMARY

The first coastal and marine protected areas in Slovenia, two nature parks - *Sečovlje salina* and *Strunjan*, and two natural monuments - *Rt Madona* and *Debeli rtič*, were established in 1990 and 1991, respetively, by the three coastal municipalities. All these areas were designated on the basis of a systematic inventory of the natural heritage in the Slovenian coastal area, carried out in the 1980s (Križan & Svetličič 1985). According to the natural heritage conservation concept, endorsed by the former Law on Natural and Cultural Heritage, which focused mainly on outstanding natural features, the study focused greatly on geomorphology, considering primarily the coastline and the underwater geological and geomorfological features, as well as on the known habitats of rare and endangered species and habitat types.

In spite of several gaps in terms of available data and the "natural heritage" approach, an important part of coastal and marine habitat types was included in the established protected areas. There was, however, an important deficiency (and it still is) in terms of some specific coastal and marine habitat types, especially reefs and sandbanks, as well as in terms of the the open sea that hosts both, specific habitat types and endangered species like the Bottlenose Dolphin and the Loggerhead Turtle. The network of comprehensive, representative and effectively managed national marine protected area system in the Slovenian sea is thus still out of reach. A number of activities would still have to be implemented, both in terms of identification and establishment of new protected areas as well as in terms of a more efficient management of the existing ones.

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POSTERS

POSTERJI

THE COAST OF S. BARTOLO SCI (MARCHES, ITALY) AS A SITE IN THE ADRIATIC AREAS NETWORK OF CONSERVATION INTEREST

OBALA SAN BARTOLA (MARCHES, ITALIJA) KOT ENA IZMED LOKALITET V MREŽI NARAVOVARSTVENO POMEMBNIH JADRANSKIH OBMOČIJ

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ABSTRACT

Monte San Bartolo Park (Pesaro, Italy) is located along the coast of Marches and includes the only rocky cliff along the whole northern Adriatic coastline. The Park was created in 1997 to protect a terrestrial area of great naturalistic importance, since it lies along a main bird migratory route, includes wintering habitats of many bird species, hosts rare plant species and constitutes an almost complete section of the Messinian stage in Italy. The coastal strip is still poorly known, even if it is characterized by important hot-spots of zoobenthic biodiversity and a great heterogeneity of habitats: soft and hard, natural and artificial substrates, and few seagrass meadows. However, human activities, outputs from local rivers and Po river plume, seasonal or special euthrophication events as well as recent climate change greatly affect this marine system, the structure and functions of which may be altered over time with consequent deterioration and loss of ecosystem services. For all these reasons, a monitoring project through an integrated approach has been started in the San Bartolo marine area, which is not a subject to conservation plans as yet. The double aim of the project is to improve the knowledge of the local marine biodiversity and to analyze the complex response of the biological marine communities to external factors, mainly human activities and global warming. Regular checks of the littoral system and biological assemblages are needed to acquire scientific knowledge suitable for planning effective conservation strategies. The distinctive features of this site strongly support the proposal of including it in a possible network of Adriatic areas worthy of conservation actions, and useful for checking the climate change effects over time.

IZVLEČEK

Park San Bartolo (Pesaro, Italija) leži vzdolž obrežja Marches in vključuje edini klif ob celotni severni jadranski obali. Ustanovili so ga leta 1997, da bi zaščitili tamkajšnjo kopensko območje izjemnega naravoslovnega pomena, saj leži vzdolž ene izmed glavnih ptičjih selitvenih poti, a je hkrati tudi dom redkih rastlinskih vrst in skoraj popoln odsek mesinske stopnje v Italiji. Ta obalni pas je še vedno slabo poznan, pa čeprav obsega pomembne "vroče točke" zoobentoške biotske pestrosti in velike raznovrstnosti habitatov: mehke in trde naravne in umetne substrate in nekaj travnikov morske trave. Vendar pa človekove dejavnosti, odplake lokalnih rek in reke Pad, sezonska ali izredna evtrofikacija in nedavne podnebne spremembe v veliki meri vplivajo na ta morski sistem, katerega struktura in funkcije se lahko sčasoma močno spremenijo zaradi slabšanja in izgube ekosistemskih storitev. Prav to so razlogi, da se je v morskem območju San Bartola, ki še ni predmet naravovarstvenih načrtov, že začel uresničevati projekt spremljanja stanja. Dvojni namen projekta je izboljšati znanje na področju morske biodiverzitete in analizirati zapletene odzive morskih združb na zunanje dejavnike, predvsem človekove dejavnosti in globalno segrevanje. Da bi pridobili ustrezno strokovno znanje, ki je nujno za načrtovanje učinkovitih

naravovarstvenih strategij, so potrebna redna preverjanja obrežnega sistema in bioloških asociacij v območju. Izjemne značilnosti te lokacije bi morale biti deležne močne podpore pri predlogu, da se vključi v mrežo jadranskih območij, vrednih naravovarstvenih akcij in koristnih pri preverjanju učinkov podnebnih sprememb skozi daljše obdobje.

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THE MARINE PROTECTED AREA OF TORRE DEL CERRANO, ABRUZZO-ITALY

MORSKO ZAVAROVANO OBMOČJE TORRE DEL CERRANO, ABRUCI, ITALIJA

Benigno D'ORAZIO

ABSTRACT

The MPA "Torre Cerrano" was founded by decree issued on October 21st 2009 by the Department of Environment and Protection of Natural Territories and published in the Italian Official Journal No. 80 on April 7th 2010.
It extends 3 nautical miles into the sea from the coast and spreads 7 km along the coastline. The Marine Protected Area is composed of sand dunes following each other for 2.5 km along the seashore, from the outlet of Calvano stream in Pineto as far as the centre of Silvi. It covers about 37 km^2 and includes a restricted B Zone opposite Torre Cerrano, a square-shaped zone with a length of about 1 km; a C Zone of 14 km^2, which extends 2 km into the sea from the coast, and a wide D Zone, a trapezium-shaped area of about 22 km^2 spreading out for 3 nautical miles.
Since 2008, the Marine Protected Area Authority, which was constituted upon signing the Cerrano Charter, has been working within the framework of Adriatic Protected Areas Network called AdriaPAN.

IZVLEČEK

MZO "Torre Cerrano" je bilo osnovano z odlokom Oddelka za okolje in zaščito naravnih teritorijev, izdanim 21. oktobra 2009 in objavljenem v italijanskem Uradnem listu št. 80 dne 7. aprila 2010.
MZO se razteza 3 navtične milje v morje in poteka 7 km vzdolž obalne črte. Sestoji iz sipin, ki si sledijo 2,5 km vzdolž obale, in sicer od izliva potoka Calvano pri Pinetu do središča Silvija. Pokriva kakih 37 km^2 in zajema omejeno Cono B nasproti Torre Cerrana (približno 1 km^2 veliko četverokotno območje), Cono C (14 km^2 veliko območje, ki se razteza 2 km v morje), in Cono D (kakih 22 km^2 veliko območje trapezaste oblike, ki se razteza v morje 3 navtične milje).
Urad MZO Torre Cerrano, ki je bil osnovan ob podpisu tako imenovane "Cerranske listine", od leta 2008 deluje v okviru Omrežja jadranskih zaščitenih območij AdriaPAN.

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BRIJUNI MARINE PROTECTED AREA

ZAVAROVANO MORSKO OBMOČJE BRIONI

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ABSTRACT

Brijuni are a group of islands in the Adriatic Sea (Republic of Croatia), situated along the western coast of the southern peak of the Istrian Peninsula. In 1983, this area was declared a National Park; in 1984, it was open for visitors. The Brijuni Marine Protected Area (MPA) is listed as IUCN category II.

The MPA consists of 14 islands and islets and the surrounding sea, with a total area of 3,395 ha: the sea area covers 2,651.7 ha, the islands 743.3 ha (ca 80% sea and 20% land). The biggest islands are Veliki Brijun (561 ha) and Mali Brijun (108.85 ha). Total coastline length of all islands is 46.82 km, while the average sea depth oscillates between 35 and 40 m.

Brijuni National Park constitutes a unity of natural, historical and cultural heritage thanks to its geographical location, geological substratum and geomorphology, diversity of habitats and mild Mediterranean climate. The main characteristics of the Park are well preserved marine and terrestrial habitats, abundance and richness of species, both autochthonous and allochthonous, landscape parks with vast meadows and large solitary trees of holm oak (*Quercus ilex*), well preserved Mediterranean macchia and holm oak and laurel (*Laurus nobilis*) forests, geological and palaeontological finds, richness in archaeological and cultural-historical sites from different time periods (the Neolithic period up to the 20th century), etc.

The whole Park has been proposed, together with the western Istrian coast, as a potential Natura 2000 site under the European Union Habitats and Birds Directives.

IZVLEČEK

Brioni so skupina otokov vzdolž zahodne obale skrajnega južnega dela Istrskega polotoka v Jadranskem morju (Republika Hrvaška). Leta 1983 je bilo otočje razglašeno za narodni park, leta 1984 pa odprto za javnost. IUCN (Svetovna zveza za varstvo narave) je zavarovano morsko območje (ZMO) Brioni uvrstila v 2. kategorijo.

ZMO Brioni sestoji iz 14 otokov in otočkov z obdajajočim morjem s skupno površino 3.395 ha, od katerih morje pokriva 2.651 ha (80 %), otoki pa 743,3 ha (20 %). Največja otoka sta Veliki Brion (561 ha) ind Mali Brion (108,85 ha). Skupna dolžina obale celotnega otočja je 46,82 km, medtem ko se povprečna globina obdajajočega morja suče med 35 in 40 m.

Narodni park Brioni je območje pomembne naravne, zgodovinske in kulturne dediščine po zaslugi njegove geografske lege, geološke podlage in geomorfologije, pestrosti habitatov in milega sredozemskega podnebja. Poglavitne značilnosti parka so dobro ohranjeni morski in kopenski habitati, veliko število in bogastvo vrst (tako avtohtonih kot alohtonih), krajinski parki s prostranimi travniki in visokimi samotarskimi črnimi hrasti (*Quercus ilex*), dobro ohranjena sredozemska makija, gozdovi črnega hrasta in lovorja (*Laurus nobilis*), geološke in paleontološke najdbe, bogastvo arheoloških in kulturno-zgodovinskih najdišč iz različnih obdobij (od neolitika to 20. stoletja), itd.

Na osnovi Habitatne in ptičje direktive EU je bil celotni park, skupaj z zahodno istrsko obalo, razglašen za potencialno območje Natura 2000.

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ANALYSIS OF MONK SEAL *(MONACHUS MONACHUS*, HERMANN 1779) SIGHTINGS IN THE CROATIAN PART OF THE ADRIATIC (2006-2009)

ANALIZA OPAZOVANJ SREDOZEMSKE MEDVEDJICE (*MONACHUS MONACHUS*, HERMANN 1779) V HRVAŠKEM DELU JADRANSKEGA MORJA (2006-2009)

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ABSTRACT

The Monk Seal (*Monachus monachus*, Hermann 1779) belongs to the order Pinnipeds (Pinnipedia), seal family (*Phocidae*) and sea monk genus (*Monachus*). Its total population amounts to about 350 individuals in smaller, isolated and endangered groups. The aim during our 4-year systematic research (2006-2009) was to gather data on Monk Seal sightings in the Croatian part of the Adriatic Sea. The result: 79 sightings in the above-mentioned area. According to the systematic research of their habitat (21 caves) on the Adriatic open- sea islands and on the coast, it has been determined that the Monk Seal inhabits them. The conclusion: for the survival of the species, it is essential to protect the areas of the open-sea islands in the Adriatic and to place infrared cameras inside the caves, thus giving us the insight as to their use.

IZVLEČEK

Sredozemska medvedjica (*Monachus monachus*, Hermann 1779) spada v red Pinnipedia, družino pravih tjulnjev (*Phocidae*) in rod *Monachus*. Njena populacija dosega kakih 350 osebkov, živečih v majhnih, izoliranih in ogroženih skupinah. Namen naših štiriletnih sistematičnih raziskav (2006-2009) je bil zbrati podatke o tej vrsti v hrvaškem delu Jadranskega morja. Rezultat: 79 opazovanj v zgoraj omenjenem delu Jadrana. Glede na sistematske raziskave njihovega habitata (21 jam) na odmaknjenih jadranskih otokih in na obali sami je bilo ugotovljeno, da jih sredozemska medvedjica vsekakor naseljuje. Sklep: za preživetje te redke vrste je nadvse pomembno, da se zaščitijo območja otokov na odprtem morju v Jadranu in postavijo infrardeče kamere v jame, da bi dobili vpogled v njihovo rabo.

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»STRENGTHENING OF THE MARINE PROTECTED AREAS NETWORK IN CROATIA (MEDPAN SOUTH)« – PILOT PROJECT PRESENTATION

"KREPITEV MREŽE MORSKIH ZAVAROVANIH OBMOČIJ NA HRVAŠKEM (MEDPAN SOUTH)" – PREDSTAVITEV PILOTNEGA PROJEKTA

Zrinka JAKL, Milena ŠIJAN

ABSTRACT

The MedPAN South project has been developed with the objective to speed up the process of establishing an efficient management of marine protected areas in the Mediterranean (MPAs). Poster presents objectives and activities of the MedPAN South pilot project in Croatia.
The main objectives of the pilot project in Croatia are:

- To support public institutions for management of Croatian marine protected areas in the „step by step" development of management plans.
- To strengthen the capacity of MPA management public institutions in matters related to the management of marine protected areas.
- To improve networking of Croatian MPAs and other relevant institutions and their integration into regional networks such as MedPAN and AdriaPAN in order to encourage the exchange of information, good practices and solutions to problems of MPAs management.

The project uses the existing tools, knowledge and experiences to achieve ambitious goal of development of management plans for Croatian MPAs by the end of 2011. It is providing technical support for the development of management plans; trainings; capacity building and knowledge sharing through thematic national and international workshops; exchange programmes related to the specifics of marine protected areas; biodiversity and socio-economic studies supporting management plans.
Direct project beneficiaries and partners are public institutions for management of Croatian marine nature and national parks: Brijuni, Telašćica, Kornati, Lastovo Islands and Mljet. Indirect beneficiaries are coastal county public institutions for the management of protected areas participating in thematic workshops of the project.
The Croatia pilot project is coordinated by the Association Sunce from Split, Croatia, and implemented in close cooperation with the Croatian Ministry of Culture, State Institute for Nature Protection, and the regional project coordinator WWF Mediterranean Programme Office (WWF MedPO). The project in Croatia is financed by the MAVA foundation and its implementation period is 2008-2012.

IZVLEČEK

Projekt MedPAN Jug je bil zasnovan z namenom, da se pospeši proces uveljavljanja učinkovitega upravljanja morskih zavarovanih območij v Sredozemlju. Poster prikazuje cilje in dejavnosti projekta MedPAN Jug na Hrvaškem. Poglavitni cilji projekta so naslednji:

- podpreti javne inštitucije, ki upravljajo morska zavarovana območja na Hrvaškem, pri postopnem razvoju upravljalskih načrtov;
- povečati kapacitete javnih inštitucij, ki upravljajo morska zavarovana območja, v zadevah, povezanih z upravljanjem morskih zavarovanih območij:

- izboljšati mreženje morskih zavarovanih območij na Hrvaškem in njihovo vključevanje v regionalne mreže, kot sta MedPAN in AdriaPAN, z namenom spodbujanja izmenjave informacij, dobrih praks in rešitev problemov, povezanih z upravljanjem morskih zavarovanih območij.

Z namenom, da se doseže ambiciozni cilj izdelave upravljalskih načrtov za zavarovana morska območja na Hrvaškem do konca leta 2011, se pri uresničevanju projekta uporabljajo že obstoječa orodja, tako kot že pridobljene izkušnje in znanje. Projekt zagotavlja tehnično podporo pri razvijanju upravljalskih načrtov; urjenju kadrov; večanju kapacitet in delitvi znanja prek tematskih nacionalnih in mednarodnih delavnic; izmenjavi programov, povezanih s posebnostmi morskih zavarovanih območij; biodiverzitetnih in socio-ekonomskih študijah za pospeševanje upravljalskih načrtov.

Neposredni projektni partnerji in porabniki so javne ustanove za upravljanje morskih, naravnih in nacionalnih parkov: Brioni, Telašćica, Kornati, Lastovsko otočje in Mljet. Posredni porabniki projekta pa so za upravljanje zavarovanih območij ustanovljene javne inštitucije v obmorskih okrajih, ki sodelujejo na projektnih tematskih delavnicah .

Hrvaški pilotni projekt koordinira Združenje Sunce iz Splita v tesnem sodelovanju s hrvaškim Ministrstvom za kulturo, državnim Zavodom za varstvo narave in regionalnim projektnim koordinatorjem WWF Mediterranean Programme Office (WWF MedPO). Projekt v obdobju njegovega trajanja (2008-2012) financira ustanova MAVA.

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MARINE PROTECTED AREAS OF CROATIA – THEIR SIZE, LEGAL STATUS AND DISTRIBUTION

MORSKA ZAVAROVANA OBMOČJA NA HRVAŠKEM – NJIHOVA VELIKOST, PRAVNI STATUS IN RAZŠIRJENOST

Marko PEĆAREVIĆ, Petra RODIĆ BARANOVIĆ, Ramona TOPIĆ, Irina ZUPAN, Dijana ŽUPAN

ABSTRACT

In the light of the recognition of the scarcity of marine resources and their common nature, marine protected areas (MPAs) are increasingly coming into the frontline of nature conservation. Here we present the current state of MPAs in Croatia. While there are different types of MPAs, we only address in this poster the MPAs as defined by the Law on nature protection. We use GIS to analyze and show the current situation as well as historic trends (change in area and type) in MPA designation in the Croatian Adriatic.

Currently, only 19 marine sites, covering in total 1.5% of the territorial sea, are designated as protected areas (PAs) in one of the 9 national categories. All of these address only the near-shore ecosystems and no open waters. Most of them are protected in categories compatible to IUCN categories II (21,648ha) and V (27,385ha), while IUCN IV is covering 13,795ha. IUCN category III is represented only by point locations of negligible surface area. In 2007, the Croatian Government enacted the ecological network consisting of sites important for conservation of birds and sites important for conservation of other taxonomic groups and habitat types (in line with the EU Birds and Habitats Directives). The Croatian ecological network comprises 441 marine sites important for habitat types and species (total area of 392,921ha, out of which marine area covers 355,067ha or 11.4% of the territorial sea) and 9 marine sites important for conservation of birds (total area of 1,281,981ha, out of which marine area covers 1,002,252ha or 32.3% of the territorial sea). These sites mostly overlap with MPAs designated in one of the national PA categories and jointly cover 39% of the Croatian territorial sea.

Even though management plans for all large MPAs protected in one of the national PA categories are currently being developed, the management authorities still face serious challenges in MPA management mainly due to a lack of capacity and intersectoral cooperation.

IZVLEČEK

Ob očitnem prepoznavanju redkosti morskih virov in njihove skupne narave se v ospredje naravovarstva vse bolj prebijajo morska zavarovana območja. V tem članku predstavljamo trenutno stanje morskih zavarovanih območij na Hrvaškem. Čeprav obstajajo različna območja te vrste, pa ob tej priložnosti želimo opisati le tista, kot jih navaja hrvaški Zakon o varstvu narave. Za analizo in prikaz trenutnega stanja kot tudi zgodovinskih trendov (sprememb) v morskih zavarovanih območjih v hrvaškem Jadranu smo uporabili GIS (geografski informacijski sistem).

Trenutno na Hrvaškem obstaja le 19 morskih lokalitet, ki imajo so s kupno površino 1.5 % teritorialnega morja status zaščitenega območja (PA) v eni od devetih nacionalnih kategorij.

Vse zadevajo zgolj ekosisteme v bližini morskih obrežij in nobenih odprtih voda. V veliki večini so zavarovane v kategorijah, ki so združljive s kategorijama II (21.648 ha) in V (27.385 ha) IUCN (Mednarodne unije za ohranjanje narave), medtem ko kategorija IV pokriva13,795 ha. Kategorija III je

zastopana s točkovnimi lokacijami z zanemarljivo majhno površino. Leta 2007 je hrvaška vlada osnovala ekološko omrežje, ki zajema lokalitete, pomembne za zaščito ptic, in lokalitete, pomembne za zaščito drugih taksonomskih skupin in habitatnih tipov (v skladu z direktivami EU o varstvu ptic in habitatov). Hrvaško ekološko omrežje obsega 441 morskih lokalitet, pomembnih za habitatne tipe in vrste (s skupno površino 392.921 ha, od katerih morsko območje pokriva 355.067 ha ali 11.4 % teritorialnega morja), in 9 morskih lokalitet, pomembnih za varstvo ptic (s skupno površino 1.281.981 ha, od katerih morsko območje pokriva 1.002.252 ha ali 32.3 % teritorialnega morja). Te lokalitete se večinoma prekrivajo z morskimi zavarovanimi območji, ki so označena v eni izmed nacionalnih kategorij PA in skupaj pokrivajo 39 % hrvaškega teritorialnega morja.

Kljub dejstvu, da so v pripravi upravljalski načrti za vsa večja morska zavarovana območja v eni izmed nacionalnih kategorij zaščitenih območij, se upravljalske oblasti zaradi pomanjkanja kapacitet in medresorskega sodelovanja še vedno spopadajo z resnimi izzivi na področju upravljanja morskih zavarovanih območij.

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PINNA NOBILIS L., 1758 (MOLLUSCA, BIVALVIA) POPULATION DYNAMICS AND STRUCTURE WITHIN THE MIRAMARE MARINE PROTECTED AREA (GULF OF TRIESTE)

POPULACIJSKA DINAMIKA IN STRUKTURA LEŠČURJA *PINNA NOBILIS L.*, 1758 (MOLLUSCA, BIVALVIA) V ZAVAROVANEM MORSKEM OBMOČJU MIRAMARE (TRŽAŠKI ZALIV)

Giulia PRESTINENZI, Saul CIRIACO, Donatella DEL PIERO, Milena TEMPESTA

ABSTRACT

Since 2008, the growth and abundance of the Mediterranean bivalve has been investigated in four sampling sites within the Miramare MPA (Trieste, Italy) by SCUBA diving using the circle-sampling technique described by Garcìa-March and Vicente (2006) in the protocol to study and monitor populations within Marine Protected Areas for the Mediterranean Protected Areas Network project (MedPAN).
The mean population density values registered are 0.21 individuals/m^2 (± 0.084) and 0.19 individuals/m^2 (± 0.049), respectively in 2008 and 2009, and these values are quite high, compared to those collected by several authors in other areas. In 2009, one of the highest abundance was recorded in the only MPA's spot, where a meadow grows: this might confirm the theory that a seagrass meadow could possibly protect these bivalves from hydrodynamic forces and predator attacks (Zavodnik (1991), Richardson . (1999), Centoducati . (2007) and García-March (2007)).
The individual growth rate is faster than those observed in other Mediterranean areas, with an annual shell length increase of 20 cm in the first year of life, 13 cm in the second and nearly 10 cm in the third year. The estimated age of the organisms, obtained with the growth curve designed for this population, reveals that in 2009 80% of the individuals were 2-3 years old according to their estimated total shell length of 30-40 cm. To test this growth curve, a preliminary study on the stable oxygen and carbon isotopes of the calcitic outer shell-layer was conducted in association with the Department of Geology of the University of Trieste: the first results fit the estimated growth rate, but more analyses need to be done.
Considering the high population density, the estimated age and the reproductive capacity of the monitored organisms, the Miramare MPA is likely to be an important site for the conservation and maintenance of population in the Northern Adriatic.

IZVLEČEK

Na štirih vzorčevalnih lokalitetah morskega zavarovanega območja Miramare (Trst, Italija) že od leta 2008 potekajo raziskave o rasti in številčnosti leščurja (). Delo opravljajo potapljači v skladu s tehniko krožnega vzorčenja, kot sta jo opisala Garcìa-March in Vicente (2006) v protokolu za preučevanje in monitoring leščurjevih populacij v morskih zavarovanih območjih za projekt Omrežje morskih zavarovanih območij (MedPAN).
Izmerjene srednje vrednosti populacijske gostote so bile 0,21 osebka/m^2 (± 0.084) v letu 2008 in 0,19 osebka/m^2 (± 0.049) v letu 2009; v primerjavi z vrednostmi, do katerih je v drugih območjih prišlo več avtorjev, so te vrednosti precej visoke. Leta 2009 je bila ena izmed najvišjih številčnosti izmerjena na edini točki morskega zavarovanega območja Miramare, kjer uspeva travnik z vrsto: to lahko potrjuje teorijo, da bi morska trava utegnila zaščititi školjke pred hidrodinamičnimi silami in napadi plenilcev (Zavodnik (1991), Richardson . (1999), Centoducati . (2007) in García-March (2007)).

Individualna stopnja rasti je hitrejša od stopenj, zabeleženih v drugih sredozemskih območjih, in sicer s školjkino letno rastjo 20 cm v prvem letu, 13 cm v drugem in slabih 10 cm v tretjem letu njenega življenja. Ocenjena starost organizmov, pridobljena s krivuljo rasti, oblikovano za to populacijo, razkriva, da je bilo v letu 2009 80 % osebkov starih 2-3 leta (glede na ocenjenih 30-40 cm njihove celotne dolžine). Da bi preizkusili to krivuljo rasti, je bila s sodelovanjem Geološke fakultete na Tržaški univerzi opravljena predhodna študija na stabilnih izotopih kisika in ogljika leščurjevih zunanjih plasti: rezultati se ujemajo z ocenjeno stopnjo rasti, vendar bo treba opraviti še nekaj dodatnih analiz.

Glede na veliko gostoto leščurjeve populacije kot tudi na izračunano starost in reprodukcijsko sposobnost preučevanih organizmov je morsko zavarovano območje Miramare po vsej verjetnosti pomembna lokaliteta za zavarovanje in vzdrževanje leščurjeve populacije v Severnem Jadranu.

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LANDSCAPE PARK STRUNJAN

KRAJINSKI PARK STRUNJAN

Dejan PUTRLE

ABSTRACT

Landscape Park Strunjan lies in the northernmost part of Mediterranean in the Gulf of Trieste of the Adriatic Sea. It is the only nature park in Slovenia, which includes the sea, thus covering the area of 429 hectares of both land and sea. Centuries long tradition of agriculture, fishing and salt production has allowed advanced coexistence of man and nature. The result is high biodiversity in many different habitat types and high value of its cultural landscape. Here you can find the largest natural coastline in a densely populated area of the Gulf of Trieste, the highest flysch cliffs in the Adriatic, the northernmost still active salt-pans in the Mediterranean and the only sea lagoon on the Slovenian coast. The park also represents one of the northernmost points of the growth for some Mediterranean plant species. Among the most important protected species here are five species of Cystoseira (*Cystoseira* sp.), three species of sea grasses (*Cymodocea nodosa, Zostera marina* and *Z. nolti*), date shell (*Litophaga litophaga*), noble pen shell (*Pinna nobilis*), Mediterranean killifish (*Aphanius fasciatus*), loggerhead sea turtle (*Caretta caretta*), Mediterranean Gull (*Larus melanocephalus*) and European Shag (*Phalacrocorax aristotelis*). Among the 4 pSACs, 3 include the sea. The most important habitats are: estuaries, mudflats and sandflats not covered by seawater at low tide, Salicornia and other annuals colonizing mud and sand, reefs, annual vegetation of drift lines, Mediterranean salt meadows, Mediterranean and thermo-Atlantic halophilous scrubs, vegetated sea cliffs of the Mediterranean coasts, coastal lagoons and eastern-Mediterranean dry and semi-dry grasslands. In addition to the pollution caused by waste, a major problem in the marine area of the park is daily anchoring of private and tourist boats. The anchoring has a large negative impact on species and habitats, so one of our protective measures will include setting daily mooring sites.

IZVLEČEK

Krajinski park Strunjan v Tržaškem zalivu leži v najsevernejšem delu Sredozemlja. Je edini naravni park v Sloveniji, ki vključuje tudi morje, tako da pokriva 429 ha kopnega in morja. Več stoletna tradicija na področjih poljedelstva, ribištva in pridobivanja soli je omogočila kakovostno sobivanje človeka in narave. Rezultat je visoka biotska pestrost v mnogih različnih habitatnih tipih in velika vrednost kulturne krajine. Tu lahko najdemo največjo naravno obalo v sicer gosto poseljenem območju Tržaškega zaliva, najvišje flišne klife na Jadranu, najsevernejše še vedno dejavne soline v Sredozemlju in edino morsko laguno na slovenski obali. Park je tudi ena najsevernejših lokalitet za rast nekaterih sredozemskih rastlinskih vrst. Med najpomembnejšimi zaščitenimi vrstami omenimo naslednje: 5 vrst iz rodu cistozire (*Cystoseira* sp.), tri vrste morske trave (*Cymodocea nodosa, Zostera marina* in *Z. nolti*), datljevko (*Litophaga litophaga*), leščurja (*Pinna nobilis*), solinarko (*Aphanius fasciatus*), kareto (*Caretta caretta*), črnoglavega galeba (*Larus melanocephalus*) in vranjeka (*Phalacrocorax aristotelis*). Med štirimi posebnimi varstvenimi območji kar trije vključujejo morje, najpomembnejši habitati pa so naslednji: rečna ustja, poloji in peščine, ki jih med oseko ne prekriva morska voda, blato in pesek, ki ju naseljujejo osočnik in druge enoletnice, čeri, obalni drobir z združbami enoletnic, sredozemski slani travniki, sredozemsko in termo-atlantsko slanoljubo grmičevje, z rastlinjem porasli morski klifi na sredozemskih obalah, obrežne lagune in vzhodno sredozemska suha in polsuha travišča. Največji problem v morskem delu parka je poleg že

znanega onesnaževanja z odpadki vsakodnevno sidranje zasebnih in turističnih plovil. Ker ima sidranje zagotovo močan učinek na vrste in habitate, bo eden naših zaščitnih ukrepov vključeval tudi določanje dovoljenih dnevnih sidrišč.

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NATURE PARK TELAŠĆICA

NARAVNI PARK TELAŠĆICA

Milena RAMOV, Vesna PETEŠIĆ

ABSTRACT

Telašćica Bay is situated in the central part of the eastern Adriatic coast, in the SE part of the island of Dugi otok. In 1980, this area became protected due to its exceptionally valuable plant and animal life, geological and geomorphological features, valuable colonies of the sea bottom and interesting archaeological heritage. The bay, which is surrounded by 13 islands and islets, together with 6 islets inside the bay of Telašćica itself, was proclaimed a Nature Park in 1988.
Total area of the Nature Park is 70.50km^2, of which 25.95km^2 covers the land, and 44.55 km^2 the sea. There are beautifully cultivated meadows and hillsides, rich with Mediterranean vegetation with more than 500 species of flora and equally rich fauna. The undersea world has more than 250 plant and 300 animal species.

IZVLEČEK

Zaliv Telašćica leži v jugovzhodnem delu Dugega otoka v osrednjem delu vzhodne jadranske obale. Leta 1980 je območje postalo zaščiteno zaradi svojih izjemno dragocenih rastlinskih in živalskih vrst, geoloških in geomorfoloških pojavov, dragocenih kolonij na morskem dnu in zanimive arheološke dediščine. Zaliv, ki ga obdaja 13 otokov in otočkov, skupaj s 6 otočki znotraj zaliva samega, je bil leta 1988 razglašen za naravni park.
Skupna površina Naravnega parka Telašćica je 70,50 km^2, od tega se 25,95km^2 razteza na kopnem in 44,55 km^2 na morju. Pohvali se lahko z lepo obdelovanimi travniki in pobočji, bogatimi s sredozemsko vegetacijo več kot 500 različnih vrst in prav tako bogato favno. Podvodni del parka je dom več kot 250 rastlinskih in 300 živalskih vrst.

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DEBELI RTIČ: A NEW LOOK AT AN OLD MARINE PROTECTED AREA

DEBELI RTIČ: NOV POGLED NA STARO ZAVAROVANO MORSKO OBMOČJE

Barbara VIDMAR, Tina TRAMPUŠ

ABSTRACT

Debeli rtič is the northernmost Slovenian peninsula in the Gulf of Trieste close to the Italian border. The whole peninsula is characterized by mostly naturally preserved coastline and sea. It consists of two cliffs (*Valdoltra* and *Debeli rtič*) and a shallow silty bay of *Sv. Jernej*. All these sites are of great importance from the conservation point of view and enjoy, according to the Slovenian legislation, nature conservation status from several aspects: ecologically important areas, valuable natural features, and Natura 2000 sites. The cliffs, salt meadows, underwater meadows, algal beds, and sandbanks constitute significant habitats both within the Slovene and European frameworks. Among the numerous marine species, some rare and endangered ones are especially worth mentioning, such as *Pinna nobilis*, *Pholas dactylus* and *Hippocampus guttulatus.* In 2009, even a *Caretta caretta* turtle was seen some 200 metres from the coast. Despite the high natural value all around the peninsula, only a small part in the extreme part of the cape is protected as a natural monument by a municipal decree from 1991, based on the former Law on Natural and Cultural Heritage.

IZVLEČEK

Debeli rtič, ki leži v Tržaškem zalivu blizu italijanske meje, je najsevernejši slovenski polotok. Njegova poglavitna značilnost sta večinoma naravno ohranjena obala in morje. Sestoji iz dveh klifov (*Valdoltra* in *Debeli rtič*) in plitkega muljastega zaliva *Sv. Jernej*. Vse te lokalitete so izjemnega naravovarstvenega pomena in na osnovi slovenske zakonodaje zaščitene kot ekološko pomembna območja, dragocene naravne vrednote in območja Nature 2000. Klifa, slani travniki, podvodni travniki, zaplate alg in peščena obrežja so pomembni rastlinski in živalski habitati tako na slovenski kot evropski ravni. Med mnogimi morskimi bitji so posebne omembe vredne nekatere redke in ogrožene vrste, kot na primer leščur (*Pinna nobilis*), datljevka (*Pholas dactylus*) in dolgonosi morski konjiček (*Hippocampus guttulatus*). Leta 2009 je bila 200 m od obale opažena celo kareta (*Caretta caretta*). Kljub izjemni naravni vrednosti celotnega polotoka, je z občinskim odlokom iz leta 1991 (na osnovi nekdanjega Zakona o naravni in kulturni dediščini) kot naravni spomenik zaščiten le majhen del skrajnega dela rta.

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LASTOVO ISLANDS NATURE PARK

NARAVNI PARK LASTOVSKO OTOČJE

Korana ZAVADLAV

ABSTRACT

On September 29, 2006, Croatian Parliament proclaimed ″Lastovo Islands″ Nature Park a protected area, which makes it eleventh Nature Park in Croatia. The Nature Park embraces 44 islands, islets and rocks (the biggest among them being Lastovo and Sušac), covering a total land area of 53 km^2 and a total sea area of 143 km^2, with the lighthouses Sušac, Tajan, Glavat and Struga located on its borders. The WWF has declared this territory one of the last ten biodiversity treasures of the Mediterranean Sea.
The Lastovo Islands were declared a Nature Park due to their mystic beauty, immense landscape value, thick forests and fertile fields rich with ponds, high coastal cliffs, land and sea caves, numerous rare sea and land species and habitats.
The article also refers to the activities that this MPA is currently undertaking in order to better conserve the biological and cultural heritage of the archipelago.

IZVLEČEK

Dne 29. septembra 2006 je hrvaški parlament razglasil Naravni park Lastovsko otočje zavarovano območje. Ta naravni park, ki je enajsti na Hrvaškem, obsega 44 otokov, otočkov in čeri (največja med otoki sta Lastovo in Sušac) s skupno kopensko površino 53 km^2 in skupno morsko površino 143 km^2. Na park mejijo svetilniki Sušac, Tajan, Glavat in Struga. Svetovni sklad za varstvo narave (WWF) je razglasil to območje eno od zadnjih desetih biodiverzitetnih zakladov Sredozemskega morja.
Lastovsko otočje je bilo razglašeno za naravni park zaradi njegovih skrivnostnih lepot, izjemne krajinske vrednosti, gostih gozdov in rodovitnih polj, bogatih z ribniki, visokih obalnih klifov, kopenskih in morskih jam ter številnih redkih morskih in kopenskih vrst in habitatov.
V članku so omenjene tudi dejavnosti, ki z namenom, da se bolje zaščiti njegova biološka in kulturna dediščina, potekajo v tem morskem zavarovanem območju.

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TIPOLOGIJA ČLANKOV

Izvirni znanstveni članek

Izvirni znanstveni članek je samo prva objava originalnih raziskovalnih rezultatov, napisana v takšni obliki, da se raziskava lahko ponovi, ugotovitve pa preverijo. V njem so zajeti rezultati avtorjevega samostojnega ali skupinskega raziskovalnega dela ter nova odkritja oziroma spoznanja. Naravoslovne in tehniške vsebine so organizirane po shemi IMRAD (Introduction, Methods, Results And Discussion). Družboslovni in humanistični znanstveni članki so teoretski, empirični ali teoretsko empirični in imajo podobno strukturo kot članki v naravoslovnih in tehniških znanostih. Izvirni znanstveni članki niso bistveno krajši od 30 tisoč znakov, izpolnjevati pa morajo naslednje pogoje:

a) izvirna opredelitev in/ali obravnava problema;
b) postavitev hipotez in razgrnitev argumentov ali opredelitev problemskega področja;
c) uporaba znanstvenega aparata (citiranje, reference);
č) kritična presoja relevantne literature;
d) avtorjev prispevek k teoriji;
e) jasni zaključki (ne povzetki) predvsem z vidika kritične presoje literature.

Pregledni znanstveni članek

V preglednem znanstvenem članku je zajet pregled najnovejših del o določenem predmetnem področju, z namenom povzemati, analizirati, oceniti ali sintetizirati že objavljene informacije ter ideje. Avtor kritično primerja različne objave, rezultati katerih so med seboj pogosto v nasprotju, ter argumentirano razsoja o njihovi veljavnosti. Končni prispevek avtorja so tako nove sinteze, ki vključujejo tudi rezultate lastnega raziskovanja. Za te članke ni predpisane sheme kot za izvirne znanstvene članke. Pregledni znanstveni članek je včasih težko ločiti od strokovnega. Pri tem je lahko v pomoč načelo, da članki, ki na splošno obravnavajo neko temo ali problem s pomanjkljivim opiranjem na novejšo svetovno znanstveno literaturo ali celo brez nje, ne sodijo med znanstvene pregledne, ampak med strokovne članke.

Kratki znanstveni prispevek

Kratki znanstveni prispevek je izvirni znanstveni članek, pri katerem so nekateri elementi sheme IMRAD lahko izpuščeni. Na kratko so povzeti izsledki končanega izvirnega raziskovalnega dela ali dela, ki je še v teku. Sem sodijo na primer kratki pregledi in predhodne objave oziroma predhodna poročila. Pri slednjih gre za obliko sporočanja najnovejših raziskovalnih izsledkov pred objavo članka s polnim besedilom.

Strokovni članek

Strokovni članek je predstavitev rezultatov objavljenih ali lastnih raziskav, ki ne vsebujejo novih idej in posplošitev. Strokovni članek je predstavitev že znanega, s poudarkom na uporabnosti rezultatov izvirnih raziskav in širjenju znanja.

Teme, ki jih predstavljajo strokovni članki, so:

a) Projekti: lahko gre za predstavitev rezultatov uspešno speljanega projekta ali predstavitev analize neuspešnega projekta z namenom ugotoviti vzroke za uspeh ali neuspeh.
b) Metode in tehnike: predstavljena je metoda ali tehnika, ki na nekem področju pomeni prednost in omogoča boljše rezultate.
c) Študija primera: predstavljena je študija primera na določenem področju ter na osnovi primera analiza smiselna za dani primer. Lahko gre, na primer, za analizo prednosti in/ali slabosti primera.
d) Uporaba standardov in vpeljava ogrodij: strokovni članki lahko predstavljajo nove standarde ali ogrodja ter primere njihove uporabe in uvajanja.
e) Nove tehnologije: pri predstavitvi novih tehnologij se je treba izogibati komercialnim poudarkom.

Priporočljiva struktura strokovnega članka ima naslednje vsebinske sklope:

a) Uvodni del predstavi namen članka.
b) Kratka predstavitev področja članka.
c) Predstavitev problema, ki odseva cilj pisanja članka.
d) Predstavitev primera, na osnovi predhodnega sklopa avtor predstavi (svoj) primer.
e) Sklep povzame rezultate ali učinke ter poda predloge in napotke, ki bodo v pomoč tistim, ki se bodo srečali z enakim ali s podobnim strokovnim izzivom.

Recenzija, prikaz knjige, kritika

Prispevek, v katerem avtor ocenjuje ali dokazuje pravilnost/nepravilnost nekega znanstvenega ali strokovnega dela, kriterija, mnenja ali ugotovitve in/ali spodbuja/podpira/ocenjuje ugotovitve, dela ali mnenja drugih avtorjev.

Polemika, diskusijski prispevek

Prispevek, v katerem avtor dokazuje pravilnost določenega kriterija, svojega mnenja ali ugotovitve in spodbija ugotovitve ali mnenja drugih avtorjev.

Prikaz znanstvenih in strokovnih posvetovanj

Povzetek prispevkov in diskusij znanstvenih ali strokovnih posvetovanj.

Prikaz prispevkov posameznikov k varstvu narave

Pregled dela in objav posameznikov, ki so pomembno prispevali k varstvu narave.