

TABLE OF CONTENTS

	Pages
REPORT	1-5
Annex I : List of participants	
Annex II : Agenda of the Meeting	
Annex III : Revised classification of Benthic Marine Habitat Types for the Mediterranean region	
Annex IV : Revised criteria for the evaluation of the conservation interest of Mediterranean Marine Habitat Types and proposed rating	
Annex V : Recommendations	

TABLE OF CONTENTS

	Pages
REPORT	1-5
Annex I : List of participants	
Annex II : Agenda of the Meeting	
Annex III : Revised classification of Benthic Marine Habitat Types for the Mediterranean region	
Annex IV : Revised criteria for the evaluation of the conservation interest of Mediterranean Marine Habitat Types and proposed rating	
Annex V : Recommendations	

Introduction

1. At their tenth Ordinary Meeting (Tunis, 18-21 November 1998) the Contracting Parties to the Convention for the Protection of the Mediterranean Sea against Pollution adopted common criteria for the preparation of national inventories of natural sites of conservation interest. The criteria provide for the establishment of a reference list of marine and coastal natural habitat types, to be drafted on the basis of a model classification to be established by the Regional Activity Centre for Specially Protected Areas (SPA/RAC).
2. At the same Meeting the Contracting Parties invited SPA/RAC to work on the elaboration of a reference list of habitat types, as well as a model classification of marine habitat types for the Mediterranean region. France offered to finance the organization of a meeting of experts devoted to the definition of such a list and classification.
3. Accordingly, a Meeting of Experts on Marine Habitat Types in the Mediterranean region was convened in Hyères (France) from 18 to 20 November 1998 with the main objectives of defining a reference classification of marine habitat types for the Mediterranean region and to draft a list of Mediterranean marine habitat types of conservation interest.
4. The Meeting was held at the Headquarters of the National Park of Port-Cros/Conservatoire Botanique Méditerranéen de Porquerolles.

Participants

5. Experts designated by the following Contracting Parties to the Barcelona Convention attended the Meeting : Albania, Bosnia and Herzegovina, Egypt, France, Greece, Israel, Italy, Lebanon, Libyan Arab Jamahiriya, Malta, Monaco, Morocco, Slovenia, Spain, Syria, Tunisia, Turkey. The European Commission was also represented.
6. The following institutions and non-governmental organizations were represented by observers: Centre d'Océanologie de Marseille, European Environment Agency/European Topic Centre on Nature Conservation (ETC/NC), ICRAM, MEDMARAVIS, World Wide Fund for Nature (WWF).
7. SPA/RAC acted as the secretariat for the Meeting.
8. The complete list of participants is attached as Annex I to this report.

Agenda item 1 - Opening of the Meeting

9. The opening session of the Meeting, chaired by Mr Emmanuel Lopez, Director of the National Park of Port-Cros/Conservatoire botanique national méditerranéen de Porquerolles, featured a statement by Mr Mohamed Adel Hentati, Director of SPA/RAC, who welcomed the participants and, speaking on behalf of Mr L.

Chabason, Coordinator of MAP, thanked the French Government for its invitation. Mr Jean-Marie Petit, Director of the Atelier Technique des Espaces Naturels, said he was happy to welcome the participants on behalf of the Atelier, whose responsibilities included work on the classification of Mediterranean marine habitats. Mr Lopez welcomed the Meeting of Experts to Hyères and eagerly looked forward to the results of its work. The National Park of Port-Cros, founded in 1963, already had a long tradition of collaboration in the Mediterranean and took a keen interest in strengthening the protection of the marine areas under its authority. After wishing the experts every success in their work, he declared the Meeting open.

Agenda item 2 - Rules of Procedure

10. The Meeting noted that the Rules of Procedure adopted for Meetings and Conferences of the Contracting Parties to the Convention for the Protection of the Mediterranean Sea against Pollution and its Protocols (UNEP(OCA)/IG.43/6, Annex XI) would apply *mutatis mutandis* to its deliberations.

Agenda item 3 - Election of officers

11. After informal consultations, the Meeting unanimously elected the following officers:

Chairperson :	Mr Charles-François Boudouresque	(France)
Vice-Chairpersons:	Mr El-Sayed A. K. Abo Hegab	(Egypt)
	Ms Marie-Christine Van Klaveren	(Monaco)
Rapporteur :	Mr Mustapha Azeba	(Morocco)

12. The Chairperson thanked the participants for the honour they had done him and expressed his confidence in the successful outcome of the Meeting.

Agenda item 4 - Adoption of the Agenda and organization of work

13. The Meeting adopted the provisional agenda contained in document UNEP(OCA)/MED WG.149/1 and approved the organization of work suggested by the Secretariat in document UNEP(OCA)/MED WG.149/2. The agenda is attached as Annex II to this report.

Agenda item 5 - Establishment of a reference classification of marine habitat types for the Mediterranean region

14. Introducing the draft classification of marine habitat types for the Mediterranean region contained in document UNEP(OCA)/MED WG.149/3/Rev.1, the SPA/RAC Consultant explained that it was based on a zoning scheme covering the whole of France (Natural Zones of Fauna, Flora and Ecological Interest-ZNIEFF), first published in 1988. In the Provence-Alpes-Côte d'Azur (PACA) region, sea-ZNIEFFs has been established to assist decision-makers in managing coastal areas. The work had then been extended to cover the entire coast of France. A new compilation had produced a list of marine biocenoses of the French metropolitan

coasts, published in 1994. Other habitat classification schemes developed within the region had proved to be hardly applicable to the Mediterranean. The present draft classification was based on the 1994 sea-ZNIEFF typology, completely revised and adapted to cover the whole of the Mediterranean.

15. The representative of the European Topic Centre on Nature Conservation (ETC/NC) described the efforts being made by his organization to develop the EUNIS habitat classification on the basis of the CORINE and Palaeartic classifications, with special emphasis on the need to make it readily comprehensible to lay people. The aim was a common language for all classification systems, integrating them in order to permit cross-referencing. He therefore welcomed the draft document before the Meeting.

16. In the course of the general debate on the structure of the draft classification of marine habitat types in the Mediterranean region as a whole, four major issues were raised:

- the advisability of taking into account habitats artificialized by human activities (harbour and polluted habitats),
- consideration of habitats affected by introduced and/or invasive species,
- consideration of habitats in the pelagic environment,
- consideration of eastern Mediterranean habitats.

17. With regard to habitats regarded as artificial and/or artificialized, located in harbour areas and polluted zones, the Meeting agreed that they should not be taken into consideration in the draft classification.

18. With regard to habitats affected by introduced and invasive species, the Meeting agreed that they should be taken into account in the classification since:

- The list of allochthonous species under consideration was not exhaustive,
- The classification was to be reviewed in the light of the evolution of species, scientific knowledge of them, and their impact on the modification of original assemblages.

To this end, the Meeting agreed to include a specific section on habitats affected by introduced and/or invasive species at the end of the classification.

19. Concerning pelagic habitats, the Meeting agreed to entrust a working group, chaired by Ms Bellan-Santini and whose members would communicate by e-mail, with the preparation of a proposal to be submitted to the Meeting of National Focal Points for SPA scheduled for March 1999, with a view to its finalization and incorporation in the habitat classification. To that end, a deadline was set at 31 January 1999. The Meeting agreed on the text of a recommendation, which is contained in Annex V to this report.

20. The Meeting agreed that the proposed classification did not fully cover eastern Mediterranean habitats. It was decided to entrust to a small working group, to be coordinated by Ms Bellan-Santini and whose members would communicate by e-

mail, the task of supplementing the list of habitats. A proposal should be produced by the end of January for submission to the Meeting of National Focal Points to be held in March 1999.

21. Some delegations questioned the advisability of taking into account bird species in the definition of the habitat typology, since they wished to leave open the possibility of considering bird populations in the identification of sites to be included in the inventories. In view of the next meeting of the National focal points for SPA, it was proposed to work on the elaboration of a list of birds to be included in the reference list of species which will be annexed to the criteria for the establishment of national inventories of natural sites of conservation interest, already adopted within MAP.

22. On the subject of terminology, the Consultant drew attention to the three annexes to the draft classification containing the zonation of biocenoses, types of sediment and a lexicon, respectively. The term "peuplement" in French had been abandoned since it had no precise equivalent in English; to cover the meaning, the terms "biocenosis", "facies" and "association" had been given separate definitions. It should be noted that all the definitions included in Annex III had already been published.

23. There was general agreement on the definitions contained in the three annexes. With regard to the sediment typology proposed in Annex II, it was agreed to modify the threshold of 50μ to 63μ , with a view to aligning it with the EUNIS classification. There was also agreement on the need to add a few more definitions.

24. At the Chairperson's suggestion, the Meeting proceeded to a detailed examination of the proposed typology. In the course of the debate, the divergent views expressed gave rise to consultations which resulted in the adoption of a revised text of the classification, which is reproduced in Annex III.

Agenda item 6 - Drawing up of a list of Mediterranean marine habitat types of conservation interest

25. The SPA/RAC Consultant introduced document UNEP(OCA)/MED WG.149/4 containing draft criteria for the evaluation of the conservation interest of Mediterranean marine habitat types and a proposed rating. A few attempts had already been made to establish criteria in the terrestrial field, but very little work had been carried out in the marine area. The only criterion common to both was vulnerability, which was defined at three levels: high, medium and low. The other criteria that had been developed, also at three levels, related to patrimonial, rarity, aesthetic and economic values.

26. At the Chairperson's suggestion, the Meeting proceeded to a general examination of the proposed criteria. In the course of the debate a number of suggestions and modifications were put forward and approved. The Meeting agreed that habitats should be evaluated for the Mediterranean as a whole, on the understanding that the criteria adopted could be used by individual countries at the national and local levels.

27. For terminological reasons and in the interests of consistency, the Chairperson suggested that under the aesthetic criterion the term "landscape", which comprised a series of habitats, should be deleted. In particular, it was decided that SPA/RAC should be invited to study the question of the definition of the marine landscape.

28. The Meeting then proceeded to examine Table 1 on the evaluation of the conservation interest of habitat types with a proposed rating, to which it introduced changes in conformity with the decisions that had been adopted under agenda item 5 and taking into account the practical experience of the different countries of the region. The Table in its revised form is reproduced in Annex IV of the report.

Agenda item 7 - Any other matters

29. At the proposal of two experts, it was decided to draw up three recommendations to be submitted to the Meeting of National Focal Points, on the inadequacy of available knowledge of biodiversity in the eastern Mediterranean, on the need to make every effort to avoid the introduction of invasive species and to monitor their development, and on the preparation of a manual of interpretation of the habitat types included in the classification. The text of these recommendations is reproduced in Annex V to this report.

Agenda item 8 - Adoption of the report of the Meeting

30. The draft report of the Meeting and Annexes III, IV and V were adopted.

Agenda item 9 - Closure of the Meeting

31. After the customary exchange of courtesies, the Chairperson declared the Meeting closed on Friday, 20 November, at 17.00 pm.

ANNEX I**LIST OF PARTICIPANTS
LISTE DES PARTICIPANTS****DELEGATIONS OF THE CONTRACTING PARTIES
DELEGATIONS DES PARTIES CONTRACTANTES****ALBANIA
ALBANIE****Mr Zamir DEDEJ**
Acting Director
Nature Protection Directorate
National Environmental Agency
C/O Ministria e Shendetesise
Bul. Bajram Curri
Tirana
AlbaniaTel: (355) (42) 64904
Fax: (355) (42) 65229
Email : zamir@cep.tirana.al**BOSNIA AND HERZEGOVINA
BOSNIE-HERZEGOVINE****Ms Marlena CUKTERAS**
43 C, Ante Starcevica
Capljina 85000
Bosnia and HerzegovinaTel: (387) (85) 802731
Fax: (387) (85) 802731
Email : mcukteras@hotmail.com**EGYPT
EGYPTE****Mr El-Sayed Abdou Khalil ABO HEGAB**
Zoology Department
Faculty of Science
Cairo University
Cairo
EgyptTel: (20) (2) 240369
Email: AboHegab@FRCU.EUN.EG**EUROPEAN COMMISSION
COMMISSION EUROPEENNE****Mr Tanino DICORRADO**
Administrateur Principal
Direction Affaires Générales et Internationales
Direction Générale de l'Environnement,
Sécurité Nucléaire et Protection Civile
200, Rue de la Loi
1049 Bruxelles
BelgiqueTel : (32) (2) 2969147
Fax : (32) (2) 2994123
Email: Tanino.Dicorrado@dg11.cec.be**FRANCE
FRANCE****Mr Tahar OU-RABAH**
Chargé de mission

Direction de la nature et des paysages
Ministère de l'Aménagement du Territoire et de
l'Environnement
20, Avenue de Ségur
75302 Paris 07 SP
France

Tel: (33) (1) 42192090
Fax: (33) (1) 42191977
Email: tahar.ou-rabah@environnement.gouv.fr

Mme Fabienne ALLAG DHUISME

Chargée de mission
Bureau des habitats naturels
Direction de la Nature et des Paysages
Ministère de l'aménagement du territoire et de
l'environnement
20, Avenue de Ségur
75007 Paris
France

Tel: (33) (1) 42191943
Fax: (33) (1) 42191998
Email: fabienne.allag@environnement.gouv.fr

Mr Charles-François BOUDOURESQUE

Centre d'Océanologie de Marseille
Campus Universitaire de Luminy
13288 Marseille Cedex 9
France

Tel: (33) (4) 91829130
Fax: (33) (4) 91411265
Email: boudour@com.univ-mrs.fr

**GREECE
GRECE**

Ms Thalia LAZARIDOU

Biologist
Greek Biotope/Wetland Centre
14th Kilometer Thessaloniki-Mihaniona
57001 Thermi
Greece

Tel: (30) (31) 476262
Fax: (30) (31) 471795
Email: thalia@ekby.gr

**ISRAEL
ISRAEL**

Mr Reuven ORTAL

Director
Department of Aquatic Ecology
Nature and National Parks Protection Authority

78, Yermiahu St.
Jerusalem 94467
Israel

Tel: (972) (2) 5005444
Fax: (972) (2) 5374887
Email: ORTALA@VMS.HUJI.AC.IL

**ITALY
ITALIE**

Mr Giulio RELINI
Istituto di Zoologia
Università di Genova
Via Balbi, 5
16126 Genova
Italy

Tel: (39) (010) 2477537
fax : (39) (010) 2477537
Email: sibmzool@unige.it

**LEBANON
LIBAN**

Mr Ghazi BITAR
Université libanaise
Faculté des sciences section 1
Hadeth
Liban

Tel: (961) (3) 315162/(5) 801395
Fax: (961) (5) 465562
Email : Lusc1@cnrs.edu.lb

**LIBYAN ARAB JAMAHIRIYA
JAMAHIRIYA ARABE LIBYENNE**

Mr Abdulmaula Abdelmagid HAMZA
Technical Centre for Environment Protection
P.O.Box 83618
Turkey street
Tripoli
Libya

Tel: (218) (21) 4448452
Fax: (218) (21) 3338098/97

**MALTA
MALTE**

Ms Christine TANTI
Environment Officer
Environment Protection Department
Floriana
Malta

Tel: (356) 231782, 230617
Fax: (356) 241378

Email: admin@environment.gov.mt

**MONACO
MONACO**

Mme Marie-Christine VAN KLAVEREN
Chef de division
Direction de l'Environnement
de l'Urbanisme et de la Construction
23, Avenue de Fontvieille
MC-98000 Monaco
Principauté de Monaco

Tel: (377) 93158963
Fax: (377) 92052891
Email: pvk@mcn.mc

**MOROCCO
MAROC**

Mr Mustapha AZEBA
Ministère Chargé des Eaux et Forêts
Direction Régionale des Eaux et Forêts du
Nord-Est
Taza 35000
Maroc

Tel: (212) (5) 280096/97
Fax: (212) (5) 673788

**SLOVENIA
SLOVENIE**

Mr Robert TURK
MZVNKD Piran
TRG Bratstva 1
6330 Piran
Slovenija

Tel: (386) (66) 75676
Fax: (386) (66) 73562
Email: Robert.turk@gov.si

**SPAIN
ESPAGNE**

Mr Juan Carlos SIMON ZARZOSO
Subdir.Gen. de conservacion de la Biodiversidad
D.G. de Conservacion de la Naturaleza
Ministry of Environment
Gran Via San Francisco, 4
28005 Madrid
Spain

Tel: (34) (91) 5975516
Fax: (34) (91) 5975566

**SYRIA
SYRIE**

Mr Bachir EL-ZALEK
Ministère de l'environnement
P.O.Box 3773
Damas
Syrie

Tel: (963) (11) 5425854
Fax: (963) (11) 3314393

**TUNISIA
TUNISIE**

Mr Fethi AYACHE

Direction de la conservation de la nature et du
milieu rural

Ministère de l'Environnement et de

l'Aménagement du Territoire

Centre Urbain Nord - Imm. ICF

Cité Essalama

1030 Tunis Cedex

Tunisie

Tel: (216) (1) 704000

Fax: (216) (1) 702431

**TURKEY
TURQUIE**

Mr Güner ERGUN

Expert

Authority for the Protection of Special Areas

Koza Sakok, No 32

Gaziosmanpasa

06700 Ankara

Turkey

Tel: (90) (312) 4381496

Fax: (90) (312) 4408553

E-mail: ockkb@tr-net.nt.tr

**REGIONAL ACTIVITY CENTRES OF THE MEDITERRANEAN ACTION PLAN
CENTRES D'ACTIVITES REGIONALES DU PLAN D'ACTION POUR LA
MEDITERRANEE**

**REGIONAL ACTIVITY CENTRE
FOR SPECIALLY PROTECTED
AREAS (RAC/SPA)
CENTRE D'ACTIVITES
REGIONALES POUR LES
AIRES SPECIALEMENT
PROTEGEES (CAR/ASP)**

Mr Mohamed Adel HENTATI
Director

Mr Marco BARBIERI
Expert/Marine Biologist

Mr Atef OUERGI
Expert/Marine Biologist

Centre d'Activités Régionales pour les
Aires Spécialement Protégées
Boulevard de l'environnement
BP 337
1080 Tunis Cedex
Tunisie

Tel: (216) (1) 795760
Fax: (216) (1) 797349
Email: car-asp@rac-spa.org.tn

Mme Denise BELLAN-SANTINI
(Consultant du CAR/ASP)
Centre d'Océanologie de Marseille
Station Marine d'Endoume
Rue Batterie de lions
13007 Marseille
France

Tel: (33) (04) 91041633
Fax: (33) (04) 91041635
Email: bellan@com.univ-mrs.fr

**OTHER DELEGATIONS
AUTRES DELEGATIONS**

ACCOBAMS

ACCOBAMS

Mme Marie-Christine VAN KLAVEREN
Secrétariat interimaire de l'Accord

Service des relations exterieures
16, Boulevard de Suisse
MC-98000 Monaco
Principauté de Monaco

Tel: (377) 93158148
Fax: (377) 93509591
Email: pvk@mcn.mc

CENTRE D'OCEANOLOGIE DE

Mr Gérard Léon André BELLAN

MARSEILLE

Station Marine d'Endoume
Rue Batterie des lions
13007 Marseille
France

Tel: (33) (4) 91041612
Fax: (33) (4) 91041635
Email: gbellan@com.univ.mrs.fr

**EUROPEAN ENVIRONMENT
AGENCY/ EUROPEAN
TOPIC CENTRE ON NATURE
CONSERVATION (ETC/NC)
AGENCE EUROPEENNE DE
L'ENVIRONNEMENT/ CENTRE
THEMATIQUE EUROPEEN POUR LA
CONSERVATION DE LA NATURE
(CTE/CN)**

Mr Dorian MOSS
Institute of Terrestrial Ecology
Monks wood
Abbots Ripton
Huntingdon PE17 2LS/ Cambridgeshire
United Kingdom

Tel: (44) (1487) 773381
Fax: (44) (1487) 773467
Email: Dorian.Moss@ite.ac.uk

ICRAM

Mr Leonardo TUNESI
ICRAM
Via di Casalotti, 300
00166 Rome
Italy

Tel: (39) (06) 61570465
Fax: (39) (06) 61550581
Email: L.TUNESI@RDN.IT

MEDMARAVIS

Mr Xaver MONBAILLIU
President
MEDMARAVIS
B.P. 2 -
83470 Saint Maximin
France

Tel: (33) (4) 94594069
Fax: (33) (4) 94594738
Email: medmaraxm@aix.pacwan.net

RAMOGE

Mme Marie-Christine VAN KLAVEREN
16, Boulevard de Suisse
MC-98000 Monaco
Principauté de Monaco

Tel: (377) 93158148
Fax: (377) 93509591
Email: ramoge@dialup.com

**WORLD WIDE FUND
FOR NATURE (WWF)**

Mr Maurizio SPOTO

Mr Roberto ODORICO

WWF - Mediterranean Programme
c/o Marine Reserve of Miramare
Viale Miramare, 349
34100 Trieste
Italy

Tel: (39) (040) 224147
Fax: (39) (040) 224147
Email: spoto@com.area.trieste.it
Odorico@com.area.trieste.it

ANNEX II

AGENDA OF THE MEETING

1. Opening of the Meeting
2. Rules of procedure
3. Election of officers
4. Adoption of the Agenda and organisation of work
5. Establishment of a reference classification of marine habitat types for the Mediterranean region
6. Drawing up of a list of Mediterranean marine habitat types of conservation interest
7. Any other matters
8. Adoption of the report of the meeting
9. Closure of the meeting

ANNEX III

REVISED DRAFT CLASSIFICATION OF BENTHIC MARINE HABITAT TYPES FOR THE MEDITERRANEAN REGION

1. INTRODUCTION

This report aims to establish a classification of the various marine habitats types for the Mediterranean region. This classification could serve as a common reference for the establishment of national inventories of natural sites of conservation interest. This inventory must take into account the different schemes established by the various national and international bodies for the same purpose. The specificity of the Mediterranean Sea, its high level of diversity, and the density of the knowledge already acquired call for harmonisation and for a specific study to be carried out. The types of habitats taken into account constitute most often the general case, whereas the regional specificities are dealt with within the framework of national studies.

Numerous initiatives, meetings, and reports enabled hierarchical lists of European marine habitats to be established. The main purpose of these initiatives (CORINE-biotopes, EEC Habitat Directive 92/43 - Annex 1, Palaearctic Classification, EUNIS habitat classification) was to establish valid lists of all the habitats in Europe.

As early as 1988, France published a zoning scheme covering the whole of the land and part of the coastal areas as Natural Zones of Fauna, Flora and Ecological Interest (ZNIEFF). The classification of the biocenoses established by Peres and Picard (1964) was used for determining the sea-ZNIEFF (Anonymous, 1988) and was taken into account not only for the French coasts but also for the whole of the Mediterranean basin. For the Provence-Alpes-Cote d'Azur Region 107 Sea-ZNIEFF have been created, the main objective of which was to present a synthesis of the scientific data available on this environment to optimise its management.

The inventory of the ZNIEFFs concerns knowledge and is considered as a scientific instrument and not as a legal tool although it is used as a protection and management administrative decision making support tool.

The inventory of the ZNIEFFs is of primary importance for the French state as a basis for international programmes and obligations (inventory of Important Bird Areas, Special Protection Areas in keeping with the EEC "Bird" Directive, inventory as a prerequisite for the designation of Special Conservation Areas in keeping with the EEC "Habitats, Fauna, Flora" Directive, Alpine Convention, Statistics for the European Environment Agency, etc.).

As early as 1991, when the inventory of ZNIEFFs was widely used, a reflection process took place that involved the real estate developers, the users and the scientists in order to:

- learn from the utilisation of the existing inventory,
- improve the legibility of the forms established,
- include new data,
- harmonise and standardise information at national level and with foreign partners.

In 1993, a first list of Parameters and Biocenoses of the metropolitan French coasts (Dauvin *et al.*, 1993) was established by a working group composed of French Mediterranean and Atlantic experts on the benthos.

In 1994, a second updated and completed edition (Dauvin *et al.*, 1994) provided a detailed typology based on the CORINE-biotopes list for the metropolitan French coast.

At the European level, the document 'CORINE biotopes manual' (1988) updated in 1989 and edited in 1991 (Anonymous, 1991) and which is a reference for the EEC Directive 92/43 EEC proved to be of difficult use for maritime purpose and more so in the Mediterranean zone. Not only was it too schematic but it also contained several errors and some misleading information.

For the north-east part of the Atlantic coast, Connor *et al.* (1995), taking as a model the typology of the ZNIEFFs and after several meetings of European experts, could establish a classification of the benthic marine biotopes of the United Kingdom and of the Republic of Ireland. This activity was carried out within the BIOMAR programme.

The classification of Palaeartic habitats (Devilliers and Devilliers-Terschuren, 1996) is a development and a geographical extension of the CORINE biotopes which does not provide significantly more information for the Mediterranean Sea.

For the Mediterranean Sea several more or less complete documents suited to the problem can be used for the demarcation of zones of heritage or ecological interest, zones that require a certain level of protection or for which sensible management is sought:

- the definition of benthic biocenoses resulting from the works in the line of Peres and Picard (1964) and for which there are only few syntheses available (Gamulin Brida, 1967; Augier, 1982; Peres, 1982; Ros *et al.*, 1985; Bellan-Santini *et al.*, 1994);
- the CORINE biotopes classification which is too succinct;
- the classifications of Palaeartic and BIOMAR habitats, unsuitable for the Mediterranean Sea;
- the list of marine biocenoses for the French metropolitan coasts (Dauvin *et al.* 1994) which has been validated for France but which must be completed and reviewed for the Mediterranean Sea; this work is in progress within the framework of the French programme for the revision of ZNIEFFs started in 1995.

The list of marine biocenoses of the French metropolitan coasts (Dauvin *et al.*, 1994) is the result of a compilation made by scientists who worked on benthic populations (communities or biocenoses; habitats as defined by the EEC Directive) in the Mediterranean Sea and on the Atlantic and Channel coasts, followed by a common reflection of these scientists.

Biocenoses have been classified as a function of the zonation and granulometric nature of the sediment.

Priority environments are those that contribute to the identification of the zone either for their own value or for that of the species that dwell in them leaving aside any consideration about the surface. Most assemblages of plants and animals (biocenoses, facies) are fairly easy to identify but the sole mention of the biocenosis can justify the creation of a ZNIEFF in as much as it is sufficiently determinant and most of all accompanied with a list of significant priority species.

This document which concerns the Mediterranean Sea only is based on the document written by Dauvin *et al.* (1994), but since the homogeneity with the Atlantic coasts is no longer necessary it has been completely revised and adapted to the specificities of the Mediterranean zone for the French coastlines (ZNIEFFs re-actualisation programme), and then extended to the whole of the Mediterranean Sea to meet the needs of RAC/SPA.

The typology proposed for the Mediterranean Sea, elaborated from the CORINE biotopes nomenclature, is hierarchical, phytosociological and uses the following as bases of references:

- the zonation as defined by Peres and Picard in 1964 (Appendix I),
- the granulometric nature of the sea beds classified as per the model adopted by Dauvin *et al.* 1994 (Appendix II).

The levels of the facies and sub-facies are mainly limited to those most widely distributed since their number increases as a function of the number of works on benthic communities and they most often constitute a strictly local datum. The facies mentioned have indicative value only. Environments affected by human activity (polluted environments and harbours) are not considered in the text.

The terms used in this report may have appeared with rather different meanings in referenced documents. A lexicon (Appendix III) gives the meaning adopted herein.

2. TYPOLOGY: LIST OF MEDITERRANEAN BENTHIC MARINE BIOCENOSES

I. SUPRALITTORAL

I. 1. MUDS

I. 1. 1. Biocenosis of beaches with slowly-drying wracks under glassworts

I. 2. SANDS

I. 2. 1 Biocenosis of supralittoral sands

I. 2. 1. 1. Facies of sands without vegetation, with scattered debris

I. 2. 1. 2. Facies of depressions with residual humidity

I. 2. 1. 3. Facies of quickly-drying wracks

I. 2. 1. 4. Facies of tree trunks which have been washed ashore

I. 2. 1. 5. Facies of phanerogams which have been washed ashore (upper part)

I. 3. STONES AND PEBBLES

I. 3. 1. Biocenosis of slowly drying wracks

I. 4. HARD BEDS AND ROCKS

I. 4. 1. Biocenosis of supralittoral rock

I. 4. 1. 1. Association with *Entophysalis deusta* and *Verrucaria amphibia*

I. 4. 1. 2. Pools with variable salinity (mediolittoral enclave)

II. MEDIOLITTORAL

II. 1. MUDS, SANDY MUDS AND SANDS

II. 1. 1. Biocenosis of muddy sands and muds

II. 1. 1. 1. Association with halophytes

II. 1. 1. 2. Facies of saltworks

II. 2. SANDS

II. 2. 1. Biocenosis of mediolittoral sands

II. 2. 1. 1. Facies with *Ophelia bicornis*

II. 3. STONES AND PEBBLES

II. 3. 1. Biocenosis of mediolittoral coarse detritic bottoms

II. 3. 1. 1. Facies of banks of dead leaves of *Posidonia oceanica* and other phanerogams

II. 4. HARD BEDS AND ROCKS

II. 4. 1. Biocenosis of the upper mediolittoral rock

II. 4. 1. 1. Association with *Bangia atropurpurea*

II. 4. 1. 2. Association with *Porphyra leucosticta*

II. 4. 1. 3. Association with *Nemalion helminthoides* and *Rissoella verruculosa*

II. 4. 1. 4. Association with *Lithophyllum papillosum* and *Polysiphonia* spp.

II. 4. 2. Biocenosis of the lower mediolittoral rock

II. 4. 2. 1. Association with *Lithophyllum lichenoides* (= entablature with *L. tortuosum*)

II. 4. 2. 2. Association with *Lithophyllum byssoides*

II. 4. 2. 3. Association with *Tenarea undulosa*

II. 4. 2. 4. Association with *Ceramium ciliatum* and *Corallina elongata*

II. 4. 2. 5. Facies with *Pollicipes cornucopiae*

II. 4. 2. 6. Association with *Enteromorpha compressa*

II. 4. 2. 7. Association with *Fucus virsoides*

II. 4. 2. 8. *Neogoniolithon brassica-florida* concretion

II. 4. 2. 9. Association with *Gelidium* spp.

II. 4.2.10. Pools and lagoons sometimes associated with vermetids (infralittoral enclave)

II. 4. 3. Mediolittoral caves

II. 4. 3. 1. Association with *Phymatolithon lenormandii* and *Hildenbrandia rubra*

III. INFRALITTORAL

III. 1. SANDY MUDS, SANDS, GRAVELS AND ROCKS IN EURYHALINE AND EURYTHERMAL ENVIRONMENT

III. 1. 1. Euryhaline and eurythermal biocenosis

- III. 1. 1. 1. Association with *Ruppia cirrhosa* and/or *Ruppia maritima*
- III. 1. 1. 2. Facies with *Ficopomatus enigmaticus*
- III. 1. 1. 3. Association with *Potamogeton pectinatus*
- III. 1. 1. 4. Association with *Zostera noltii* in euryhaline and eurythermal environment
- III. 1. 1. 5. Association with *Zostera marina* in euryhaline and eurythermal environment
- III. 1. 1. 6. Association with *Gracilaria* spp.
- III. 1. 1. 7. Association with *Chaetomorpha linum* and *Valonia aegagropila*
- III. 1. 1. 8. Association with *Halopithys incurva*
- III. 1. 1. 9. Association with *Ulva laetevirens* and *Enteromorpha linza*
- III. 1. 1. 10. Association with *Cystoseira barbata*
- III. 1. 1. 11. Association with *Lamprothamnium papulosum*
- III. 1. 1. 12. Association with *Cladophora echinus* and *Rytiphloea tinctoria*

III. 2. FINE SANDS WITH MORE OR LESS MUD

III. 2. 1. Biocenosis of fine sands in very shallow waters

- III. 2. 1. 1. Facies with *Lentidium mediterraneum*

III. 2. 2. Biocenosis of well sorted fine sands

- III. 2. 2. 1. Association with *Cymodocea nodosa* on well sorted fine sands
- III. 2. 2. 2. Association with *Halophila stipulacea*

III. 2. 3. Biocenosis of superficial muddy sands in sheltered waters

- III. 2. 3. 1. Facies with *Callinassa tyrrhena* and *Kellia corbuloides*
- III. 2. 3. 2. Facies with fresh water resurgences with *Cerastoderma glaucum* and *Cyathura carinata*
- III. 2. 3. 3. Facies with *Loripes lacteus*, *Tapes* spp.

III. 2. 3. 4. Association with *Cymodocea nodosa* on superficial muddy sands in sheltered waters

III. 2. 3. 5. Association with *Zostera noltii* on superficial muddy sands in sheltered waters

III. 2. 3. 6. Association with *Caulerpa prolifera* on superficial muddy sands in sheltered waters

III. 2. 3. 7. Facies of hydrothermal oozes with *Cyclope neritea* and nematodes

III. 3. COARSE SANDS WITH MORE OR LESS MUD

III. 3. 1. Biocenosis of coarse sands and fine gravels mixed by the waves

III. 3. 1. 1. Association with rhodolithes

III. 3. 2. Biocenosis of coarse sands and fine gravels under the influence of bottom currents (also found in the Circalittoral)

III. 3. 2. 1. Maërl facies (= Association with *Lithothamnion corallioides* and *Phymatolithon calcareum*) (can also be found as facies of the biocenosis of coastal detritic).

III. 3. 2. 2. Association with rhodolithes

III. 4. STONES AND PEBBLES

III. 4. 1. Biocenosis of infralittoral pebbles

III. 4. 1. 1. Facies with *Gouania wildenowi*

III. 5. POSIDONIA OCEANICA MEADOWS

III. 5. 1. Posidonia oceanica meadows (= Association with *Posidonia oceanica*)

III. 5. 1. 1. Ecomorphosis of striped meadows

III. 5. 1. 2. Ecomorphosis of "barrier-reef" meadows

III. 5. 1. 3. Facies of dead "mattes" of *Posidonia oceanica* without much epiflora

III. 5. 1. 4. Association with *Caulerpa prolifera*

III. 6. HARD BEDS AND ROCKS

III. 6. 1. Biocenosis of infralittoral algae¹:

- III. 6. 1. 1. Overgrazed facies with encrusting algae and sea urchins
- III. 6. 1. 2. Association with *Cystoseira amentacea* (var. *amentacea*, var. *stricta*, var. *spicata*)
- III. 6. 1. 3. Facies with Vermetids
- III. 6. 1. 4. Facies with *Mytilus galloprovincialis*
- III. 6. 1. 5. Association with *Corallina elongata* and *Herposiphonia secunda*
- III. 6. 1. 6. Association with *Corallina officinalis*
- III. 6. 1. 7. Association with *Codium vermilara* and *Rhodymenia ardissoni*
- III. 6. 1. 8. Association with *Dasycladus vermicularis*
- III. 6. 1. 9. Association with *Alsidium helminthochorton*
- III. 6. 1. 10. Association with *Cystoseira tamariscifolia* and *Saccorhiza polyschides*
- III. 6. 1. 11. Association with *Gelidium spinosum* v. *hystrix*
- III. 6. 1. 12. Association with *Lobophora variegata*
- III. 6. 1. 13. Association with *Ceramium rubrum*
- III. 6. 1. 14. Facies with *Cladocora caespitosa*
- III. 6. 1. 15. Association with *Cystoseira brachycarpa*
- III. 6. 1. 16. Association with *Cystoseira crinita*
- III. 6. 1. 17. Association with *Cystoseira crinitophylla*
- III. 6. 1. 18. Association with *Cystoseira sauvageauana*
- III. 6. 1. 19. Association with *Cystoseira spinosa*
- III. 6. 1. 20. Association with *Sargassum vulgare*
- III. 6. 1. 21. Association with *Dictyopteris polypodioides*
- III. 6. 1. 22. Association with *Calpomenia sinuosa*
- III. 6. 1. 23. Association with *Stypocaulon scoparium* (= *Halopteris scoparia*)
- III. 6. 1. 24. Association with *Trichosolen myura* and *Liagora farinosa*
- III. 6. 1. 25. Association with *Cystoseira compressa*

- III. 6. 1. 26. Association with *Pterocladia capillacea* and *Ulva*

¹ the facies and associations of the biocenosis of infralittoral algae are presented in accordance with the two dominant factors affecting this biocenosis, namely hydrodynamics and light, in descending order.

laetevirens

III. 6. 1. 27. Facies with large Hydrozoa

III. 6. 1. 28. Association with *Pterothamnion crispum* and
Compsothamnion thuyoides

III. 6. 1. 29. Association with *Schottera nicaeensis*

III. 6. 1. 30. Association with *Rhodymenia ardissoni* and *Rhodophyllis
divaricata*

III. 6. 1. 31. Facies with *Astroides calycularis*

III. 6. 1. 32. Association with *Flabellia petiolata* and *Peyssonnelia
squamaria*

III. 6. 1. 33. Association with *Halymenia floresia* and *Halarachnion
ligulatum*

III. 6. 1. 34. Association with *Peyssonnelia rubra* and *Peyssonnelia* spp.

III. 6. 1. 35. Facies and Associations of Coralligenous biocenosis (in
enclave)

IV. CIRCALITTORAL

IV. 1. MUDS

IV. 1. 1. Biocenosis of coastal terrigenous muds

IV. 1. 1. 1. Facies of soft muds with *Turritella tricarinata communis*

IV. 1. 1. 2. Facies of sticky muds with *Virgularia mirabilis* and
Pennatula phosphorea

IV. 1. 1. 3. Facies of sticky muds with *Alcyonium palmatum* and
Stichopus regalis

IV. 2. SANDS

IV. 2. 1. Biocenosis of the muddy detritic bottom

IV. 2. 1. 1. Facies with *Ophiothrix quinquemaculata*

IV. 2. 2. Biocenosis of the coastal detritic bottom

IV. 2. 2. 1. Association with rhodolithes

IV. 2. 2. 2. Maërl Facies (*Lithothamnion corallioides* and
Phymatholithon calcareum)

IV. 2. 2. 3. Association with *Peyssonnelia rosa-marina*

IV. 2. 2. 4. Association with *Arthrocladia villosa*

- IV. 2. 2. 5. Association with *Osmundaria volubilis*
- IV. 2. 2. 6. Association with *Kallymenia patens*
- IV. 2. 2. 7. Association with *Laminaria rodriguezii* on detritic
- IV. 2. 2. 8. Facies with *Ophiura texturata*
- IV. 2. 2. 9. Facies with Synascidies
- V. 2. 2. 10. Facies with large Bryozoa

IV. 2. 3. Biocenosis of shelf-edge detritic bottom

- IV. 2. 3. 1. Facies with *Neolampas rostellata*
- IV. 2. 3. 2. Facies with *Leptometra phalangium*

IV. 2. 4. Biocenosis of coarse sands and fine gravels under the influence of bottom currents (biocenosis found in areas under specific hydrodynamic conditions - straits-; also found in the Infralittoral)

IV. 3. HARD BEDS AND ROCKS

IV. 3. 1. Coralligenous biocenosis

- IV. 3. 1. 1. Association with *Cystoseira zosteroides*
- IV. 3. 1. 2. Association with *Cystoseira usneoides*
- IV. 3. 1. 3. Association with *Cystoseira dubia*
- IV. 3. 1. 4. Association with *Cystoseira corniculata*
- IV. 3. 1. 5. Association with *Sargassum* spp. (indigenous)
- IV. 3. 1. 6. Association with *Mesophyllum lichenoides*
- IV. 3. 1. 7. Association with *Lithophyllum frondosum* and *Halimeda tuna*
- IV. 3. 1. 8. Association with *Laminaria ochroleuca*
- IV. 3. 1. 9. Association with *Rodriguezella strafforelli*
- IV. 3. 1. 10. Facies with *Eunicella cavolinii*
- IV. 3. 1. 11. Facies with *Eunicella singularis*
- IV. 3. 1. 12. Facies with *Lophogorgia sarmentosa*
- IV. 3. 1. 13. Facies with *Paramuricea clavata*
- IV. 3. 1. 14. Facies with *Parazoanthus axinellae*
- IV. 3. 1. 15. Coralligenous platforms

IV.3. 2. Semi-dark caves (also in enclave in upper stages)

IV. 3. 2. 1. Facies with *Parazoanthus axinellae*

IV. 3. 2. 2. Facies with *Corallium rubrum*

IV. 3. 2. 3. Facies with *Leptopsammia pruvoti*

IV. 3. 3. Biocenosis of shelf-edge rock

V. BATHYAL

V. 1. MUDS

V. 1. 1. Biocenosis of bathyal muds

V. 1. 1. 1. Facies of sandy muds with *Thenaea muricata*

V. 1. 1. 2. Facies of fluid muds with *Brissopsis lyrifera*

V. 1. 1. 3. Facies of soft muds with *Funiculina quadrangularis* and *Apporhais seressianus*

V. 1. 1. 4. Facies of compact muds with *Isidella elongata*

V. 1. 1. 5. Facies with *Pheronema grayi*

V. 2. SANDS

V. 2. 1. Biocenosis of bathyal detritic sands with *Grypheus vitreus*

V. 3. HARD BEDS AND ROCKS

V. 3. 1. Biocenosis of deep sea corals

V. 3. 2. Caves and ducts in total darkness (in eclave in the upper stages)

VI ABYSSAL

VI. 1. MUDS

VI. 1. 1. Biocenosis of abyssal muds

RECENT CASES OF HABITATS AFFECTED BY INTRODUCED AND/OR INVASIVE SPECIES

Two majors cases have been observed :

1. The species constitutes an individualized facies or association (eg. *Sargassum mutans*, *Brachydontes pharaonis*, *Styopodium shimperi*,...)
2. The species affects several habitats, possibly on several stages (eg. *Caulerpa taxifolia*, *Caulerpa racemosa*,...)

APPENDIX I

ZONATION OF BIOCENOSES IN THE MEDITERRANEAN REGION

(Bellan-Santini *et al.* 1994)

Two main systems can be distinguished as a function of the vertical light gradient:

- the phytal system which is the habitat of all types of flora;
- the aphyital system which is not the habitat of autotrophic flora except for certain algae in conditions still unclear.

Each of the two main systems comprises subdivisions or stages.

The phytal system comprises:

- the Supralittoral stage where organisms that require a high level of humidifying but that are never immersed are present. The upper limit corresponds to the zone splashed by the waves (including the spray of the waves);
- the Mediolittoral stage which corresponds to the zone affected by waves, submitted to sea level variations caused by the wind, atmospheric pressure and tides;
- the Infralittoral stage which is the immersed zone compatible with the life of the marine phanerogams and photophilous algae;
- the Circalittoral stage which stretches up to the survival boundary of autotrophic pluricellular algae (general case).

The aphyital system comprises:

- the Bathyal stage which stretches up to the boundary of the continental slope;
- the Abyssal stage, the presence of which is acknowledged in the Mediterranean sea (Pérès, 1984; Bellan-Santini, 1985; Laubier & Emig, 1993) and which corresponds to the plain that would start at about 2,000 m. A faunistic renewal is noticed there, the reasons of which are still unclear, and a high endemism rate.

The boundary between the last two stages is still insufficiently defined in the Mediterranean sea.

APPENDIX II

TYPES OF SEDIMENTS SELECTED

(Dauvin *et al.*, 1993, modified)

- Mud: more than 75% of fine particles < 63µm
- Sandy mud: 25 to 75% fine particles < 63µm
- Fine sand with more or less mud: 5 to 25% of fine particles < 63µm
- Fine sand: less than 5% of fine particles, fraction larger than 2 mm < 15%, median smaller than 250µm
- Dune medium sand: about 0% of fine particles, fraction larger than 2 mm < 15%, median between 315 and 800 µm
- Heterogeneous muddy sand: fine particles between 10 and 30%, sand, coarse sand and gravel between 50 and 80%
- Coarse sand: less than 5% of fine particles, more than 50% of sand + fine particles, median smaller than 2 mm
- Muddy heterogeneous sediment: more than 5% of fine, median larger than 500 µm, high percentage of pebbles or shells
- Gravel: less than 5% of fine particles, less than 50% of pebbles + shells, median larger than 2 mm
- Small stones: less than 5% of fine particles, more than 50% of pebbles + shells.

Granulometry (as per Larssonneur, 1977, modified)

- . Rock chaos;
 - . Blocks: larger than 10 cm;
 - . Pebbles and shells: elements larger than 2 cm ;
 - . Coarse gravel: elements between 1 and 2 cm ;
 - . Medium gravel: elements between 5 and 10 mm ;
 - . Small gravel and particles: elements between 2 and 5 mm ;
 - . Coarse sand: elements between 1 and 2 mm ;
 - . Medium sand: elements between 0.5 and 1 mm ;
 - . Fine sand: elements between 0.2 and 0.5 mm ;
 - . Finer sand: elements between 0.1 and 0.2 mm ;
 - . Finest sand: elements between 0.063 and 0.1 mm ;
 - . Fine particles: mud + clay: fraction smaller than 0.063 mm.
-
- . well sorted sediment ;
 - . poorly sorted sediment, heterogeneous.

APPENDIX III

LEXICON

Association: permanent aspect of a biocenosis with a vegetal physiognomic dominance where the species are linked by an ecological compatibility and a chorological affinity.

Biocenosis : grouping of living organisms, linked by relationships of interdependence within a biotope with relatively homogenous major characteristics; each biocenosis comprises mainly the phytocenosis, which includes flora, and the zoocenosis, which includes fauna. The notions of community or association in the phytosociological sense of the word are very close to the notion of biocenosis although they cannot exactly replace it.

Biotope: geographical area with variable surface or volume submitted to ecological conditions where the dominant elements are homogenous.

Characteristics: a species is considered as characteristic when it is exclusive or preferential for the biotope considered, whether it is represented widely or not, sporadic or not.

Community: grouping of living organisms linked by interdependence relationships within a biotope, typically characterized with respect to one or several dominant species.

Ecomorphosis : a particular morphology linked to local ecological conditions.

Enclave: local existence for microclimatic reasons of a habitat within a surface normally occupied by another habitat or another stage.

Euryhaline: which exhibits a large range of variation of the salinity.

Facies: aspect exhibited by a biocenosis when the local predominance of certain factors causes the prevalence of either one or a very small number of species, essentially animal ones.

Habitat: area distinguished by geographic, abiotic and biotic features (definition of EEC Directive 92/43). the definition of the habitat can be compared herein to that of a biocenosis, facies and association.

Introduced species: species whose remote (not marginal) extension of the range is linked, directly or indirectly, to human activity. Within its new area, populations of individuals are born *in situ*, without human assistance (it is naturalized).

Invasive species: is an introduced species which has become a key species, or which has a significant impact on key species, functional groups or landscape, and/or a species which has a negative economic impact.

Stage: vertical space of the marine benthic domain where the ecological conditions, as a function of its situation with respect to the sea level, are notably constant or fluctuate regularly between the two critical levels which indicate the boundaries of the stage.

ANNEX IV

REVISED CRITERIA FOR THE EVALUATION OF THE CONSERVATION INTEREST OF MEDITERRANEAN MARINE HABITAT TYPES AND PROPOSED RATING

1. CRITERIA FOR THE EVALUATION OF THE CONSERVATION INTEREST OF MEDITERRANEAN MARINE HABITAT TYPES

The various lists of threatened or endangered species (Barcelona Protocol - Annex II, Berne Convention, Habitat Directive - Annex II) were established using selection criteria determined by various Organisations and which are referenced in various documents (Wells *et al.*, 1983, IUCN 1994, UNEP 1995, Boudouresque *et al.*, 1996). Criteria were also defined for the evaluation of sites (Barcelona Protocol - Annex I, Habitat Directive - Annex III, Bardat *et al.* 1997, MAP/UNEP, 1997).

As to the habitats, a few attempts were made in the terrestrial domain to evaluate them and to establish their hierarchy (*in* Bardat *et al.*, 1997) but almost never in the marine domain.

Certain habitats clearly deserve specific attention due to their vulnerability but also because other criteria make them important: presence of species either protected or considered as having a high heritage value, but also intrinsic value of the habitat from an aesthetic, economic, heritage view point, or due to its rarity.

Bardat *et al.* (1997) have established a natural space evaluation method. For this they present site selection criteria among which only one is specific to the habitats:

vulnerability which they define as the inability of the habitat to maintain its structure and its functions when faced with unfavorable influences either potential or existing. Its evaluation considered as subjective is sometimes questioned. They evaluate it as per three levels:

- 1: high vulnerability,
- 2: medium vulnerability,
- 3: low vulnerability.

The other criteria that we will take into consideration characterise the intrinsic value of a habitat (biocenosis, association, facies) hence the interest to maintain its condition even if it does not face a potentially direct threat. Their scale can also be assessed as per three levels.

Heritage value: appraisal of the value of a given habitat for the national or regional natural heritage due to its unique character, which may be endemic, structurally exceptional (cliff, cave, "platier"...) or have a unique ecological situation (meeting of two masses of water, concentration zone) or be of symbolic and cultural value:

- 1: high heritage value,
- 2: medium value value,
- 3: low heritage value.

Rarity: habitat encountered more or less frequently:

- 1: habitat known in only one or in a very limited number of sites,
- 2: habitat rare in most countries for it is endemic to a zone or very scattered,
- 3: habitat not rare.

Aesthetic: evaluation of the aesthetic and landscape value of a given habitat:

- 1: habitat of high aesthetic value,
- 2: habitat of medium aesthetic value,
- 3: habitat of low aesthetic value.

Economic: evaluation of the economic significance of a given habitat either direct due to its richness in species exploited by fishing activities or indirect due to its significance in the trophic network or of its possible touristic exploitation:

- 1: high economic value,
- 2: medium economic value,
- 3: low economic value.

On the basis of these criteria, habitats can be classified into three main categories:

- Priority habitats (P): habitats the conservation of which is mandatory. There are several class 1 criteria.

- Remarkable habitats (R): habitats that deserve specific attention or management. There is one class 1 criterion.

- Other habitats (OH): habitats that have no rarity or vulnerability character and the heritage, aesthetic and economic importance of which is limited. These habitats do not require special conservation or management measures. There is no class 1 criterion.

A table with several topics enables habitats to be classified either by criteria or according to a set of two criteria or more to determine, depending on the needs, the protection or management levels sought.

It is clear that the assessment of the level for each criterion is carried out for the Mediterranean as a whole, but can also be applied locally, nationally and subregionally.

The estimation of the level for each criteria can be made using three data sources:

- exploitation of the literature,
- information collected from amateurs and professionals,
- on site prospection within the framework of local, national or international programmes.

2. EVALUATION OF THE CONSERVATION INTEREST OF MEDITERRANEAN MARINE HABITAT TYPES AND PROPOSED RATING

A provisional list of the types of habitats with an attribution - provisional too - of the criteria levels selected is given here below (Tab. 1).

It is worth noting that the evaluation of the habitats at the level of association and facies is not necessarily the same as that of the biocenosis which those associations and facies belong to. Some of them could be considered as priority, i.e. requiring, due to their vulnerability, their heritage quality, their rarity or their high aesthetic value, a specific protection whereas the biocenosis itself or the other facies are of no specific interest. Moreover, the evaluation levels of each criterion can vary as a function of the local conditions.

Table 1

Assessment of the conservation interest of habitat types and proposed rating for the whole of the Mediterranean

Legend: Criteria : V : vulnerability; H : heritage value; R : rarity; Ae : Aesthetic; Ec : Economic significance. Rating (Rt) : P: Priority habitat; R : Remarkable habitat; OH : Other habitat.

	V	H	R	Ae	Ec	Rt
I. SUPRALITTORAL						
Biocenosis of beaches with slowly-drying wracks under glassworts	2	3	2	3	3	OH
Biocenosis of supralittoral sands	1	2	3	3	2	R
Facies of sands without vegetation, with scattered debris	1	2	3	3	2	R
Facies of depressions with residual humidity	1	2	3	3	3	R
Facies of quickly-drying wracks	1	2	3	3	3	R
Facies of tree trunks which have been washed ashore	1	2	3	3	2	R
Facies of phanerogams which have been washed ashore(upper part)	1	2	3	2	1	P
Biocenosis of slowly drying wracks	2	3	3	3	3	OH
Biocenosis of supralittoral rock	2	2	3	3	3	OH
Association with <i>Entophysalis deusta</i> and <i>Verrucaria amphibia</i>	2	2	3	3	3	OH
Pools of variable salinity (mediolittoral enclave)	1	2	2	3	3	R
II. MEDIOLITTORAL						
Biocenosis of muddy sands and muds	2	3	2	3	2	OH
Association with halophytes	1	1	2	3	2	P
Facies of saltworks	1	1	2	3	2	P
Biocenosis of mediolittoral sands	1	2	3	2	2	R
Facies with <i>Ophelia bicornis</i>	1	2	2	2	2	R
Biocenosis of the mediolittoral coarse detritic bottoms	2	3	3	3	3	OH
Facies of banks of dead leaves of <i>Posidonia oceanica</i> and other phanerogams	1	2	3	2	1	P
Biocenosis of the upper mediolittoral rock	2	2	2	2	3	OH
Association with <i>Bangia atropurpurea</i>	2	2	2	2	3	OH

Association with <i>Porphyra leucosticta</i>	2	3	3	2	3	OH
Association with <i>Nemalion helminthoides</i> and <i>Rissoella verruculosa</i>	1	1	2	2	3	P
Association with <i>Lithophyllum papillosum</i> and <i>Polysiphonia</i> spp.	1	1	2	2	3	P
Biocenosis of the lower mediolittoral rock	1	2	2	2	3	R
Association with <i>Lithophyllum lichenoides</i>	1	1	1	1	3	P
Association with <i>Lithophyllum byssoides</i>	1	2	2	2	3	R
Association with <i>Tenarea undulosa</i>	1	2	2	2	3	R
Association with <i>Ceramium ciliatum</i> and <i>Corallina elongata</i>	1	2	2	2	3	R
Facies with <i>Pollicipes cornucopiae</i>	1	2	1	3	2	P
Association with <i>Enteromorpha compressa</i>	3	3	3	3	3	OH
Association with <i>Fucus virsoides</i>	1	1	1	2	3	P
<i>Neogoniolithon brassica-florida</i> concretion	1	1	2	2	3	P
Association with <i>Gelidium</i> spp.	2	2	2	2	3	OH
Pools and lagoons sometimes associated with vermetids (infralittoral enclave)	1	1	2	2	3	P
Mediolittoral caves	1	1	1	2	2	P
Association with <i>Phymatolithon lenormandii</i> and <i>Hildenbrandia rubra</i>	1	2	1	2	3	P

III. INFRALITTORAL

Euryhaline and eurythermal biocenosis	1	2	3	3	2	R
Association with <i>Ruppia cirrhosa</i> and/or <i>Ruppia maritima</i>	1	1	2	3	3	P
Association with <i>Ficopomatus enigmaticus</i>	1	2	2	3	3	R
Association with <i>Potamogeton pectinatus</i>	1	1	2	3	3	P
Association with <i>Zostera noltii</i> (euryhaline and eurythermal env.)	1	1	2	3	3	P
Association with <i>Zostera marina</i> (euryhaline and eurythermal env.)	1	1	2	3	3	P
Association with <i>Gracilaria</i> spp.	1	2	2	3	3	R
Association with <i>Chaetomorpha linum</i> and <i>Valonia aegagropila</i>	1	2	2	3	3	R
Association with <i>Halopitys incurva</i>	1	1	2	3	3	P
Association with <i>Ulva laetevirens</i> and <i>Enteromorpha linza</i>	2	2	2	3	3	OH
Association with <i>Cystoseira barbata</i>	1	2	2	2	3	R
Association with <i>Lamprothamnium papulosum</i>	1	2	2	3	3	R
Association with <i>Cladophora echinus</i> and <i>Ritiphloea tinctoria</i>	1	2	2	3	3	R
Biocenosis of fine sands in very shallow waters	1	2	3	3	3	R
Facies with <i>Lentidium mediterraneum</i>	1	2	2	3	2	R
Biocenosis of well sorted fine sands	1	2	3	3	2	R
Association with <i>Cymodocea nodosa</i> on well sorted fine sands	1	2	2	3	2	R
Association with <i>Halophila stipulacea</i>	1	1	2	3	3	P
Biocenosis of superficial muddy sands in sheltered waters	1	3	3	3	2	R
Facies with <i>Callianassa tyrrhena</i> and <i>Kellia corbuloides</i>	1	3	2	3	3	R
Facies with fresh water resurgences with <i>Cerastoderma glaucum</i> and <i>Cyathura carinata</i>	1	3	2	3	2	R
Facies with <i>Loripes lacteus</i> , <i>Tapes</i> spp.	1	3	2	3	1	P
Association with <i>Cymodocea nodosa</i>	1	2	2	2	2	R
Association with <i>Zostera noltii</i>	1	1	2	2	2	P
Association with <i>Caulerpa prolifera</i>	2	2	2	2	2	OH
Facies of hydrothermal oozes with <i>Cyclope neritea</i> and nematodes	1	1	1	3	3	P
Biocenosis of coarse sands and fine gravels mixed by the waves	2	2	2	3	3	OH
Association with rhodolithes	1	1	2	2	3	P
Biocenosis of coarse sands and fine gravels under bottom currents (Inf)	1	2	2	3	3	R
Maerl facies (<i>Lithothamnion corallioides</i> & <i>Phymatolithon calcareum</i>)	1	1	1	2	2	P

Association with rhodolithes	1	1	2	2	3	P
Biocenosis of infralittoral pebbles	3	3	2	3	3	OH
Facies with <i>Gouania wildenowi</i>	2	1	2	3	3	R
<i>Posidonia oceanica</i> meadows	1	1	2	1	1	P
Ecomorphosis of striped meadows	1	1	2	1	1	P
Ecomorphosis of "barrier-reef" meadows	1	1	2	1	1	P
Facies of dead mattes of <i>Posidonia oceanica</i> without much epiflora	2	3	2	3	3	OH
Association with <i>Caulerpa prolifera</i>	2	3	2	3	3	OH
Biocenosis of infralittoral algae	1	2	2	2	2	R
Overgrazed facies with incrustant algae and sea urchins	3	3	3	3	3	OH
Association with <i>Cystoseira amentacea</i> (var. <i>amentacea</i> , var. <i>stricta</i> , var. <i>spicata</i>)	1	1	2	2	2	P
Facies with Vermetids	1	1	1	1	3	P
Facies with <i>Mytilus galloprovincialis</i>	3	3	3	3	2	OH
Association with <i>Corallina elongata</i> and <i>Herposiphonia secunda</i>	3	3	3	3	3	OH
Association with <i>Corallina officinalis</i>	3	3	3	3	3	OH
Association with <i>Codium vermilara</i> and <i>Rhodymenia ardissoni</i>	3	3	2	3	3	OH
Association with <i>Dasycladus vermicularis</i>	2	2	2	2	3	OH
Association with <i>Alsidium helminthochorton</i>	2	2	2	2	3	OH
Association with <i>Cystoseira tamariscifolia</i> and <i>Saccorhiza polyschides</i>	1	1	2	2	2	P
Association with <i>Gelidium spinosum v. hystrix</i>	2	2	2	2	3	OH
Association with <i>Lobophora variegata</i>	2	2	2	2	3	OH
Association with <i>Ceramium rubrum</i>	2	2	2	2	3	OH
Facies with <i>Cladocora caespitosa</i>	1	2	1	2	2	P
Association with <i>Cystoseira brachycarpa</i>	1	1	2	2	2	P
Association with <i>Cystoseira crinita</i>	1	1	2	2	2	P
Association with <i>Cystoseira crinitophylla</i>	1	1	2	2	2	P
Association with <i>Cystoseira sauvageauana</i>	1	1	2	2	2	P
Association with <i>Cystoseira spinosa</i>	1	1	2	2	2	P
Association with <i>Sargassum vulgare</i>	1	1	2	2	2	P
Association with <i>Dictyopteris polypodioides</i>	2	3	2	2	3	OH
Association with <i>Calpomenia sinuosa</i>	3	3	3	3	3	OH
Association with <i>Stypocaulon scoparium (=Halopteris scoparia)</i>	2	3	2	2	3	OH
Association with <i>Trichosolen myura</i> and <i>Liagora farinosa</i>	2	2	2	2	3	OH
Association with <i>Cystoseira compressa</i>	1	1	2	2	2	P
Association with <i>Pterocladia capillacea</i> and <i>Ulva laetevirens</i>	2	2	2	2	3	OH
Facies with large Hydrozoa	1	2	2	2	3	R
Association with <i>Pterothamnion crispum</i> and <i>Compsothamnion thuyoides</i>	2	2	2	2	3	OH
Association with <i>Schottera nicaeensis</i>	2	1	2	2	3	R
Association with <i>Rhodymenia ardissoni</i> and <i>Rhodophyllis divaricata</i>	2	2	2	2	3	OH
Facies with <i>Astroides calycularis</i>	2	2	2	1	2	R
Association with <i>Flabellia petiolata</i> and <i>Peyssonnelia squamaria</i>	2	2	2	2	3	OH
Association with <i>Halymenia floresia</i> and <i>Halarachnion ligulatum</i>	2	2	2	2	3	OH
Association with <i>Peyssonnelia rubra</i> and <i>Peyssonnelia</i> spp.	2	2	2	2	3	OH
Facies and Associations of Coralligenous biocenosis	1	1	2	1	2	P
IV. CIRCALITTORAL						
Biocenosis of coastal terrigenous muds	3	3	3	3	1	R

Facies of soft muds with <i>Turritella tricarinata communis</i>	3	3	3	3	1	R
Facies of sticky muds with <i>Virgularia mirabilis</i> and <i>Pennatula phosphorea</i>	2	3	2	3	1	R
Facies of sticky muds with <i>Alcyonium palmatum</i> and <i>Stichopus regalis</i>	2	3	2	3	1	R
Biocenosis of the muddy detritic bottom	2	3	2	3	1	R
Facies with <i>Ophiothrix quinquemaculata</i>	2	3	2	3	3	OH
Biocenosis of the coastal detritic bottom	2	2	2	3	2	OH
Association with rhodolithes	2	2	2	3	3	OH
Maerl facies (<i>Lithothamnion corallioides</i> & <i>Phymatolithon calcareum</i>)	1	2	2	2	3	R
Association with <i>Peyssonnelia rosa-marina</i>	1	2	2	2	3	R
Association with <i>Arthrocladia villosa</i>	2	2	2	2	3	OH
Association with <i>Osmundaria volubilis</i>	1	2	2	3	3	R
Association with <i>Kallymenia patens</i>	1	2	2	3	3	R
Association with <i>Laminaria rodriguezii</i> on detritic	1	1	1	2	3	P
Facies with <i>Ophiura texturata</i>	2	2	2	3	2	OH
Facies with Synascidies	2	2	2	3	3	OH
Facies with large Bryozoa	1	1	2	2	3	P
Biocenosis of shelf-edge detritic bottom	3	3	2	3	1	R
Facies with <i>Neolampas rostellata</i>	3	3	2	3	2	OH
Facies with <i>Leptometra phalangium</i>	3	3	2	3	2	OH
Biocen. of coarse sands and fine gravels under bottom currents (Circ)	2	2	1	3	3	R
Corralligenous biocenosis	1	1	2	1	2	P
Association with <i>Cystoseira zosteroides</i>	1	2	1	1	3	P
Association with <i>Cystoseira usneoides</i>	1	2	1	1	3	P
Association with <i>Cystoseira dubia</i>	1	2	1	1	3	P
Association with <i>Cystoseira corniculata</i>	1	2	1	1	3	P
Association with <i>Sargassum</i> spp. (indigenous)	1	1	1	2	3	P
Association with <i>Mesophyllum lichenoides</i>	2	2	2	2	3	OH
Association with <i>Lithophyllum frondosum</i> and <i>Halimeda tuna</i>	1	2	2	2	2	R
Association with <i>Laminaria ochroleuca</i>	1	2	1	1	3	P
Association with <i>Rodriguezella strafforelli</i>	1	1	1	1	3	P
Facies with <i>Eunicella cavolinii</i>	1	1	3	1	2	P
Facies with <i>Eunicella singularis</i>	1	1	2	1	2	P
Facies with <i>Lophogorgia sarmentosa</i>	1	1	1	1	3	P
Facies with <i>Paramuricea clavata</i>	1	1	2	1	2	P
Facies with <i>Parazoanthus axinellae</i>	2	2	2	1	2	R
Coralligenous platforms	1	1	1	1	3	P
Semi-dark caves	1	1	2	1	3	P
Facies with <i>Parazoanthus axinellae</i>	2	2	3	1	3	R
Facies with <i>Corallium rubrum</i>	1	1	2	1	1	P
Facies with <i>Leptopsammia pruvoti</i>	2	2	2	1	3	R
Biocenosis of shelf-edge rock	2	2	1	2	3	R

V. BATHYAL

Biocenosis of bathyal muds	2	3	3	3	1	R
Facies of sandy muds with <i>Thenea muricata</i>	2	2	2	3	1	R
Facies of fluid muds with <i>Brissopsis lyrifera</i>	2	2	2	3	1	R
Facies of soft muds with <i>Funiculina quadrangularis</i> and <i>Apporhais seressianus</i>	1	2	2	2	1	P

Facies of compact muds with <i>Isidella elongata</i>	1	2	2	2	1	P
Facies with <i>Pheronema grayi</i>	2	2	2	3	1	R
Biocenosis of bathyal detritic sands with <i>Grypheus vitreus</i>	2	3	1	3	3	R
Biocenosis of deep sea corals	1	2	1	1	2	P
Caves and ducts in total darkness (in inclusion in the upper stages)	2	1	1	2	3	P
VI. ABYSSAL						
Biocenosis of abyssal muds	2	1	2	3	3	R

ANNEX V

RECOMMENDATIONS

The Meeting of Experts on Marine Habitat Types in the Mediterranean region,

1. Recognizing the importance of pelagic habitats for biodiversity conservation,

Wishing to provide the Contracting Parties to the Barcelona Convention with a comprehensive tool for the implementation of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean,

Recommends that the Focal Points for Specially Protected Areas devote part of their next meeting to the definition of pelagic habitats, following consultations with specialists in the field and taking existing work into account.

On the occasion of this discussion and in agreement with the provisions adopted by the experts on marine benthic habitats, a supplement on the eastern Mediterranean should also be added to the list of benthic habitats.

The consultations required for the definition of pelagic habitats and the supplement to the list of benthic habitats will be carried out by exchange of information by e-mail, this work being coordinated by Ms. Bellan-Santini.

2. Aware of the inadequacy of knowledge on biodiversity in the eastern part of the Mediterranean, which makes it difficult to produce a good definition of marine habitats and the species present therein,

Also aware of the serious repercussions this might have on the effectiveness of protection and management measures and consequently on the conservation of biodiversity,

Recommends measures to improve knowledge of this region through the promotion of scientific research, if possible coordinated, and the compilation of data contained in scientific literature that is not readily accessible.

3. Aware of the potentially very serious ecological consequences resulting from the introduction of allochthonous species into the marine environment,

Recommends that the Contracting Parties make every effort to avoid introducing such species, and in the case of invasive species that have already been introduced, to monitor their expansion on a permanent basis and to limit it to the extent possible.

4. Wishing to make the typology of marine habitats in the Mediterranean region a tool as much as possible operational for the managers, and on the model of the initiative of the European Commission to publish an interpretation manual of the habitats included in the Directive 92/43/EEC,

Recommend that the Contracting Parties make provision for the publication of an illustrated interpretation manual of the marine habitats in the Mediterranean region for the use of the managers.

ANNEX V

RECOMMENDATIONS

The Meeting of Experts on Marine Habitat Types in the Mediterranean region,

1. Recognizing the importance of pelagic habitats for biodiversity conservation,

Wishing to provide the Contracting Parties to the Barcelona Convention with a comprehensive tool for the implementation of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean,

Recommends that the Focal Points for Specially Protected Areas devote part of their next meeting to the definition of pelagic habitats, following consultations with specialists in the field and taking existing work into account.

On the occasion of this discussion and in agreement with the provisions adopted by the experts on marine benthic habitats, a supplement on the eastern Mediterranean should also be added to the list of benthic habitats.

The consultations required for the definition of pelagic habitats and the supplement to the list of benthic habitats will be carried out by exchange of information by e-mail, this work being coordinated by Ms. Bellan-Santini.

2. Aware of the inadequacy of knowledge on biodiversity in the eastern part of the Mediterranean, which makes it difficult to produce a good definition of marine habitats and the species present therein,

Also aware of the serious repercussions this might have on the effectiveness of protection and management measures and consequently on the conservation of biodiversity,

Recommends measures to improve knowledge of this region through the promotion of scientific research, if possible coordinated, and the compilation of data contained in scientific literature that is not readily accessible.

3. Aware of the potentially very serious ecological consequences resulting from the introduction of allochthonous species into the marine environment,

Recommends that the Contracting Parties make every effort to avoid introducing such species, and in the case of invasive species that have already been introduced, to monitor their expansion on a permanent basis and to limit it to the extent possible.

4. Wishing to make the typology of marine habitats in the Mediterranean region a tool as much as possible operational for the managers, and on the model of the initiative of the European Commission to publish an interpretation manual of the habitats included in the Directive 92/43/EEC,

Recommend that the Contracting Parties make provision for the publication of an illustrated interpretation manual of the marine habitats in the Mediterranean region for the use of the managers.