UNEP

CBD

Convention on Biological Diversity

Distr.
GENERAL

UNEP/CBD/EW-BCS&IMA/1/2*
22 December 2009

ORIGINAL: ENGLISH

EXPERT WORKSHOP ON SCIENTIFIC AND TECHNICAL GUIDANCE ON THE USE OF BIOGEOGRAPHIC CLASSIFICATION SYSTEMS AND IDENTIFICATION OF MARINE AREAS BEYOND NATIONAL JURISDICTION IN NEED OF PROTECTION
Ottawa, 29 September–2 October 2009

REPORT OF THE EXPERT WORKSHOP ON SCIENTIFIC AND TECHNICAL GUIDANCE ON THE USE OF BIOGEOGRAPHIC CLASSIFICATION SYSTEMS AND IDENTIFICATION OF MARINE AREAS BEYOND NATIONAL JURISDICTION IN NEED OF PROTECTION

INTRODUCTION

1. At its ninth meeting, the Conference of Parties to the Convention on Biological Diversity, in decision IX/20, made a significant step forward toward achieving the 2012 target for the establishment of marine protected areas (MPAs). It adopted scientific criteria (annex I to the decision) for identifying ecologically or biologically significant marine areas (EBSAs) in need of protection, and the scientific guidance (annex II to the decision) for designing representative networks of marine protected areas. The Conference of the Parties requested the Executive Secretary to transmit the information contained in annexes I and II to the decision to the relevant General Assembly processes. The Conference of the Parties also took note of the four initial steps to be considered in the development of representative networks of marine protected areas (MPAs), in annex III to the decision.

2. In the same decision, the Conference of the Parties urged Parties and invited other Governments and relevant organizations to apply, as appropriate, the scientific criteria, the scientific guidance, and initial steps, with a view to assist the relevant processes within the General Assembly and implement conservation and management measures, including the establishment of representative networks of marine protected areas in accordance with international law, including the United Nations Convention on the Law of the Sea, and recognizing that these criteria may require adaptation by Parties if they choose to apply them within their national jurisdiction, noting that they would do so with regard to national policies and criteria.

* Reposted for technical reasons.

3. The Conference of the Parties further decided to convene an expert workshop, including scientific and technical experts from different Parties, other Governments and relevant organizations, with balanced regional and sectoral participation and using the best available information and data at the time, in order to provide scientific and technical guidance on the use and further development of biogeographic classification systems, and guidance on the identification of areas beyond the national jurisdiction which meet the scientific criteria. The workshop would review and synthesize progress on the identification of areas beyond national jurisdiction that met the scientific criteria, and experience with the use of the biogeographic classification system, building upon a compilation of existing sectoral, regional and national efforts. The workshop would not consider issues relating to management but only provide scientific and technical information and guidance. The Conference of the Parties also requested the Executive Secretary to transmit the results of the workshop to the fourteenth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) for its consideration prior to the tenth meeting of the Conference of Parties, with a view to assisting the United Nations General Assembly.

4. In response to the above requests, the Executive Secretary organized, with financial support from the Governments of Canada and Germany, an Expert Workshop on Scientific and Technical Guidance on the Use of Biogeographic Classification Systems and Identification of Marine Areas beyond National Jurisdiction in Need of Protection. The workshop was held at the Lord Elgin Hotel in Ottawa, Canada from 29 September to 2 October 2009.

5. The workshop was attended by experts from Argentina, Bulgaria, Canada, China, Comoros, Estonia, France, Germany, Guatemala, Japan, Mexico, Norway, the Philippines, Portugal, Senegal and Turkmenistan. Participants were selected from among experts nominated by Governments in consultation with the Bureau of the Conference of the Parties. The workshop was also attended by a member of the Bureau of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) and by resource persons provided by Australia, Brazil and IUCN. Experts/observers from the following other Governments, United Nations bodies, specialized agencies, and other bodies attended: the National Oceanic and Atmospheric Administration (NOAA) of the United States of America, the United Nations Division of Ocean Affairs and the Law of the Sea (UNDOALOS), the Food and Agriculture Organization of the United Nations (FAO), the International Seabed Authority (ISA), the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC / UNESCO), United Nations Environment Programme – World Conservation Monitoring Centre (UNEP – WCMC), United Nations Environment Programme/Mediterranean Action Plan (UNEP/MAP), United Nations University – Institute of Advanced Studies (UNU – IAS), IUCN World Commission on Protected Areas (IUCN/WCPA), Census of Marine Life, Ocean Biogeographic Information System (OBIS), BirdLife International, Greenpeace International, and World Ocean Council. The full list of participants is attached as annex I.

ITEM 1. OPENING OF THE MEETING

6. The workshop was opened at 9 a.m. on Tuesday, 29 September 2009 by Dr. Wendy Watson-Wright, Assistant Deputy Minister, Science, Fisheries and Oceans Canada. She welcomed participants to Ottawa, indicating that Canada was honoured to host this international expert workshop. She stressed that as a maritime nation bordered by three oceans, Canada's oceans were not only important to coastal communities, but to the well-being of all Canadians. She then indicated that Canada's legislative basis for oceans management is achieved through the Oceans Act, which is based on the principles of sustainable development, integrated management and the precautionary approach. Dr. Watson-Wright provided updates on recent marine work, including the delineation of EBSAs for portions of domestic waters — areas which are ecologically or biologically significant, and which may require an enhanced level of protection. She then highlighted the recent work undertaken by Canada to develop a national framework and guiding principles for a biogeographic classification system. Finally, Dr. Watson-Wright reinforced Canada's commitment to meet its obligations under the Convention on Biological Diversity and wished the group of scientific experts a productive session.

7. Mr. Henning von Nordheim, of Germany's Agency for Nature Conservation, welcomed all on behalf of the Germany Environment Ministry, which, in its capacity as current CBD president, he said, has a heightened interest in the outcome of this meeting. He indicated that Germany was particularly grateful that Canada organized this meeting, an important signal that they are committed to contribute to this process. Germany, too, is pleased to support the process of enhancing the protection of marine biodiversity in the global oceans. He referred to the successful outcome of the discussions on marine issues at the ninth meeting of the COP in Bonn in May 2008, as "groundbreaking". As a result, Minister Gabriel was convinced that Germany should invest more in the process, which resulted in a prompt contribution of 600, 000 Euros to this process. This contribution has gone toward the partial financing of this meeting, as well as the finalization of the Global Open Oceans and Deep Seabed (GOODS) Biogeographic Classification report (published by UNESCO/IOC), a crucial working tool for this meeting. Most of the contribution goes into support of the current and future background work of the Global Oceans Biodiversity Initiative (GOBI), facilitated by IUCN as the GOBI secretariat, and has been and will continue to be essential to make progress in this work. He noted that this workshop would be key in making further progress in marine conservation on the global open oceans and deep seas between now and 2012, the deadline set by the WSSD in Johannesburg for the establishment of a global network of marine protected areas. After a brief outline of Germany's substantial experience in setting up marine protected areas networks in Helsinki Commission (HELCOM) - Baltic Marine Environment Protection Commission, OSPAR Commission and the Natura 2000 programme of EU, Mr. von Nordheim acknowledged the enormity of the challenges before participants but encouraged them to look at what has already been achieved rather than being discouraged by gaps and obstacles. He emphasized that this workshop would be a key to convincing the global community, and in particular the next meeting of SBSTTA, and that there are already a number of examples where the CBD EBSA criteria have been applied or tested successfully.

8. Ms. Jihyun Lee, of the Secretariat of the Convention on Biological Diversity, delivered the statement of the Executive Secretary to the Convention on Biological Diversity, Dr. Ahmed Djoghlaf. In his statement, Dr. Djoghlaf welcomed the participants and expressed his appreciation to the Governments of Canada and Germany for generously hosting and co-funding the workshop. He emphasized the theme of the first UN-designated World Ocean Day, "Our Oceans, Our Responsibility", and highlighted that the experts are expected to scientifically and technically support the Parties to the CBD in undertaking faithfully their responsibilities toward conserving the biodiversity in the remote part of our oceans. He also reminded the workshop participants of the World Summit on Sustainable Development (WSSD) global commitments on the establishment of representative networks of marine protected areas by 2012. He then invited all to join hands with the Secretariat in celebrating the 2010 International Year of Biodiversity, together with Parties, CBD partners and other global communities. He wished participants productive workshop deliberations and a successful outcome.

ITEM 2. ELECTION OF THE CO-CHAIRS, ADOPTION OF THE AGENDA AND ORGANIZATION OF WORK

9. The workshop elected Mr. Jake Rice (Canada) and Ms. Elva Escobar (Mexico) as the workshop Co-Chairs.

10. The workshop adopted the provisional agenda (UNEP/CBD/EW-BCS&IMA/1/1).

11. The workshop adopted the organization of work, as contained in annex II to the annotated provisional agenda (UNEP/CBD/ EW-BCS&IMA/1/1/Add.1/Rev.1).

ITEM 3. REVIEW AND SYNTHESIS OF PROGRESS ON THE IDENTIFICATION OF AREAS BEYOND NATIONAL JURISDICTION THAT MEET THE SCIENTIFIC CRITERIA IN ANNEX I TO DECISION IX/20

12. In its consideration of this item, the workshop had before it the submissions by Parties, other Governments and relevant organizations in response to a notification dated 2 March 2009 (ref. No. 2009-021) as well as the compilation of the inputs to the electronic forum contributed by Parties, other Governments, relevant organizations and the workshop participants prior to the workshop in response to the notification dated 25 June 2009 (ref. No. 2009-068).

13. The workshop participants shared, through individual presentations and open discussions, their global, regional and national experiences in the identification of areas beyond national jurisdiction that meet the scientific criteria in annex I to decision IX/20 or identification of areas that meet similar criteria. Summaries of the individual presentations are provided in annex II, below.

14. The workshop then discussed and synthesized, in the plenary and break-out group sessions, lessons learned based on the above documents, and the results of individual presentations and open discussions.

ITEM 4. REVIEW AND SYNTHESIS OF EXPERIENCE WITH THE USE OF THE BIOGEOGRAPHIC CLASSIFICATION SYSTEM, AS REFERRED TO IN PARAGRAPH 19 OF DECISION IX/20

15. In its consideration of this item, the workshop had before it the information documents referred to in paragraph 12 above, as well as the publication *Global Open Oceans and Deep Seabed (GOODS) Biogeographic Classification*, submitted by the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO) in response to the request of the COP in paragraph 6 of decision IX/20.

16. Participants shared, through individual presentations and open discussions, their global, regional and national experiences with the use of the biogeographic classification system, as referred to in paragraph 19 of decision IX/20. Summaries of the presentations are provided in annex III to this report.

ITEM 5. DEVELOPMENT OF SCIENTIFIC AND TECHNICAL GUIDANCE ON THE USE AND FURTHER DEVELOPMENT OF BIOGEOGRAPHIC CLASSIFICATION SYSTEMS, AND GUIDANCE ON THE IDENTIFICATION OF MARINE AREAS BEYOND NATIONAL JURISDICTION THAT MEET THE SCIENTIFIC CRITERIA IN ANNEX I TO DECISION IX/20

17. For the consideration of this item, based on the compilation mentioned in paragraph 12, the background document,[1] *Defining Ecologically or Biologically Significant Areas in the Open Oceans and Deep Seas: Analysis, Tools, Resources and Illustrations*, and building on the above-noted presentations and deliberations of the workshop, the workshop participants were divided into four break-out groups, to consider in-depth development of two documents of scientific and technical guidance, including:

(a) *Group 1*. Scientific guidance on the use and further development of biogeographic classification systems;

(b) *Group 2*. Scientific guidance on the identification of marine areas beyond national jurisdiction that meet the scientific criteria in annex I to decision IX/20;

---

[1] This document was submitted by IUCN, Duke University (Marine Geospatial Ecology Lab), Census of Marine Life, UNEP-WCMC, Ocean Biogeographic Information System (OBIS) and Marine Conservation Biology Institute (MCBI) and is available at https://www.cbd.int/doc/meetings/mar/ewbcsima-01/other/ewbcsima-01-multiorgs-en.pdf.

(c) *Group 3*. Synthesis of progress on the identification of areas beyond national jurisdiction that meet the scientific criteria in annex I to decision IX/20; and

(d) *Group 4*. Data and analytic methods

18. The results of break-out group sessions are contained in annexes IV, V, VI, VII and VIII below.

ITEM 6. OTHER MATTERS

19. No other matters were discussed.

ITEM 7. ADOPTION OF THE REPORT

20. Participants considered and adopted the report of the workshop on the basis of a draft report prepared and presented by the workshop Co-Chairs with some changes.

ITEM 8. CLOSURE OF THE MEETING

21. In closing the workshop, the Co-Chairs thanked all the participants for their contribution to the successful conclusion of the workshop. They thanked the Government of Canada and Germany for hosting and co-funding for the workshop. They also expressed their appreciation to Germany/IUCN and the French National MPA Agency for kindly hosting dinner receptions for the workshop participants. The Co-Chairs thanked the Global Ocean Biodiversity Initiative (GOBI)[2] on behalf of the meeting, for the work done prior to the workshop supporting both preparation of the background document on defining ecologically or biologically significant areas in the open oceans and deep seas and generally supporting the work of the workshop. The support of the German Government in allowing this to proceed was crucial to the progress made.

22. The workshop Co-Chairs declared the workshop closed at 8:45 p.m. on Friday, 2 October 2009.

[2] The Global Ocean Biodiversity Initiative (GOBI) is a project core-funded by the German Government to help implement CBD decision IX/20 of the Conference of the Parties to the Convention on Biological Diversity. It is based on the advice of the Advisory Board consisting of major global institutions of relevance for the oceans as well as a Scientific Advisory Board of independent scientists. It is facilitated by IUCN in partnerships with a wide variety of organizations, including the Census of Marine Life, the Duke University Marine Geospatial Ecology Lab, the Ocean Biogeographic Information System, UNEP-WCMC and Marine Conservation Biology Institute in association with a global network of scientists.

Annex I

LIST OF PARTICIPANTS

A. *Government-nominated experts*

Argentina
Ms. Maria Laura Tombesi
Professional Technician
Secretaria de Ambiente y Desarrollo Sustentable
Bazurco 3260 Capital 1419
Buenos Aires
Argentina
Tel: +54 11 4348 8462
Fax: +54 11 4348 8200
E-Mail: mtombesi@ambiente.gob.ar

Bulgaria
Ms. Daniela Petrova
Associate Professor, Laboratory of Hydrobiology
Institute of Fishing Resources
Blvd Primorski 4
P.O. Box 72
Varna 9000
Bulgaria
Tel: +359 52 632 066
E-Mail: danibelbg@yahoo.com

Canada
Ms. Ellen Kenchington
Research Scientist
Bedford Institute of Oceanography
Department of Fisheries and Ocean
P.O. Box 1006
Dartmouth, NS B2Y 4A2
Canada
Tel: +1 902 426 2030
E-Mail: ellen.kenchington@dfo-mpo.gc.ca

Mr. Jake Rice
Senior National Advisor, Ecosystem Science
Department of Fisheries and Oceans
Fisheries and Oceans Canada
200 Kent Street
Ottawa, Ontario K1A 0E6, Canada
Tel: +1 613 990 0288
Fax: +1 613 954 0807
E-Mail: ricej@dfo-mpo.gc.ca

China

Mr. Zhu Mingyuan
Professor
First Institute of Oceanography, SOA
6 Xianxialing Road
Qingdao 266061
China
Tel: +86 532 8896 4792
Fax: +86 532 88967458
E-Mail: zhumingyuan@fio.org.cn
Web: http://www.fio.org.cn

Comoros
Ms. Najat Said Abdallah
Technical Advisor
Cabinet of the Minister
Ministère de l'Agriculture, de la Pêche et de l'Environnement
B.P. 5414
Moroni
Comoros
Tel: +269 763 17 68, 269 333 0307
Fax: +269 763 4890
E-Mail: mchangama@yahoo.com, najat@comorestelecom.km

Estonia
Mr. Georg Martin
Head of the Department of Marine Biology
Estonian Marine Institute, University of Tartu
Mäealuse 10a
12618 Tallinn
Estonia
Tel: +3726718936
Fax: +3726718900
E-Mail: georg.martin@ut.ee

France
Ms. Sophie Arnaud-Haond
Chercheur, Etude des Ecosystèmes Profonds (DEEP)
Institut Français de Recherches pour l'Exploitation de la Mer (IFREMER)
Centre de Brest, Département Environnement Profond
Z.I. Pointe du Diable - BP 70
Plouzane F-29280
France
Tel: +332 98224305
E-Mail: sarnaud@ifremer.fr

Germany
Mr. Henning von Nordheim
Head of Division
Marine and Coastal Nature Conservation
Agency for Nature Conservation (Germany)
Insel Vilm
Putbus D-18581
Germany
Tel: +49 38 301 86 120
E-Mail: henning.von.nordheim@bfn-vilm.de

Guatemala
Mr. Alejandro Arrivillaga
Specialist
Marine Conservation Programme of the Mesoamerican Reef
Arco 3 no. 21 zona 5
Ciudad Guatemala 01005
Guatemala
Tel: +502 6634-2119
E-Mail: aarrivi@hotmail.com

Japan
Mr. Yoshihisa Shirayama
Director of Seto Marine Biological Laboratory
Field Science Education and Research Center
Kyoto University
459, Shirahama
Wakayama 649-2211
Japan
Tel: +81 739 42 3515
E-Mail: yshira@seto.kyoto-u.ac.jp

Mexico
Ms. Elva Escobar
Researcher at the Institute of Marine Sciences and Limnology
U.N.A.M.
Lab. Biodiversidad y Macroecologia
04510 Mexico, D.F.
Mexico
Tel: +52 5622 5835 / 5622.5841 (office)
Fax: +52 5616 0748
E-Mail: escobri@cmarl.unam.mx

Norway
Mr. Hein Rune Skjoldal
Institute of Marine Research
P.O. Box 1870 Nordnes
N-5817 Bergen, Norway
Tel: +47 55 23 8500
E-Mail: hein.rune.skjoldal@imr.no

Philippines
Porfirio M. Alino, PhD
The Marine Science Institute
University of the Philippines
Diliman, Quezon City
1101 PHILIPPINES
Email: pmalino@upmsi.ph

Portugal
Mr. Ricardo Serrão dos Santos
Principal Researcher at the University of the Azores
Departamento de Oceanografia e Pescas
Universidad dos Açores
Cais de Santa Cruz
Horta (Açores) PT-9901-862
Portugal
Tel: +351 292 200 407; +351 962 416 708
Fax: +351 292 200411
E-Mail: ricardo@uac.pt; rserraosantos@yahoo.com

Senegal
Mr. Ousmane Kane
Chef Division Aires Marine Protégées et Zones Humides
Direction des Parcs Nationaux
Ministère de l'Environnement et de la Protection de la Nature
BP. 5135
Fann
Dakar, Senegal
Tel: +221-832-23-09
Fax: +221-832-23-11
E-Mail: dpn@sentoo.sn, oussou77@hotmail.com

Turkmenistan
Ms. Shirin Karriyeva
IBA Project Lobby and Advocacy Manager
SBSTTA Focal Point
Ministry of Nature Protection
102 Kemine Street
Ashgabat 744000
Turkmenistan
Tel: +993 12 39 83 88
Fax: +993 12 39 83 88; +993 12 39 31 84
E-Mail: shirinkarryeva@mail.ru

B. Observers

United States National Oceanic and Atmospheric Administration (NOAA)
Mr. Robert J. Brock
Fisheries Biologist
NOAA Fisheries Service
Office of Science and Technology
1315 East-West Highway (F/ST7)
Silver Spring, Maryland 20910-3282
United States of America
Tel: +1 301 713 2363, ext. 162
Fax: +1 301-713-1875
E-Mail: robert.brock@noaa.gov

United Nations Division for Ocean Affairs and the Law of the Sea (UN/DOALOS)
Ms. Valentina Germani
Law of the Sea/Ocean Affairs Officer
Division for Ocean Affairs and the Law of the Sea, Office of Legal Affairs
Room DC2-0412, United Nations Headquarters
New York, NY 10017
United States of America
Tel: +1 212 963 4956
Fax: +1 212 963 5847
E-Mail: germani@un.org

Food and Agriculture Organization of the United Nations (FAO)
Ms. Merete Tandstad
Fishery Resources Officer
Fisheries Management and Conservation Service (FIMF)
Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla
Rome
Italy
Tel: +39 06 57 05 20 19
E-Mail: merete.tandstad@fao.org

International Seabed Authority (ISA)
Mr. Adam Cook
Scientific Affairs Officer
International Seabed Authority
14-20 Port Royal Street
Kingston, Jamaica
Tel: +1 876-922-9105-9 (x 288)
Fax: +1 876-922 0195
E-Mail: acook@isa.org.jm
Web: http://www.isa.org.jm/en/default.htm

Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO)/
Mr. Luciano Fonseca
Programme Specialist
IOC – Ocean Science Section
United Nations Educational, Scientific and Cultural Organization
1, rue Miollis
75732 Paris CEDEX 15
Paris , France
Tel: +33 1 45 68 39 99
Fax: +33 1 45 68 58 10
E-Mail: l.fonseca@unesco.org

United Nations Environment Programme – World Conservation Monitoring Centre (UNEP-WCMC)
Ms. Colleen Corrigan
Senior Programme Officer on Protected Areas
United Nations Environment Programme - World Conservation Monitoring Centre
219 Huntingdon Road
Cambridge CB3 ODL
United Kingdom of Great Britain and Northern Ireland
Tel: +44 1223277314, Ext 267
Fax: +44 1223277136
E-Mail: colleen.corrigan@unep-wcmc.org
Web: http://www.unep-wcmc.org/

United Nations Environment Programme/ Mediterranean Action Plan
Ms. Maria Jesus De Pablo
High Seas Programme Officer
United Nations Environment Programme/Mediterranean Action Plan
Regional Activity Center for Specially Protected Areas (RAC/SPA)
Boulevard du Leader Yasser Arafat BP 337
1080 Tunis Cedex - TUNISIE
Tel: +216 71 206 649
Fax: +216 71 206 490
E-Mail: mjdepablo@rac-spa.org

United Nations University - Institute of Advanced Studies (UNU - IAS)
Ms. Marjo Vierros
Adjunct Senior Fellow
Institute of Advanced Studies
United Nations University - Institute of Advanced Studies
9311 Emerald Drive
Whistler, B.C. V0N 1B9
Canada
Tel: + 1 604 938-1512; +1 604 902 0877
E-Mail: vierros@ias.unu.edu

Census of Marine Life
Mr. Patrick Halpin
Director Geospatial Analysis Program
Nicholas School of the Environment
Duke University
Box 90328
Durham, NC 27708
United States of America
Tel.: +1 919-613-8062
E-Mail: phalpin@duke.edu

OBIS
Mr. Edward Vanden Berghe
Ocean Biogeographic Information System
Rutgers University Institute of Marine and Coastal Sciences
71, Dudley Road
New Brunswick - NJ 08901
United States of America
Tel: +1 732 932 6555
E-Mail: evberghe@iobis.org

IUCN/WCPA
Mr. Jeff Ardron
Director of High Seas Programme, Marine Conservation Biology Institute
IUCN - The World Conservation Union (USA), WCPA
600 Pennsylvania Ave SE
Suite 210
Washington D.C. 20003
United States of America
Tel: +1 202 546 5346
Fax: +1 202 546 5348
E-Mail: jeff.ardron@MCBI.org

BirdLife International
Mr. Ben Lascelles
Global Marine Important Bird Area Officer
BirdLife International
Wellbrook Court
Girton Road
Cambridge CB3 0NA
United Kingdom of Great Britain and Northern Ireland
Fax:+ 44 1 223 277 200
E-Mail: ben.lascelles@birdlife.org, birdlifre@birdlife.org

Greenpeace International
Mr. Paul Johnston
Principal Scientist
Greenpeace Research Laboratories
Greenpeace International
University of Exeter - School of Biosciences
Innovation Centre Phase - Rennes Drive
Exeter - Devon EX4 4RN
United Kingdom of Great Britain and Northern Ireland
E-Mail: pjohnsto@ex.ac.uk; richard.page@greenpeace.org

World Ocean Council
Mr. Paul Holthus
Executive Director
World Ocean Council
3035 Hibiscus Drive
Suite 1
Honolulu - Hawaii 96822
United States of America
Tel: +1 808 277-9008
Fax: +1 808 550 8317
E-Mail: paul.holthus@oceancouncil.org

C. Resource persons

Ms. Ana Paula Leite Prates
Manager
Aquatic Biodiversity and Fisheries Resources Division
Office for Biodiversity and Forests
Ministry of the Environment
SEPN 505 Lote 02 Bloco B
Ed. Marie Prendi Cruz, Sala 406
Brasilia-DF CEP 70. 730-542
Brazil
Tel: +55 61 3272 5616 or 3105 2066
Fax: +55 61 3274 1730
E-Mail: ana-paula.prates@mma.gov.br

Mr. Ian Cresswell
Science Director
CSIRO Wealth from Oceans – National Research Flagship
Castray Esplanade
Hobart TAS 7001
Australia
Tel: +61 3 62325213
Fax :+61 3 62325125
E-Mail: ian.cresswell@csiro.au

Ms. Kristina M. Gjerde
High Seas Policy Advisor
IUCN Global Marine Program
ul. Piaskowa 12 C
Konstancin
Chylice
Poland
Tel: +48 22 754-1803
Fax: +48 22 756 4919
E-Mail: kgjerde@it.com.pl

D. *Secretariat of the Convention on Biological Diversity*

Ms. Jihyun Lee
Environmental Affairs Officer – Marine and Coastal Biodiversity and the Ecosystem Approach
Scientific, Technical and Technological Matters Unit
413 Saint-Jacques, Suite 800
Montreal – H2Y 1N9, Canada
Tel: +1 514 2877035
Fax: +1 514 2886588
E-Mail: jihyun.lee@cbd.int

Mr. Jason Spensley
Programme Officer, LifeWeb Initiative
413 Saint-Jacques, Suite 800
Montréal, Québec, H2Y1N9, Canada
Tel: +1 514 2878704
Fax: +1514 2886588
E-mail: jason.spensley@cbd.int

Ms. Jacqueline Grekin
Programme Assistant
Scientific, Technical and Technological Matters Unit
413 Saint-Jacques, Suite 800
Montreal – H2Y 1N9, Canada
Tel: +1 514 2878705
Fax: +1 514 2886588
E-Mail: jacqueline.grekin@cbd.int

Annex II

SUMMARY OF PRESENTATIONS FOR THE REVIEW AND SYNTHESIS OF PROGRESS ON THE IDENTIFICATION OF AREAS BEYOND NATIONAL JURISDICTION THAT MEET THE SCIENTIFIC CRITERIA IN ANNEX I TO DECISION IX/20

Global Experiences

1. **Mr. Pat Halpin (Census of Marine Life).** Mr. Halpin spoke about analysis, tools, resources and illustrations for defining EBSAs in the open oceans and deep seas. He noted that this process will require the application of a wide variety of data types and the development of synthetic analyses. Because the open oceans and deep seas are distant, deep and dynamic environments, prioritization of significant areas in theses ecosystems will rely heavily on aggregated collections of observation data, statistical models, and remote sensing imagery. In addition, the selection of significant areas beyond national jurisdiction will require a cooperative, international approach. A first step towards developing the data, tools and approaches required to implement the selection of EBSAs is the development of example "illustrations" of how the selection criteria may be developed. A cooperative group representing the IUCN, the Census of Marine Life, UNEP-WCMC, Marine Conservation Biology Institute (MCBI) as well as a large number of collaborators developed a set of example illustrations and considerations as an initial contribution to the CBD COP IX/20 decision. Mr. Halpin provided an overview describing annex 2 to the background document, *Defining Ecologically or Biologically Significant Areas in the Open Oceans and Deep Seas: Analysis, Tools, Resources and Illustrations*, provided for the CBD workshop. An example illustration for each of the seven adopted EBSA criteria was described. These illustrations provide a range of examples considering species, habitats and recurrent oceanographic features using a variety of techniques ranging from field surveys, satellite tracking of tagged animals and remote sensing, to sophisticated modelling and range prediction. These illustrations are not presented as proposals for designating specific EBSA locations or management measures, but are instead presented as examples of various scientific methods and techniques relevant to each criterion. This presentation provided a general overview of these techniques and discussed key issues concerning the strengths, challenges and limitations in the availability of data and scientific understanding we face at this time.

2. **Edward Vanden Berghe (OBIS).** Mr. Vanden Berge delivered a presentation on the Ocean Biogeographic Information System (OBIS), an on-line, user-friendly system for absorbing, integrating, and assessing data about life in the oceans. He indicated that it was created as the data integration component of the Census of Marine Life. Since its inception, it has evolved into a global network of Regional and Thematic OBIS Nodes, to assure the world-wide scientific support needed to fulfil the global mandate. OBIS integrates data from many sources, over a wide range of marine themes, from poles to equator, from microbes to whales. As of September 2009, OBIS contains more than 20 million records of over 100,000 species, extracted from nearly 700 different sources. All data are freely available over the internet and interoperable with other oceanographic data systems. Mr. Vanden Berghe explained that the mission of OBIS is to support scientific research in biogeography, to support informed management of the global ocean (including areas beyond national jurisdiction), and to provide a framework for data repatriation.

3. **Kristina Gjerde (Germany/IUCN Project on EBSA Criteria).** Ms. Gjerde described the German/IUCN project to support the implementation of COP decision IX/20 regarding scientific criteria for the identification of ecologically or biologically significant areas in the open ocean and deep sea in need of protection (EBSA criteria project). The IUCN project on EBSA criteria is designed to provide scientific support to the CBD Secretariat, States and relevant organizations in their process of applying the CBD EBSA criteria. To date the project has focused on engaging the scientific community and on developing illustrations of how individual EBSA criterion can be interpreted and applied (see the presentation by Pat Halpin, summarized above, and the background document *Defining Ecologically or Biologically Significant Areas in the Open Oceans and Deep Sea: Analysis, Tools, Resources and Illustrations*). To help coordinate and facilitate a globally inclusive scientific effort, the project structure

consists of an Advisory Board of intergovernmental organizations and bodies with a marine mandate; a Science Board to provide scientific advice; and a project management team within IUCN. This project is supported by funding from the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. Primary project partners to date include: the Census of Marine Life, Duke University's Marine Geospatial Ecology Lab, the Ocean Biogeographic Information System (OBIS), UNEP – World Conservation Monitoring Center (UNEP – WCMC), and the Marine Conservation Biology Institute (MCBI). Additional experts from around the world are also participating. IUCN welcomes new partners and exchanges of information. For further information, see www.openoceandeepsea.org.

National and Regional Experiences

4. **Mr. Ousmane Kane (Senegal).** He stated that there are MPAs in many countries in Africa with different levels of management. There are also networks to protect some species. There are various activities to enhance the management of MPAs, such as monitoring, census, etc. However, the paucity of data continues to be a challenge. There are no MPAs designated in areas beyond national jurisdiction, therefore the countries in the African region would need guidance to address various challenges related to the effective development and management of MPAs. In this regard, he highlighted the urgent need for capacity-building for the development and management of MPAs.

5. **Mr. Zhu Mingyuan (China)**. Mr. Mingyuan spoke about biodiversity conservation in the Yellow Sea, a marginal Sea in North West Pacific Ocean, surrounded by China, RO Korea and DPRK. He indicated that from the results of the Transboundary Diagnostic Analysis of Yellow Sea Large Marine Ecosystem Project, habitat modification was one of five main environmental problems in the Yellow Sea. There are three main threats to the habitat of the Yellow Sea, i.e. reclamation, conversion and degradation. Mr. Mingyuan pointed out that because not all habitats are equally important, it is essential to identify critical habitats and to map them. The Yellow Sea Eco-Region Planning Programme (YSEPP) project identified ecologically important areas for six taxonomic groups. The biodiversity component of the project developed a classification of wetland types based on Ramsar categories in order to identify critically important wetlands. The habitats are described with information on their geographical locations and scales, integrity (fragmentation due to reduction in ecosystem function), continuity (linkage with other habitats), biodiversity (noteworthy fauna/flora, status of protection, etc.) and human impacts. These habitats are scored based on a system with a weighting of 40% for habitat characteristics (area, integrity and continuity) and 60% for biodiversity, and the three most representative habitats are suggested as potential sites for demonstration of biodiversity management.

6. **Ms. Elva Escobar (Mexico).** The presentation addressed existing regional progress on the identification of areas beyond national jurisdiction that meet the scientific criteria. The Latin America and Caribbean region is encompassed in 18 WCPA marine regions of the world's oceans and is highly variable, spanning from tropical to temperate and cold ecosystems, with diverse productivity, and ranging from well-oxygenated to hypoxic bottoms. The Caribbean Sea is the best assessed sub-region within the Latin America region, and its common guidelines and criteria for protected areas in the Wider Caribbean Region, identification, selection, establishment and management have been covered among the regional assessments for MPAs. Most of the states within the region have established national protected areas that are of different types, for different purposes and have diverse management systems. The MPAs are of coastal nature with few exceptions. A system of protected areas exists along the Mesoamerican reef. More recently knowledge on threats in marine areas has been evaluated, and a large number of priority coastal areas have been suggested for marine biodiversity conservation regionally. The lessons learned from the application of scientific criteria in marine waters within national jurisdiction from the regional analysis indicate that the existing knowledge follows similar criteria in defining MPAs, that the conservation nature, extent and coverage vary from country to country, and that asymmetries were recognized within the region on number, use and management. Finally, there are incipient efforts in offshore habitats. Our conclusion is that the efforts made have a comprehensive representation, and are complementary leading to conservation targets in the region.

7. **Ms. Ellen Kenchington (Canada).** The Canadian application of EBSA criteria predates the adoption of the CBD criteria but differs in only minor ways. Canadian EBSAs form one of four components for establishing conservation objectives within Canada's Large Ocean Management Areas (LOMAs). Five LOMAs have been established with diverse ecosystem components and drivers as well as with varying degrees and types of ecosystem knowledge. The EBSA process benefited from an early agreement on three criteria (uniqueness, aggregation of individuals and fitness consequences) with two qualifiers used to prioritize the selections (naturalness and resilience). Application of the criteria was not always straightforward. Recognition of a few key points made this process simpler: 1) not all important ecological functions are place-based, and there is room for process-based criteria to deal with those separately; 2) physical features can be useful in the first pass of identification of EBSAs; 3) EBSA prioritization is a relative rather than absolute process; 4) EBSAs identify areas for risk-adverse management, which may or may not include MPAs. However, having criteria in place ensured that there was a consistency of approach across all LOMAs, and it allowed for a wide range of data inputs to the decision-making process. Canada also has been a major participant in the North Atlantic Fisheries Organization (NAFO) process to identify Vulnerable Marine Ecosystems (VMEs) applying the FAO guidelines. The NAFO process quickly focused on place-based identification of structural habitats, specifically corals and sponges. In this application there was more difficulty in operationalizing words such as "significant" and providing a scientific basis for the selection of areas. However, these were overcome and closures for both physical features (e.g., seamounts) and structural VMEs (corals and sponges) have been implemented.

8. **Porfirio M. Aliño (Philippines).** The Philippines utilizes marine biogeographic areas to identify priority areas that serve as a basis for achieving at least 10% of the critical habitats and the areas which are ecologically or biologically significant within each biogeographic region in its EEZ. There are six biogeographic regions in the Philippines: the South China Sea, the Sulu Sea, the Visayan Seas, the Celebes Sea, the North Philippine Sea and the South Philippine Sea. Various marine corridors have been identified based on the transition areas of the biogeographic areas which are part of the highest priority area for conservation and also recently has been referred to as Marine Key Biodiversity Areas (MKBA). MKBAs identified by Conservation International utilize trigger species based on the irreplaceability and vulnerability of threatened species in the IUCN red list. In the South China Sea, the Spratlys has been identified as an ecologically or biologically significant area in this region. It has also been identified as one of the priority seascapes to be contributed by the Philippines national plan of action in the Coral Triangle Initiative (CTI). The CTI area encompasses six countries: Indonesia, Malaysia, Philippines, Papua New Guinea, Timor-Leste and the Solomons. In the CTI there are also some biogeographic classifications utilized to identify a system of MPAs that will also dovetail with CBD criteria of representativeness but also recognizes the need to integrate with other goals in achieving the targets of the regional action plan such as an ecosystem approach to fisheries management. Most MPAs in the Philippines have been established by local governments and communities mainly with the objective of helping in the replenishment of overexploited fisheries. Albeit at the small scale, local spillover has attained some successes that provide local benefits; these have been generally constrained in its overall sustainable use objective in the larger fisheries ecological impacts due to social and economic externalities. Recent efforts have been trying to integrate MPA work with fisheries management within an overall integrated coastal management approach.

9. **Ms. Ana Paula Leite Prates (Brazil).** The process to identify priority areas for the conservation, sustainable use and benefit-sharing of Brazilian biological diversity in coastal and marine regions was led by the Ministry of the Environment and several partners in 2006. In the Brazilian coastal zone, protected areas represent a good portion of the national territory, but in the marine part (territorial sea and the economic exclusive zone) less than 1.5% of the area is under some kind of protection. Concluding the revision and updating process of priority areas is one of the objectives of designing a representative and effective protected area system for the different Brazilian biomes, including the marine and costal zones. It is important to highlight that these processes already use the CBD criteria approved in decision IX/20, and the analysis will be updated every five years. 506 priority areas were indicated in the coastal region and 102 in the marine region. It is important to say that in a large number of these areas, fisheries

management zones were indicated, and also the creation of no-take zones. The results of this process are available at the following website: www.mma.gov.br/.

10. Ms. Sophie Arnaud-Haond (France). One of the main challenges to identify the most accurate locations for the establishment of MPAs is to make best use of the sometimes scarce, and always diverse, data in hand, without *a priori* on the issue of the analysis. In particular, it is crucial to have a global geographical understanding of the distribution and dynamics of the ecosystems or species we aim at representing in MPAs, as well as to identify the regions or taxa that may have an unequally high importance in maintaining the dynamics and integrity of the entire set of ecosystems, communities or populations of interest. We propose to introduce new tools developed in the field of complex system, in particular tools based on network theory, to provide a holistic and standardized framework. We recently adapted network tools to analyze a broad spectrum of biogeographical data and unravel systems dynamics from the ecosystem level, based on their faunal composition, to an intraspecific level, based on population genetics data. We aimed to analyse those systems without the usual constraints, *a priori*, or underlying hypothesis inherent to classical methods to i) derive the topology and dynamics of unstable systems such as systems of declining populations and ii) target regions or populations playing a crucial rule in maintaining the connectivity or integrity of the system studied. At the ecosystem level and based on the taxonomic composition of associated communities, the worldwide biogeography of hydrothermal vents was unravelled and linked to the geological history of spreading ridge systems, allowing a genuine determination of biogeographical provinces represented by spatially clustered, distinct communities. At the species level, genetic data were analyzed with network to understand the dynamics of metapopulations of the threatened seagrass *Posidonia oceanica* in the Mediterranean Sea, allowing targeting regions with a central role in maintaining the integrity of this threatened species across its entire range (Rozenfeld et al., 2008). Network tools provide a standardized framework to analyze the spatial patterns of biodiversity distribution, from the ecosystems to the genetic level, and to derive information as to the present day or past dynamics of the system studied. Such standardized approaches may be of considerable interest in conservation biology and for developing management strategy or setup networks of protected areas. In particular, considering the EBSA criteria, those tools will allow defining distinct biogeographic provinces, identifying the rare assemblages and thereby answering the criteria of uniqueness or rarity, of biological diversity and representativity. Also, by depicting and analyzing the dynamic in space and time identifying key regions for the maintenance of metapopulation system of important (structural, keystones or endangered) species, network analysis will allow addressing the importance for threatened, endangered or declining species and/or habitat, and bringing information as to the special importance for life history stages of species.

11. Daniela Petrova (Bulgaria). Since 1989, Bulgaria has experienced profound social, economic and political changes that continue to have far-reaching implications for the protection and sustainable use of the country's rich flora and fauna. Bulgarian officials, scientists, and conservationists, who are working to respond to these changes, were assisted from 1991 to 1994 to develop a set of recommendations for conserving Bulgaria's biota through the National Biological Diversity Conservation Strategy (NBDCS) project. A three-year process, spanning from 1992 to 1995, was funded by the Bureau for Europe and the New Independent States of the U.S. Agency for International Development (USAID/ENI) and was carried out as technical assistance to the Government of Bulgaria's Ministry of Environment (MOE) by the United States-based Biodiversity Support Program, a consortium of World Wildlife Fund, The Nature Conservancy, and World Resources Institute. The Black Sea is a unique body of water. Its narrow connection with the world's oceans through the Bosphorus, combined with its thermal and density-related stratification, produce unique ecological conditions. These special conditions explain, to a large degree, the increasing level of interest in its biota and its characteristic diversity. The hydrological and hydrochemical peculiarities of the Black Sea, together with its restricted vertical water interchange, allow poisonous hydrogen sulphide gas to form and persist beneath the 150-metre isobath. Consequently, most of the flora and fauna occupy only the uppermost 130-140 meters of the water mass, or 13% of the volume of the whole sea. And among its other peculiarities, the Black Sea ranks first among the world's threatened water basins. Threats to biological diversity in the Black Sea include habitat loss and degradation, pollution, eutrophication, illegal bottom trawling, channelization of sea waters, drainage of wetlands along the Back Sea coast, urban expansion, illegal bottom trawling, pollution, radioactive substances, introduction of invasive species by ballast waters, overfishing, and overexploitation of ecosystems. Marine protected areas have already been designated in all national waters of the bordering States. These areas will increase in time and, with integrated management, a fully developed, functional and efficiently controlled network of specially protected areas in the Black Sea can become a reality. Goals for the nominated marine protected areas include managing fisheries and other human activities, conserving biodiversity and habitat, increasing scientific knowledge, providing educational opportunities, enhancing recreational activities and supporting fish populations. Ecologically connected networks of marine protected areas could amplify the effectiveness and conservation benefits of each individual area in the network. There are currently 42 designated protected areas in the coastal and marine regions of Bulgaria. Many of these are coastal wetlands. Cape Kaliakra marine area was one of the first protected areas in Bulgaria, declared a national park as early as 1941. On the basis of the EU's 6th Environmental Action Programme 2002-2012, the European Commission adopted in 2005 a Thematic Strategy on the Protection and Conservation of the marine environment including under a legal instrument, the Marine Strategy Directive, that is presently being discussed by the EU Council of Ministers and the European Parliament. The ultimate objective of the EU Marine Strategy as proposed by the European Commission is to achieve "Good Environmental Status" of the marine environment by 2021. The 2007 Black Sea Strategic Action Programme (SAP) will adhere to three key environmental management approaches: integrated coastal zone management (ICZM), the Ecosystem approach and integrated river basin management (IRBM).

12. **Mr. Hein Rune Skjoldal (Norway).** Mr. Skjoldal gave a brief presentation on experience in establishing a system of MPAs in Norway. This work has extended over a 20-year time period and was initiated by establishment of a group that advised on strategy and selection criteria for MPAs. The group took the existing IUCN criteria as their starting point. They suggested simplification and recommended use of a shorter list of criteria: 1) typical, 2) special, 3) high productivity, and 4) high diversity. A second group of experts was then tasked with reviewing knowledge of distribution patterns of marine flora and fauna and select candidate areas which could be considered as MPAs. They found the third criterion on productivity difficult to use, although in some cases it was used indirectly (e.g. productive shallow water areas as important feeding areas for sea ducks). After a political process that provided guidance on the relation between use and conservation, a third group was tasked with selecting areas from the candidate list and propose a plan for a national system of MPAs. This group had representatives from national agencies, industry and environmental NGOs. The group was mandated to use five criteria for the selection of areas that was recommended to be included in the national plan: 1) representative, 2) special, 3) vulnerable, 4) threatened, and 5) use as reference area. In practice, the two first criteria were the main ones that informed the selection of areas into the overall MPA plan. In retrospect, when the plan was compared to the IUCN criteria, it was evident that all the criteria had been used to some degree but usually only in indirect ways. The Norwegian MPA plan comprises 36 areas (ranging in size from five to >3,000 km^2) and is now undergoing political treatment before final decisions are made.

13. **Mr. Henning von Nordheim (Germany).** He presented the current status of the OSPAR network of 130 MPAs, mostly in territorial waters of OSPAR Contracting Parties, emphasizing the experience of OSPAR in applying selection criteria very similar to the EBSA criteria also in areas beyond national jurisdiction (ABNJ) of the OSPAR Maritime Area (North-East Atlantic). In 2003 OSPAR ministers adopted guidelines for the identification and selection of MPAs, including ecological and practical criteria for the selection of areas for protection and a commitment to establish a network of a "well managed" network of MPAs by 2010. Working with these criteria, OSPAR, with its working group on MPAs, regularly convened by Germany, has provided a forum for co-ordination with deep-sea scientists and stakeholders, which has shown that these criteria can be used for selection of MPAs in territorial seas as well as in ABNJ. The OSPAR selection process considers two sets of criteria in parallel: seven ecological criteria (similar to CBD EBSA criteria), with the addition of "representativity", and five "practical" criteria (potential for restoration, degree of acceptance, potential for success of management measures, potential damage to the area by human activities, and scientific value). Of relevance to the CBD EBSA criteria, 'uniqueness or rarity' and 'threatened, endangered or declining species and/or

habitats', OSPAR has developed the OSPAR List of Threatened and/or Declining Species and Habitats. When making a comparative analysis of the OSPAR selection criteria against CBD EBSA criteria and UN/FAO criteria of vulnerable marine ecosystems (VMEs), it can be confirmed that, in the context of OSPAR's well developed proposals, the EBSA criteria are effective and should be further applied globally. The OSPAR Commission would welcome recognition by the CBD that the seven OSPAR examples that where presented with comprehensive background information ("pro-forma") qualify as EBSAs in need of protection in open-ocean waters and deep-sea habitats. In 2008, OSPAR unanimously endorsed in principle the proposal for the "Charlie Gibbs MPA", the first very large MPA in the OSPAR ABNJ, and in 2009 the Conservation Objectives for the site. OSPAR 2009 also agreed that six other areas in the ABNJ should be approved, in principle. Currently various consultations with competent authorities for the OSPAR ABNJ are under way; one of them, North East Atlantic Fisheries Commission (NEAFC), has already protected parts of the seven areas in ABNJ against the destructive effects of bottom trawling from 2009 onwards.

14. **Ms. Maria Jesus De Pablo (UNEP-MAP).** Analysis of key aspects of physical and ecological dynamics as well as the issues regarding implementation of operational criteria for the site selection process is addressed in the main activities planned to implement the Joint Management Action of the European Community and the United Nations Environment Programme-Mediterranean Action Plan entitled 'Identification of possible Specially Protected Areas of Mediterranean Importance (SPAMIs) in areas beyond national jurisdiction'. The Regional Activity Centre for Specially Protected Areas (UNEP-MAP) is the implementation Agency of the action, which envisages two-phase projects. Operational criteria needed an adequate elaboration in order to prepare a short-list of potential sites that could be later endorsed by the Contracting Parties to the Barcelona Convention. It is expected that candidate sites will broaden the representativeness of SPAMIs with absent or underrepresented habitat and ecological processes. Application of SPAMI criteria and the contributions of other operational criteria, such as the CBD EBSA criteria have been suggested as effective strategies to overcome constraints related to limited data availability. Expertise from various disciplines, international cooperation, and understanding of the existing legal framework are required to identify possible SPAMIs in the open seas, including deep seas. The process of the promising sites designation is ongoing, with data still being obtained, and the results should be considered only tentative. The preliminary set of potential SPAMIs in ABNJ is being developed jointly by a group of experts in consultation with the Steering Committee.

<u>Relevant Initiatives by UN/International Organizations</u>

15. **Ms. Merete Tandstad (FAO).** The FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas was adopted in August 2008 by member states. The development of the Guidelines was a multi-stakeholder process that included FAO members, industry, NGOs/IGOs, scientists and researchers. As a contribution to the development and implementation of the FAO Guidelines, FAO also carried out a worldwide review of bottom fisheries in the high seas. This review will be updated at regular intervals. The FAO International Guidelines are a voluntary international instrument and provide management tools and guidance to facilitate and encourage the efforts of States and RFMO/As towards sustainable use of marine living resources exploited by deep-sea fisheries, the prevention of significant adverse impacts on deep-sea Vulnerable Marine Ecosystems (VMEs) and the protection of marine biodiversity that these ecosystems contain. The Guidelines provide detailed guidance on requirements and obligations for the identification and management of Vulnerable Marine Ecosystems (VMEs), and for assessing significant adverse impacts (SAIs). The criteria for identification of VMEs are 1) Uniqueness or rarity; 2) Functional significance of the habitat; 3) Fragility; 4) Life-history traits of component species that make recovery difficult; and 5) Structural complexity. The criteria for identification of VMEs are similar to the CBD EBSA criteria, which presents opportunities for collaborative activities, although some differences exists. To support the implementation of the guidelines, FAO has initiated a programme intended to respond to the requests for assistance made to FAO from its members. The objective is to improve the current management systems through more and better information as well as engagement and communication among stakeholders, and through capacity-building. Furthermore, the program seeks to

establish a knowledge baseline in relation to these fisheries and related ecosystems. The programme has four main components, which although interlinked, can also be implemented independently: 1) development of support tools for the implementation of the FAO International Guidelines; 2) Vulnerable Marine Ecosystem Mapping System; 3) Demonstration and pilot implementation activities for enhanced management of deep-sea fisheries in the Indian Ocean; and 4) Global coordination, monitoring and evaluation, and dissemination of information. As part of this initiative, a workshop will be held in Republic of Korea in February 2010 to review the implementation of the FAO Guidelines including work on identification of VMEs and the way forward.

16. **Mr. Adam Cook (ISA).** The role of the International Seabed Authority is to organize and control activities in areas beyond national jurisdiction, particularly with a view to administering the mineral resources of the Area. The rules of the Authority require, *inter alia*, that necessary measures are taken to ensure effective protection for the marine environment from harmful effects, which may arise from commercial activities associated with the resources. The Authority has ratified the rules and regulations for the prospecting and exploration of manganese nodules, and the draft rules and regulations for prospecting and exploration of polymetallic sulphides are currently being considered by the Council. The draft regulations for cobalt-rich crusts have been prepared by the Legal and Technical Commission and will be considered by the Council in due course. One of the components in both the ratified and draft regulations concerns the protection of the marine environment. However, the lack of knowledge regarding the deep-sea environment has meant that the requirements are generally based on the precautionary principle, with the Authority instigating work to gather information about the relevant environments in order to be better prepared when exploitation commences. Contractors have shown interest in two areas for polymetallic nodules: the Clarion-Clipperton Zone in the central Pacific and the Central Indian Ocean. Of these two areas, most contractors (7 of 8) are interested in the Clarion-Clipperton Zone and it is for this reason that most environmental effort has been concentrated in this region. The area of interest is found approximately 7-17°N and 115-157°W. The main environmental activity of the Authority in this region was the Kaplan project, which examined benthic biogeography and led to the formation of a proposal that identified nine locations in the Clarion Clipperton Zone as areas of environmental interest for which an environmental management plan is currently being considered. With regard to the resources for which regulations are currently being considered, whilst there is debate about the most appealing locations for sulphide mining, the area most likely to be of interest for cobalt-rich crust mining is the central northern Pacific Ocean. The Authority is currently collaborating with the CenSeam programme of the Census of Marine Life to investigate the biogeography of seamount fauna in this region, the data from which will be used to identify potentially ecologically significant areas for which a management plan could be prepared. The Authority will monitor any developments with regard to the mining of polymetallic sulphides beyond national jurisdiction with one of the aims being to initiate further environmental studies as appropriate to identify significant ecological areas that may need specific protection.

17. **Ms. Colleen Corrigan (UNEP-WCMC).** The purpose of the presentation was to share insights on the importance of looking at the application of CBD scientific criteria through regional perspectives where they can be considered collectively and at a large, oceanic scale that matches oceanographic processes and the needs of highly migratory species. The presentation also provided lessons learned following early discussions and expert input surrounding application of criteria collectively at the regional scale. A case study from the Ross Sea in Antarctica demonstrated how all seven EBSA criteria can be relevant to one large-scale area. Key issues to consider when developing a regional approach include developing a hierarchical scale of application; incorporation of benthic-pelagic coupling where possible; following a realistic timeframe; consideration of threats; attention to data validation, gaps, proxies and appropriate models; and the critical importance of ensuring early collaboration with key partners.

18. **Mr. Jeff Ardron (WCPA).** Reef-forming cold water corals are known to be very sensitive to certain anthropogenic activities such as bottom contact fishing, and expected to be heavily impacted by ocean acidification. They are also known to have very slow recovery rates. They therefore represent a good example of species which fit the EBSA criterion: *vulnerability, fragility, sensitivity, or slow*

recovery. Using known locations of the six reef-forming *scleractinian* (or “stony”) cold-water coral species, amassed from research and cruise data bases, a global predictive habitat model was developed based on 26 environmental conditions using a *maximum entropy* analysis. This approach represents a practical way forward in identifying sensitive, fragile and slow-recovering coral species and their habitats in regions of the world’s oceans that have not been well studied or surveyed. This analysis also provides a means by which proposed conservation measures can be assessed for their likely conservation value with regard to these species. For example, protective bottom trawl closures in the North East Atlantic are located in areas that often have a very high probability of containing cold water coral habitat. In contrast, this analysis indicates that the voluntary bottom trawl closures in the Southern Indian Ocean may not be positioned in areas that would protect the majority of sensitive coral habitat predicted in the region (though they may have value for other kinds of EBSAs). To conclude, predictive habitat modelling is a form of decision support, applicable in data-limited areas, which can facilitate follow-up actions such as research surveys and precautionary management actions. The fine spatial resolution of these predictions (1 km x 1 km) allows for consideration of these possible EBSAs at a scale suitable for conservation measures. We suggest that areas predicted to have a high likelihood of stony coral occurrences which are being considered as likely EBSAs, should be ground-truthed through directed surveys.

19. Mr. Ben Lascelles (Birdlife International). The BirdLife International Important Bird Area (IBA) programme uses a globally agreed standardised set of data-driven criteria and thresholds to identify priority sites for conservation. The criteria are based around vulnerability and irreplaceability, key attributes for identifying priority sites. There is considerable overlap and congruence between the criteria used to identify IBAs and those adopted by the CBD to identify EBSAs in areas beyond national jurisdiction. Marine IBAs (defined on the basis of seabird data) are likely to be strong candidates for the identification of, or inclusion within, EBSAs. Seabirds are oceanic top predators that are particularly easy to detect, track and count, and can act as important indicators of wider marine biodiversity and marine ecosystem health. They also occur at a variety of predictable habitats and oceanic features frequently used by a range of other coastal and pelagic biodiversity. The Global Procellariiform Tracking Database, managed by the Global Seabird Programme of BirdLife International, holds data on 28 seabird species contributed by 57 scientists from 11 countries. A complete analysis of this dataset is needed to define additional IBAs in both Exclusive Economic Zones and international waters, and will be of key importance in defining EBSAs for seabirds in the latter.

Annex III

SUMMARY OF PRESENTATIONS FOR THE REVIEW AND SYNTHESIS OF EXPERIENCE WITH THE USE OF THE BIOGEOGRAPHIC CLASSIFICATION SYSTEM, AS REFERRED TO IN PARAGRAPH 19 OF DECISION IX/20

Global Experiences

1. **Marjo Vierros (United Nations University - Institute of Advanced Studies).** The presentation was titled “Introducing the Global Open Oceans and Deep Seabed (GOODS) biogeographic classification and its potential uses”. The presentation covered the development of the GOODS classification and elaborated on how it might be used. The GOODS biogeographic classification is the only comprehensive global biogeographic classification system for open oceans and the deep seabed. It divides the ocean beyond the continental shelf into 78 large-scale benthic and pelagic biogeographic provinces based on both environmental variables and biological information. Possible uses of the classification system include (i) assessment, monitoring and scientific research; (ii) application of the ecosystem approach; (iii) planning and implementation of representative networks of marine protected areas; and (iv) undertaking environmental impact assessment, threat assessment and ecological modelling.

National and Regional Experiences

2. **Ian Cresswell (Australia).** He presented on Australia’s agreed Bioregionalisation – the Integrated Marine and Coastal Regionalisation. Australia’s marine area is highly diverse flora and fauna. Much of this rich and complex marine biodiversity remains poorly sampled. Developing a system of MPAs that is comprehensive, adequate, and representative is therefore a challenging prospect, especially by the 2012 target. Australia is taking a hierarchical approach to managing its marine biodiversity using a nested set of bioregions known as the Integrated Marine and Coastal Regionalisation of Australia (IMCRA). IMCRA provides a way of dividing up Australia’s oceans into units that reflect spatial patterns in plants, animals and habitats; that make sense ecologically, and are at appropriate sizes for planning and management. It consists of two separate regionalisations: a benthic bioregionalisation and a pelagic regionalisation. Provinces are the largest unit in the benthic bioregionalisation. They are defined using distributions of demersal fish and an analysis of species turnover and richness around Australia, and divided into different climatic categories: tropical, sub-tropical, warm temperate and cool temperate. They are separated by ‘transition zones’ where species distributions from provinces on either side overlap. The second level of the benthic bioregionalisation consists of 60 meso-scale bioregions on the continental shelf, defined using information on climate, oceanography, geology & geomorphology, biota and estuaries. The third level of the benthic bioregionalisation describes geomorphic units which are derived from geomorphic features, and classified into 14 geomorphic classes. The pelagic regionalisation provides qualitative descriptions on the Indian, Pacific and the Southern Ocean. It characterises ocean zones based on water temperature, circulation and assemblages of biota, and also describes 25 different water masses identified by examining temperature, salinity and dissolved oxygen. Furthermore circulatory regimes were described using surface and subsurface currents, primary productivity, sea surface height and sea surface temperature. Oceanographic features are the finest scale analysis of structure within oceanic surface layers. IMCRA is a key data layer in Australia’s programme to develop marine bioregional plans, including a system of MPAs. Each plan will describe a region's key habitats, plants and animals; natural processes; human uses and benefits; and threats to the long-term ecological sustainability of the region and will describe the range of conservation measures to protect the key values in each region. Further to this, Australian governments are currently working to develop a new national system for monitoring, evaluation and reporting to provide a basis of ecosystem-based management (EBM), recognising the nested sub-elements, including ecosystem-based fisheries management (EBFM) and ecosystem-based conservation management (EBCM). The system should be applicable at the range of spatial scales

required by policy and management decisions, with IMCRA being the agreed biogeographic framework for the development of the system.

3. **Elva Escobar (Mexico).** The objective of the presentation was to share national experiences on the use of the biogeographic classification system, as referred to in paragraph 19 of decision IX/20. Three case studies were presented, two of fully scientific nature and in progress regarding the identification of areas of endemism and linking *Munidopsis geyeri* metapopulation within the Atlantic Equatorial Belt. The other case study demonstrates the interaction between the Mexican government, NGOs and Mexican scientists in producing an analysis of scientific gaps in marine biodiversity and defining areas of ecological priority for conservation in Mexico. The methods were presented, based on the two-day workshop with 45 experts from 33 academic institutions, including the data gathering, the list of conservation targets, the previous prioritization efforts, the National Biodiversity Information System (SNIB) of national marine records, the validation of priority sites and the comparison with existing MPAs. This effort considered using the national databases of marine biodiversity SNIB of 153,221 records of marine species out of 143 projects funded by the Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO). These include diverse marine groups of invertebrates, vertebrates and marine plants and algae. Results of the analysis, displayed as maps, are presented showing the priority sites and their conservation priority, the percentage coverage of priority sites by marine ecoregion and the addition with Mexico's island biodiversity database. The next steps include an analysis at different scales, including local, regional and ecoregional, the evaluation of the MPAs' effectiveness, validation and improvement of information on marine biodiversity, and the development of a model that allows estimation of the natural viability, evaluation of the effect of global climate changes on the priority sites and the selection of different algorithms for quantitative analyses for conservation of focal biodiversity. Threat assessments are continuously updated and added to these results.

4. **Ellen Kenchington (Canada).** A number of biogeographic classification systems (BCSs) have emerged in the past decade with differing spatial scales (from highly regional to global), approach (from the one based almost entirely on previous works to the one based on quantitative analyses of extant data), and scope (consideration of one ecosystem dimension versus all possible data sources). In Canada, three government departments and the Canadian Council of Resource Ministers each had different marine BCSs developed over different periods of time for different purposes. A workshop held in June 2009, including experts from all departments, reviewed existing BCSs that encompass Canadian waters. They adopted the Guiding Principles of the GOODS report and proceeded to reach consensus on 12 ecoregions for Canada's three oceans. Rapid consensus was reached because most debate on defining boundaries could be resolved by recalling the hierarchical spatial structure. The largest spatial scales were linked to physical oceanographic and geological features underpinned by the control these have on species distributions. A key point was the recognition of transition zones, either gradients over broad distances or abrupt but variable transitions, which the experts felt should be zoned separately and may require different management.

5. **Jeff Ardron (IUCN World Commission on Protected Areas).** Seamounts are prominent features of the world's seafloor, the target of deep-sea commercial fisheries, and of interest for mineral exploitation. They can host vulnerable benthic communities, which can be rapidly and severely impacted by human activities. There have been recent calls to establish networks of MPAs on the high seas, including seamounts. However, there is little biological information on the benthic communities on seamounts, and this has limited the ability of scientists to inform managers about seamounts that should be protected as part of a network. Recognising this general issue that exists on the open oceans and deep seas, particularly those areas beyond national jurisdiction, we present a seamount classification based on "biologically meaningful" physical variables for which global-scale data are available. The approach involves the use of a general biogeographic classification for the bathyal depth zone (near-surface to 3500 m), and then uses four key environmental variables (overlying export production, summit depth, oxygen levels, and seamount proximity) to group seamounts with similar characteristics. This procedure is done in a simple hierarchical manner, which results in 194 seamount classes throughout the world's oceans. The method was compared against a multivariate approach, and ground-truthed against octocoral data for

the North Atlantic. We believe it gives biologically realistic groupings, in a transparent process that can be used to: 1) directly select, or aid selection of, seamounts to be protected and 2) assess currently existing networks of closures and protected areas for possible gaps in seamount representativity.

6. **Paul Holthus (World Ocean Council).** The World Ocean Council (WOC) is a newly developing international, cross-sectoral industry alliance on ocean sustainability and stewardship. The WOC is bringing together a range of ocean industry sectors, e.g. shipping, fisheries, oil/gas, aquaculture, ocean renewable energy, tourism, etc. The WOC is catalyzing industry collaboration and leadership on shared issues, e.g. marine spatial planning, ocean noise, marine invasive species, etc., and engage in key policy and intergovernmental processes addressing ocean issues, e.g. CBD, Arctic Council. Industry activities in the marine environment require a comprehensive and up-to-date assessment of marine resources to support the environmental planning and compliance efforts, with increased needs for an effective structure and process for documenting and tracking the status of marine areas, resources and environmental conditions. A marine resources knowledge management system, based on an ecoregional approach and organizational framework, is needed by ocean users to provide a systematic and documented means to establish and update baseline information and data on marine resources in support of planning and situational analysis to minimize and mitigate impacts to marine resources. A comprehensive, widely accepted marine ecosystem classification system for compiling, presenting, mapping and updating information on an ecoregional basis provides a valuable basis for natural resource management and will save considerable effort and cost when researching, managing data, and creating marine resource assessments. The Marine Ecoregions of the World (MEOW) and Global Open Oceans and Deep Seabed (GOODS) taken together provide a comprehensive, integrated framework for developing a marine resources knowledge management system.

Annex IV

REVIEW AND SYNTHESIS OF PROGRESS ON THE IDENTIFICATION OF AREAS BEYOND NATIONAL JURISDICTION THAT MEET THE SCIENTIFIC CRITERIA IN ANNEX I TO DECISION IX/20 OR SIMILAR CRITERIA

1. The CBD EBSA criteria, or similar criteria, have been applied in coastal areas as well as open-ocean and deep-sea areas within national jurisdiction (e.g. by Australia, Brazil, Canada, Mexico, United States of America), and by regional and non-governmental organizations. At this workshop, presentations on specific examples were provided. There is also some experience in applying the CBD EBSA criteria, or similar criteria, in ABNJ, demonstrating their value in such areas. Ten examples focusing on open-ocean waters and deep-sea habitats, primarily beyond national jurisdiction, are provided below:

a. ***Regional Activity Centre for Specially Protected Areas of the United Nations Environment Programme/Mediterranean Action Plan***

(Source : http://www.cbd.int/doc/meetings/mar/ewbcsima-01/other/ewbcsima-01-iucn-medras-en.pdf)

Work is underway within the Mediterranean to create an ecological network of representative MPAs under the aegis of the Barcelona Convention and its Specially Protected Areas of Mediterranean Importance (SPAMIs)[3]. The "Joint Management Action" of the European Community with the United Nations Environment Programme/Mediterranean Action Plan (UNEP/MAP) on "Identification of possible SPAMIs in the Mediterranean areas beyond national jurisdiction" was established to promote the establishment of such a network, including in ABNJ.

The Joint Management Action envisages a two-phase process. The first phase includes a feasibility assessment based on sound science to identify ABNJ in the open ocean and deep sea that may qualify as SPAMIs. During the second phase, the potential SPAMIs in ABNJ will be reviewed based on ecological, economic, social and political criteria.

During the first phase, large-scale ecological units will be identified to serve as the basis for developing a representative network. Areas of conservation importance will then be identified using the SPAMI criteria harmonized with the CBD EBSA and other criteria adapted to suit Mediterranean conditions and information availability. The CBD EBSA criteria provide a helpful supplement to the older SPAMI criteria in that they provide more specific operational guidance.

The delivery of spatial data, planning tools, science guidelines, socio-economic and ecological evaluations in a decision-support framework are essential in designing SPAMIs in ABNJ, and for informing decision-makers. Performance tools or evaluation methods, which could be applied or adapted for use, are being considered.

Key elements in the project methodology include overviews and specific case studies to communicate the proposed aims and project methods to Contracting Parties. The development of these case studies is intended to stimulate debate and encourage the prioritization of a short-list of possible SPAMIs in ABNJ in the Mediterranean region. The acceptance of scientific criteria such as CBD EBSA will support the development of a preliminary short-list of potential SPAMI sites.

---

[3] The SPAMIs include sites that are important for conserving the components of biological diversity in the Mediterranean; contain ecosystems specific to the Mediterranean areas or to the habitats of endangered species; and sites of special interest at the scientific, aesthetic, cultural or educational levels, as it is stated in the 1995 Protocol concerning the Specially Protected Areas and Biological Diversity of the Barcelona Convention.

b. ***OSPAR network of proposed MPAs, including in areas beyond national jurisdiction***

(Source: http://www.ospar.org/)

The OSPAR (Convention for the Protection of the Marine Environment of the North-East Atlantic) Maritime Area extends from the Strait of Gibraltar in the south, to the North Pole in the north, to Greenland in the west. About 85% of it covers deep-sea areas and about 40% is High Seas (pelagic zone beyond national jurisdiction). OSPAR Ministers adopted a declaration recommending the establishment of an "ecologically coherent network of well-managed" MPAs by 2010 (OSPAR, 2003), including ABNJ. OSPAR uses a total of seven selection criteria, which are very similar to the CBD EBSA criteria but include representativity, and, in addition, five practical considerations.

In 2007 Portugal nominated the Rainbow hydrothermal vent field to the OSPAR network of MPAs as a site in the claimed extended shelf of the Azores. It was initially brought to the consideration of OSPAR by WWF International when it was considered to be on the seabed beyond national jurisdiction. It represents an OSPAR priority habitat, listed on the Initial OSPAR List of Threatened and/or Declining Species and Habitats as an example of "oceanic ridges with hydrothermal vents/fields". Like other vent sites in the area, Rainbow vent is well known, well characterized scientifically, and has some unique features.

The OSPAR MPA network process represents a regional approach to identify priority areas for protection that has been refined through practice over the years. Two factors that may be worth considering in the CBD EBSA criteria application are that: 1) the OSPAR criteria are supplemented by a regionally agreed list of priority habitats and species; and 2) submissions for candidate areas are substantiated through a standardized fact sheet (proforma). Such fact sheets promote a consistent approach to the provision of scientific background information for each area.

Sites in ABNJ in the OSPAR Maritime Area have been under consideration since 2007. One of the seven areas is the Charlie Gibbs Fracture Zone (CGFZ), a proposal initially developed by WWF International. The CGFZ and the other six proposals (Reykjanes Ridge, Southern MAR, Altair seamount, Antialtair seamount, Milne seamount cluster and Josephine seamount) were reviewed scientifically by the International Council for the Exploration of the Sea (ICES). At that time, these areas were thought to lie beyond national jurisdiction. As a result of the submissions to the Commission on extended continental shelf claims by Iceland and Portugal in April and May 2009, respectively, the limits of the continental shelf now overlap with most of the seabed in six of these areas.

All the areas were selected according to the OSPAR criteria and were considered to be representative of most of the deep-sea and open-ocean habitats of the wider Atlantic OSPAR region.

The Charlie Gibbs Fracture Zone covers the northern part of the Mid-Atlantic Ridge, including the Charlie Gibbs Fracture and Maxwell Fracture zones. It comprises the Faraday (1251 km^2) and Hecate (358 km^2) seamounts, and in the north a section of the Reykjanes Ridge (20644 km^2) where bottom trawling and fishing with static gear, including bottom set gillnets and longlines, has been prohibited since 2004 (NEAFC Recommendation VII:2008 followed by Recommendation VIII:2009). NEAFC (2009) agreed on further and larger closures, partially overlapping with several of the OSPAR proposals.

The case for this proposal was largely based on the cooperative, multinational, large-scale scientific research programme focusing on "Patterns and Processes of the Ecosystem of the Northern mid-Atlantic" (MAR-ECO) as part of the global Census of Marine Life Initiative, which will be concluded in 2010. The Charlie Gibbs Fracture Zone was one of three focal areas of study under the MARECO programme. Other studies, such as the UK research programme EcoMar (http://www.oceanlab.abdn.ac.uk/ecomar), are ongoing.

Recently the OSPAR Secretariat compared the CBD EBSA criteria against the OSPAR selection criteria for CGFZ and the other six proposed deep-sea and open-ocean areas, and concluded that both sets of criteria were met. The results were summarized and submitted to this workshop as a background document (available at https://www.cbd.int/doc/meetings/mar/ewbcsima-01/other/ewbcsima-01-ospar-en.pdf)

c. ***Northwest Atlantic Fisheries Organization (NAFO) Identification of significant concentrations of corals and sponges in the high seas***

(Source: www.nafo.int)

In 2006, the United National General Assembly (UNGA), in its Sustainable Fisheries Resolution 61/105, called for States and Regional Fisheries Management Organisations (RFMOs) to adopt conservation and management measures in order to prevent significant adverse impacts on vulnerable marine ecosystems (VMEs). In order to facilitate this process, the FAO developed Technical Guidelines for Deep-Sea Fisheries on the High-Seas (FAO, 2009). The Guidelines include criteria for identifying VMEs, which are similar to the CBD EBSA criteria, and guidance on managing the impacts of fishing on such ecosystems.

The Scientific Council of NAFO, through its Working Group on the Ecosystem Approach to Fisheries Management and joint ICES Working Group on Deepwater Ecology, applied the FAO criteria to the high-seas of the Northwest Atlantic within its jurisdiction. Because corals and sponges were identified as displaying characteristics of possible VMEs according to the FAO guidelines, it was possible to focus on these taxa with minimal debate. For each, individual species were assessed, and those that met the criteria were identified. Taxa with similar size and morphology were then grouped (e.g., large gorgonian corals, sea pens) and their distribution mapped using data from research vessel surveys. The sponges and corals of concern formed relatively rare dense aggregations resulting in large numbers of tows with only small bycatch and a few tows with very large bycatch. The 90% and 97.5% quantiles of the cumulative catch curve were used to identify significant concentrations of different groups of coral, while for sponges a spatial analysis was also introduced which identified the bycatch level indicative of sponge grounds.

This work was able to proceed rapidly to the adoption of bottom-fishing closures to protect both coral and sponge communities within the fishing footprint on Flemish Cap and the Southeast Grand Banks. There was very little difficulty in identifying the coral and sponge species which met the criteria. It was more difficult to provide a scientific basis for the determination of significant concentrations of corals and sponge but this was enabled through the spatial analyses. While the FAO criteria will enable other bodies to similarly identify VMEs and ensure consistency of application, the values used to identify significant concentrations may differ depending on species composition. However, the process used in the NAFO regulatory area is transferable to other fished areas.

d. ***High Seas Mediterranean Reserves and High Seas Enclaves of the Western and Central Pacific***

(Source: http://www.cbd.int/doc/meetings/mar/ewbcsima-01/other/ewbcsima-01-greenpeace-en.pdf)

Greenpeace International conducted studies on the possible application of the CBD EBSA criteria to areas beyond national jurisdiction. The areas considered in these studies were: (i) the four Pacific High Seas Enclaves in the Pacific islands region and (ii) two areas in the Mediterranean comprising high seas areas of the Southern Balearics and the Sicilian Channel. The evaluations of each area were based on information retrieved from peer-reviewed literature as well as other relevant high quality data sources when these were available. The CBD EBSA criteria were applied as a framework against which to objectively evaluate the data and information. The criteria were tested both under relatively data-poor and data-rich conditions, as less information was available for the Pacific as compared to the Mediterranean. The exercise illustrated that the CBD EBSA criteria could be used effectively to distil relevant information from a wider information base to inform discussions about appropriate conservation measures but could also effectively bring a focus to bear upon areas where data to fully inform such a dialogue were lacking.

e. ***BirdLife International Important Bird Area example on the high seas***

(Source: http://www.cbd.int/doc/?meeting=EWBCSIMA-01; http://lifeibasmarinhas.spea.pt/y-book/ibasmarinhas/; http://www.seo.org/programa_intro.cfm?idPrograma=32)

The BirdLife International Important Bird Area (IBA) programme has used a standardized set of data-driven criteria and thresholds to identify priority sites for bird conservation since the 1970s.

The Global Procellariiform Tracking Database, managed by the Global Seabird Programme of BirdLife International, holds tracking data on 28 seabird species contributed by 57 scientists from 11 countries. An IBA analysis on a selection of data held within this database has identified a number of IBAs in the Southern Ocean that occur in (ABNJ. An analysis produced by BirdLife International for the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) combined the breeding distribution of 20 southern-hemisphere seabird species, determined from tracking data, to assess the overlap with the CCSBT area. This analysis found a number of areas that meet the IBA criteria for congregations and threatened species in ABNJ. These areas would also meet the CBD EBSA criteria for special importance for life-history stages, biological diversity, and importance for threatened species, as many of the seabirds included are listed as threatened or vulnerable on the IUCN Red List.

Projects conducted by BirdLife's Partners SEO/BirdLife in Spain and SPEA in Portugal collected satellite tracking data from Cory's Shearwater *Calonectris diomedea borealis.* Analysis of these tracking data identified a number of areas that would meet the IBA criteria both within and beyond areas of national jurisdiction. Four sites in ABNJ between 40-45º N and 15-25º W met the IBA criteria for congregations. These sites would also meet the CBD EBSA criteria on special importance for life-history stages of species, as they were used throughout the year, and also for biological diversity, as large numbers of birds were shown to be congregating there.

To build on these experiences, BirdLife organized a workshop to refine methodologies for analysing tracking data to identify sites meeting the IBA criteria. This workshop concluded that further analysis of seabird tracking and distribution data would define additional IBAs in both EEZs and ABNJ, and would be of key importance in defining EBSAs for seabirds in the latter.

f. ***The Blue Whale, Balaenoptera musculus: An Endangered Species on the Costa Rica Dome***

(Source: https://www.cbd.int/cms/ui/forums/attachment.aspx?id=73)

The Whale and Dolphin Conservation Society submitted a document illustrating the application of the CBD EBSA criteria in the Costa Rica Dome area. Long-term research showing the year-round presence of blue whales in this area formed the basis for an assessment according to the CBD EBSA criteria. The analysis demonstrates that this area, encompassing waters falling both within and beyond national jurisdiction, likely fulfils several of these criteria but in particular highlights its clear importance for threatened, endangered or declining species and/or habitats.

The Costa Rica Dome is a shoaling of the generally strong, shallow thermocline of the Eastern tropical Pacific Ocean. This upwelling of cold, nutrient-rich waters occurs due to the confluence of currents west of the Isthmus of Darien. Its size and position vary throughout the year. It is a distinct and highly productive biological habitat where phytoplankton and zooplankton biomass are higher than in surrounding tropical waters.

The assessment of the area against the CBD EBSA criteria used a variety of information, including satellite tagging data, field measurements documenting the presence of numerous feeding blue whales in the area and photo-identification methods. Remote sensing data indicated a higher level of biomass of phytoplankton and elevated nutrient levels. Ship-board measurements of conductivity and temperature taken at various depths and positions were also used to inform the evaluation process and define the presence and extent of this physico-chemically defined water area. This example thus illustrates that the criteria can be effectively applied to identifying important habitat for a highly migratory species even when that habitat is dynamic, changing in size and position (in this case on a predictable seasonal basis).

g. ***Applying criteria through a regional analytical approach to the Ross Sea, Southern Ocean***

(Source: http://www.cbd.int/doc/meetings/mar/ewbcsima-01/other/ewbcsima-01-unep-wcmc-02-en.pdf)

The Ross Sea is a broad continental shelf and slope system located in the Antarctic Region south of 60º, part of the Antarctic shelf system in the Southern Ocean, and has been preliminarily identified as an important area of the oceans through two processes. First, the Northern Ross Sea/Eastern Antarctica and the Ross Sea Shelf emerged as two of eleven areas identified as potential priority areas through the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) bioregionalization process of 2007 (CCAMLR 2007). These areas were identified by applying Antarctic Specially Protected Areas criteria from the 1991 Madrid Protocol to the Antarctic Treaty. Although different, these criteria include substantial overlap with the CBD EBSA criteria. The process entailed workshops that utilized a cluster analysis combining ecological data with bioregionalization data to identify potential priority areas for further exploration.

Building on the CCAMLR findings, scientists compiled the most recent data available measuring the range of biodiversity and other relevant ecological processes, including climate change. The criteria that were applied in this case also included the seven CBD EBSA criteria. The purpose of this exercise was in part to test their simultaneous application as a group to one area of the ocean. The assessment identified many significant properties in the Ross Sea, including its unique assemblage of an intact food web with top predators, important breeding areas for substantial proportions of many Antarctic bird and marine mammal species, sensitive ice-dependent communities and circulation systems near the Antarctic Convergence Zone, and one of the most natural (i.e. least impacted) areas in the marine environment.

Lessons learned from this process of assessing an area against all of the CBD EBSA criteria include: the need 1) to incorporate a hierarchy of analytical scales within the region, 2) to consider the complexities between benthic and pelagic systems, 3) to focus initially on identifying EBSAs rather than management measures, 4) to work closely with data providers to ensure accurate representation of data, validate data and models; 5) to use proxies and indicators where first-hand data are not available, 6) to create a realistic timeframe for the best results of end goals, and 7) to set up collaboration of partners from an early stage.

h. ***Illustrations compiled by Global Ocean Biodiversity Initiative (GOBI)***[4]

(Source: http://www.cbd.int/doc/meetings/mar/ewbcsima-01/other/ewbcsima-01-multiorgs-en.pdf)

Defining ecologically or biologically significant areas (EBSAs) in the open oceans and deep seas will require the application of a wide variety of data types and the development of synthetic analyses. A first step towards developing the data, tools and analytical approaches required to implement the selection of EBSAs is the development of example "illustrations" depicting potential methods for implementing the selection criteria. A cooperative group facilitated by IUCN, the Census of Marine Life, WCMC, MCBI as well as a large number of individual collaborators developed a set of example illustrations and considerations as an initial contribution to the CBD process in response to decision IX/20.

Example illustrations for each of the seven adopted EBSA criteria were described. These illustrations provide a range of examples considering species, habitats and recurrent oceanographic features using a variety of techniques ranging from field surveys, satellite tracking of tagged animals and remote sensing, to sophisticated modelling and range prediction. These illustrations are not presented as proposals for designating specific EBSA locations or management measures, but are instead presented as examples of various scientific methods and techniques relevant to each criterion. The information in the report submitted provides a general overview of these techniques, and discusses key issues concerning the strengths, challenges and limitations in the availability of data and scientific understanding faced at this time.

The report also provides rationale and options for an open portal for EBSA-related information and includes a link to an interactive mapping website http://openoceansdeepseas.org. This portal is intended to help transfer experience and provide capacity-building to Parties.

i. ***Illustration of the uniqueness criterion: The Saya de Malha Banks***

(Source: http://www.cbd.int/doc/meetings/mar/ewbcsima-01/other/ewbcsima-01-multiorgs-en.pdf)

The Saya de Malha Banks, which are part of the underwater Mascarene Plateau, are the largest submerged banks in the world. They were selected by a group of experts as an illustrative example for the CBD EBSA uniqueness criterion because of their geology, high productivity in a low-nutrient area, and through their status as the largest seagrass meadow in the open ocean. This selection was based on the opinion of scientific experts and on a review of available literature. Both satellite data and field measurements from various expeditions to the area led by different countries support the opinion that the Saya de Malha Banks form an area of high productivity. This illustrative example shows that it is possible to identify areas of uniqueness in ABNJ based on available data.

j. ***Illustration of the uniqueness criterion: The Sargasso Sea***

(Source: http://www.cbd.int/doc/meetings/mar/ewbcsima-01/other/ewbcsima-01-multiorgs-en.pdf)

[4] The *Global Ocean Biodiversity Initiative* is a project core-funded by the German Government to help implement decision IX/20 of theCBD COP. It is based on the advice of the Advisory Board consisting of major global institutions of relevance for the oceans as well as a Scientific Advisory Board of independent scientists. It is facilitated by IUCN in partnership with a wide variety of organizations, including the Census of Marine Life, the Duke University Marine Geospatial Ecology Lab, the Ocean Biogeographic Information System, UNEP-WCMC and Marine Conservation Biology Institutes in association with a global network of scientists.

The Sargasso Sea, located in the North Atlantic Subtropical Gyre, is unique in being the only area in the world to function as a centre of distribution for a self-sustaining community of holopelagic (continuously pelagic) drift algae (*Sargassum* spp.). Information about the Sargasso Sea was gathered by a group of experts on the basis of peer-reviewed literature, technical reports and datasets as well as comparisons with similar regions of the ocean located within subtropical gyres. The Sargasso Sea is the only area in the world within a subtropical gyre to have high *Sargassum* concentrations and importance to a wide variety of threatened and commercially important species, thus being a good illustrative example of the uniqueness criterion.

2. Experience in the Mediterranean shows that the CBD EBSA criteria can usefully inform the application of existing criteria developed prior to it. Experience in the Northeast Atlantic demonstrates the usefulness of a standardized fact sheet documenting how the criteria have been applied, and what the specific properties of each EBSA are. More generally, the above experiences show that criteria-based processes facilitate the identification of areas in need of protection. While there may be some differences between criteria, the scientifically sound information stemming from the use of such criteria has allowed the process of identification to move forward in a constructive manner, which assisted in informing decision-makers.

3. It will be important to continue developing experience with the application of the CBD EBSA criteria at the global and regional level, for example through the Global Ocean Biodiversity Initiative (GOBI). Consideration should also be given to the development of any additional tools that may be necessary, including, for example, a standardized fact sheet for EBSAs (for example, see OSPAR 2003).

References

BirdLife International (2006) *Distribution of albatrosses and petrels within the CCSBT area*. Paper submitted to the Sixth Meeting of the Ecologically Related Species Working Group, 20-23 February 2006, Kaohsiung, Taiwan.

Dinter WP (2001) *Biogeography of the OSPAR Maritime Area*. Bundesamt for Naturschutz, Bonn, Germany. 167 pp.

Fiedler, P.C. 2002. The annual cycle and biological effects of the Costa Rica Dome. *Deep-Sea Research*, 49, 321-338.

ICES 2005. *Report of the ICES Advisory Committee on Fishery Management, Advisory Committee on the Marine Environment and Advisory Committee on Ecosystems.* ICES Advice. Volume 1. Copenhagen: ICES. Available at:

http://www.ices.dk/products/icesadvice/2005/ICES%20Advice%202005%20Volume%201.pdf

OSPAR 2003. *Guidelines for the Identification and Selection of Marine Protected Areas in the OSPAR Maritime Area*. Reference number: 2003-17. Available at: www.ospar.org

Additional Information

Brower, K. 2009. Still blue. *National Geographic*, March.

Calambokidis, J. and Barlow, J. 2004. Abundance of blue and humpback whales in the eastern North Pacific estimated by capture-recapture and line-transect methods. *Marine Mammal Science*, 20(1):63-85.

CCAMLR. 2007. *Workshop on Bioregionalisation of the Southern Ocean*. SC-CAMLRXXVI/11. Brussels, Belgium, 13 to 17 August 2007.

Halpern, B.S., S.Walbridge, K.A. Selkoe, C.B. Kappel, F. Micheli, C. D'Agrosa, J.F. Bruno, K.S. Casey, C. Ebert, H.E. Fox, R. Fujita, D. Heinemann, H.S. Lenihan, M.P. Madin, M.T. Perry, E.R. Selig, M. Spalding, R. Steneck & R.Watson. 2008. A global map of human impact on marine ecosystems. *Science* 319: 948-951

FAO. *International Guidelines for the Management of Deep-Sea Fisheries in the High Seas*. Directives internationales sur la gestion de la pêche profonde en haute mer. Directrices Internacionales para la Ordenacíon de las Pesquerías de Aguas Profundas en Alta Mar. Rome/Roma, FAO 2009. 73p

Bergstad, O.A., Falkenhaugh, T., Astthorsson, O.S., Byrkjedal, I., Gebruk, A.V., Piatkowski, U., Priede, I.G., Santos, R.S., Vecchione, M., Lorance, P. & Gordon, J.D.M. (2008) Towards improved understanding of the diversity and abundance patterns of the mid-ocean ridge macro- and megafauna. *Deep-Sea Research* II 55: 1 – 5.

Dando, P. and Juniper K. S. (eds.) (2001): *Management of Hydrothermal Vent Sites*. Report from the InterRidge Workshop: Management and Conservation of Hydrothermal Vent Ecosystems. InterRidge http://www.interridge.org/files/interridge/Management_Vents_May01.pdf

Felley, J.D., Vecchione, M. &Wilson Jr., R.R. (2008) Small-scale distribution of deep-sea demersal nekton and other megafauna in the Charlie-Gibbs Fracture Zone of the Mid-Atlantic Ridge. *Deep-Sea Research II* 55: 153 – 160.

Gebruk, A.V. (2008) Holothurians (Holothuroidea, Echinodermata) of the northern Mid-Atlantic Ridge collected by the G.O. Sars MAR-ECO expedition with descriptions of four new species. *Marine Biology Research* 4: 48 – 60.

Gebruk, A.V., Fenchal, T. & Uiblein, F. (2008) Benthic fauna of the northern Mid-Atlantic Ridge: results of the MAR-ECO expedition. *Marine Biology Research* 4: 1 –2.

Magalhães, M. C., R. S. Santos & K. C. Hamer 2008. Dual-foraging of Cory's shearwaters in the Azores: feeding locations, behaviour at sea and implications for food provisioning of chicks. *Marine Ecology - Progress Series*, 359: 283-293. doi:10.3354/meps07340.

Mullineaux L. et al. (1998): Deep-Sea Sanctuaries at Hydrothermal Vents: A Position Paper. *InterRidge News* 7(1), 15-16.

Nøttestad, L., Olsen, E. & Skov, H. (2004) *Observations of marine mammals and seabirds along the Mid Atlantic Ridge 6 June – 2 July 2004* . MAR-ECO PN3 G.O. Sars 2004 cruise report. 42 pp.

Santos, R. S., A Colaço & S Christiansen (Eds.) 2003. Planning the Management of Deep-sea Hydrothermal Vent Fields MPAs in the Azores Triple Junction. Arquipélago – *Life and Marine Sciences*, Supplement 4: xii + 70pp. University of the Azores. Ponta Delgada. (ISBN: 972-8612-14-1).

http://www.horta.uac.pt/intradop//images/stories/arquipelago/Supplement4_Management.pdf

Annex V

Scientific guidance on the use and further development of biogeographic classification systems

1. EXPERIENCE WITH THE USE OF BIOGEOGRAPHIC CLASSIFICATION SYSTEMS

Biogeographic classification systems are used nationally and regionally in many different management applications. Examples of applications where they are used include (i) ecological assessment, monitoring and scientific research; (ii) application of the ecosystem approach; (iii) planning and implementation of representative networks of marine protected areas; and (iv) undertaking environmental impact assessment, threat assessment and ecological modeling. Each of these actual and potential uses is elaborated below, with examples of actual applications given where available.

A. Ecological assessment, monitoring and scientific research

Ecological assessment and monitoring are integral to devising management responses, including in the context of adaptive management. Biogeographic classification delineates units that provide a framework for assessing status, trends and threats at the scales of specific regions or subregions. There are many initiatives at national and international scales that invest significantly in collection of ocean data, such as the US National Integrated Ocean Observing System, the IOC GOOS and MARS European Network of Marine Research Stations and Institutes. These initiatives may benefit from a biogeographic classification by contributing to cost effective monitoring designs. Examples of specific uses include:

a) **Monitoring and state of the environment reporting**, based on biogeographic units;

b) **Determining scales or units at which to undertake assessment and monitoring for the purposes of adaptive management;**

c) **Locating ocean observing systems so that all or selected ecological regions are covered in the planned monitoring and research;**

d) **Planning and directing future research** in poorly understood areas.

e) **Facilitating data collection by ocean industries**: Many ocean industries invest significantly in collection of ocean data for commercial operations. Biogeographic classification systems could contribute to the cost-effective design of this program. In addition, ocean industries collect a large amount of data at the planning and management stages, and as part of impact assessment and disaster-response planning. These data would be extremely useful for further development of biogeographic classification systems. At the same time, industry could benefit from use of improved biogeographic classification for their planning and management processes, creating a compatibility of interest; and

f) **Facilitating data exchange through clearing-house mechanisms** using biogeographic units as a basis for organizing data.

SELECTED EXAMPLES:

- Mexico has undertaken Transboundary Diagnostic Analysis to evaluate the environmental problems of the Gulf of Mexico. The effort was conducted within a biogeographically based Large Marine Ecosystem framework. This project provided information about priority areas and threats in the Gulf of Mexico.
- The Philippines has set up meteorological networks based on biogeographic regions.
- The sites of the European Multidisciplinary Seafloor Observatory (EMSO) were selected using

biogeographic classification.

B. Application of an ecosystem approach (either as part of an integrated approach or within a sectorally based approach)

Biogeographic classification systems can delineate ecologically based management units with similar biological and physical characteristics for implementing the ecosystem approach, as defined in COP decision V/6, in marine spatial planning and in sectoral management using an ecosystem context, such as the FAO Ecosystem Approach to Fisheries[5]. These units can be expected to respond in more coherent and consistent ways to management actions than if the actions were applied across boundaries of the units. Examples of specific uses include:

(a) **Planning for management (including marine spatial planning)** – either for sector-specific activities, such as biodiversity conservation explicitly in fisheries or cross-sectoral management. Biogeographic classification systems can provide information to management about appropriate scales of interventions and protection of valued environments.

SELECTED EXAMPLES:

- The GOODS classification is being used by the World Ocean Council (WOC), an ocean industry alliance, as a basis to map industry uses of ocean space in a marine spatial planning framework.
- Australia is using biogeographic classification to support the development of marine regional plans. These plans collate existing marine science and socio-economic information for each marine region. Using the units from the biogeographic classification as the framework, the plans will describe each region's key habitats, plants and animals; natural processes; human uses and benefits; as well as known and potential threats to the long-term ecological sustainability of the region. The plans will give details about the various statutory obligations that apply, as well as the range of conservation measures that will be put in place.
- In the USA, an Interagency Ocean Policy Task Force will make suggestions about possible "coastal and marine spatial planning" (zoning of uses in the ocean) by the end of 2009. Various layers in a biogeographical classification system could be useful in assisting industries to create "blue jobs" such as ocean energy development, aquaculture, marine drugs, and maritime trade in making future planning decisions.
- The Baltic Sea Action Plan uses biogeographic and habitat classification systems as a basis for regional management of human activities in the Baltic Sea.
- China implements ecosystem-based management through marine spatial planning. A marine zoning plan has been developed, which integrates ecological information with information about economic activities. The integrated management work is implemented through the State Oceanic Administration (SOA).

(b) **Sectoral conservation and management measures,** for examples in fisheries stock assessments, catch monitoring and biodiversity conservation, with the biogeographic units being likely to contain relatively discrete populations of species taken in fisheries.

---

[5] FAO. 2003. *FAO Technical Guidelines for Responsible Fisheries*. No. 4 Suppl.2.

SELECTED EXAMPLES:

- CCAMLR has used biogeographic units as the spatial basis for catch reporting and implementation of conservation and management measures on a stock-by-stock basis. This demonstrates the importance of delineating appropriately scaled and biologically relevant management units for implementing an ecosystem approach.
- The Philippines has used biogeographic units to integrate fisheries information with other environmental information to assist in implementation of the Ecosystem Approach to Fisheries.

C. Planning and implementation of representative networks of marine protected areas

Marine protected areas are widely considered to be one of the essential tools and approaches for conservation and sustainable use of biodiversity, and an important component of implementing the ecosystem approach to marine management. Approximately 0.8% of the oceans and 5.9% of territorial seas are protected in some form of marine protected area, reflecting very slow progress towards various international marine protected area targets, including those adopted by the CBD. These protected areas cover only a small proportion of the ranges of all marine habitats and are heavily biased towards the continental shelf and associated coastal ecosystems. Biogeographic classification systems provide a key data layer to assess progress towards the 2012 target for representative networks of marine protected areas in the following ways:

(a) **Building representative networks of marine protected areas** based on an understanding of the spatial distribution of ecosystems, habitats and species. The use of biogeographic classification systems is a precondition for identifying units, which should be "represented" in the network (either alone or in combination with other criteria discussed in section 2 of this annex). Each of the examples in the box below has applied biogeographic classification systems for the design of representative networks of marine protected areas.

SELECTED EXAMPLES:

- Brazil has used the Marine Ecoregions of the World (MEOW) classification system to design its national network of MPAs. In addition, the four biogeographic regions were used in the planning process to gather together experts from each region to discuss the regional MPA system.
- In the Philippines, biogeographic classification was used to structure the assessment of threats and gaps in marine Key Biodiversity Areas. They have also been used to look at uses such as fisheries and ocean technology.
- A national representative network of MPAs in Australia has been designed using biogeographic information, while a planning process towards this end is underway in Mexico and Canada.
- CCAMLR is establishing a scientific basis for the future development of a representative network of MPAs in the Southern Ocean. This includes the development of a broad-scale biogeographic classification of the Southern Ocean, and the fine-scale subdivision of biogeographic provinces.
- OSPAR is using biogeographic classification as a basis for establishing an "ecologically coherent network of well-managed MPAs in the North-East Atlantic by 2010." The concepts of representativity and connectivity underlie the notion of "ecologically coherent networks." The biogeographic classification system has also been used by Contracting Parties when submitting MPA nominations to OSPAR.
- The Coral Triangle Initiative (CTI) is planning to utilize biogeographic information in designing networks of MPAs. This includes using a biogeographic framework to test whether there is enough evolutionary representation of species in MPAs and whether threats are addressed. Biogeographic

classification will also be used to ensure representativity and to design MPA networks to be resilient to climate change. This work is still in a conceptual stage. A Coral Triangle Atlas has been developed.

- HELCOM uses a biogeographic subdivision system of the Baltic Sea Area when determining if its network of MPAs (BSPAs) covers in a representative manner, all regions of the Baltic Sea. The classification is also used in assessing the status of species and habitats as well as in applying conservation measures and conducting Baltic-wide monitoring.

Assessing progress in MPA network development and evaluating gaps in existing MPA networks through an evaluation of how well various biogeographic units are represented in the network.

SELECTED EXAMPLES:

- In the Baltic Sea, a broad-scale classification system based on the marine landscape concept has been used to evaluate the existing MPA network for representativity and cohesiveness.
- Australia is assessing progress in its national representative system of MPAs using biogeographic information to determine whether the system is comprehensive, adequate and representative.
- In the OSPAR area, biogeographic classification has enabled the Parties to assess progress with respect to the degrees to which the various biogeographic units are represented within the emerging OSPAR network of MPAs and the extent to which it is "ecologically coherent". Such ecologically based analyses can provide an objective basis by which to focus on shared ecological goals in ecological regions shared by several Contracting Parties, rather than using political boundaries which single out the progress of individual countries.
- UNEP-WCMC used a biogeographic classification system to determine the percentage of protection within and beyond territorial seas globally (UNEP 2008. State of the World's Protected Areas 2007)
- In the ASEAN (Association of Southeast Asian Nations) region, the ASEAN Centre for Biodiversity (ACB) is undergoing an MPA gap analysis utilizing biogeographic regions previously used by Kelleher et al. (1995)[6] based on the modified biogeographic regions by Hayden et al. (1984)[7].

D. Undertaking environmental impact assessment, threat assessment and ecological modelling

Biogeographic classification provides units that can be used as a basis for research, forecasting and proactive management of climate change and other impacts. Actual and potential uses in this category include:

(a) **Impact and threat assessments** for assessing risks and predicting potential impacts of specific activities and uses of the marine environment at meaningful spatial scales.

SELECTED EXAMPLES:

In Australia, biogeographic classifications have assisted decision-making in the assessment of applications for regulated use of the marine environment and in identifying areas that have particular values for conservation or use (eg., zoning in the Great Barrier Reef Marine Park).

---

6 Kelleher, G, C. Bleakley and S. Wells (1995). *A Global Representative System of Marine Protected Areas*. Published by the Great Barrier Reef Marine Park Authority, the World Bank and the World Conservation Union (IUCN), p. 44.

7 Hayden, B.P., G.C. Ray and R. Dolan (1984). Classification of coastal and marine environments. *Environmental Conservation* 11 (3): 199 - 207.

(b) **Assessing risks associated with future uses of the oceans** – Biogeographic classification systems may, together with other appropriate information, be used in determining the scales and units for assessing potential environmental impacts of future uses of the oceans. These systems could help delineate likely scales of impacts of undertaking and likely sources of external drivers that need to be considered in assessing risks. Some uses that are currently being discussed include exploitation of marine genetic resources, dumping of materials, carbon sequestration in the deep sea and ocean fertilization experiments.

(c) **Prediction of areas** where habitats, including ones indicative of CBD EBSAs or the FAO VMEs are likely to occur and to shift, in order to direct further research and management planning. Biogeographic information can be organized into units that allow evaluation, for example, of rarity and uniqueness (see annex VI to this report), as well as predictive range mapping to determine likely distribution of species indicative of EBSAs.

SELECTED EXAMPLES:

CCAMLR has used biogeographic information derived from a classification to identify and protect VMEs in the benthic environment that are at risk from the effects of bottom-fishing activities, in accordance with UN General Assembly Resolution 61/105. In the absence of detailed information on the locations of vulnerable species, communities and habitats, biogeographic maps may be useful in predicting where similar types of habitats are likely to occur. This could help with directing further research to establish the spatial extent and characteristics of areas that may be assessed as VMEs, and implementing measures to ensure their protection. In particular, habitat models can be used to develop risk-assessment maps for predicting impacts on VMEs in different fishing locations.

(d) **Broad-scale ecological modelling** to enhance understanding of ecosystem structure, functions and processes and predict responses to cumulative stresses as well as chronic impacts such as climate change and ocean acidification. Predictive modelling (see annex VIII to this report) may provide better results when applied within the context of a relatively homogeneous biogeographic unit.

(e) **Assessing the risk of species extirpations, non-native species introductions**, and other threats, by helping to delineate areas with similar habitats of species assemblages.

E. Assisting in the application of the CBD EBSA criteria

Biogeographic classification systems provide a framework that can be used to help locate sites that meet the CBD EBSA criteria. For example, biogeographic classification can provide a scale for application of the "uniqueness and rarity" criterion and help in narrowing down locations that might be of special importance for the life-history stages of species. The systems would also be helpful in establishing the necessary monitoring efficiently (see section 1A of this annex)

2. FURTHER DEVELOPMENT OF BIOGEOGRAPHIC CLASSIFICATION SYSTEMS

A. General considerations in further development of classification systems

As is evident from the discussion above, biogeographic classification is fundamental for marine spatial planning and can serve as a framework for a number of uses from assessment and monitoring to MPA network design. In order for managers and policy-makers to have confidence in a biogeographic classification system, it should have scientific credibility and legitimacy, and be sufficiently comprehensive to meet policy needs.

Scientific credibility can be facilitated through a peer review process, and through periodic refinement of the classification system as new and improved data become available (or as a result of climate change in certain areas). However, updates that are too frequent may not provide a stable framework for management purposes. It should also be noted that a biogeographic classification does not have to be perfect to be useful for management.

The application of a biogeographic classification system for a variety of management purposes will provide important experience that can be used in its future refinement. The application of a classification system by a wide variety of stakeholders will also be helpful in building broad political acceptance. For example, a collaborative partnership with ocean industries might entail the industry providing their data for updating a classification system. This updated classification can then be provided back to the industry for their use. Achieving collaborations such as these would require the development of partnerships and building trust.

For specific national and regional applications, a nested, hierarchical classification system would have particular value in being able to provide finer scale regions in areas of interest for specific management purposes. Including finer scale bioregions in a classification could help answer questions related to connectivity and to look at transition zones between coastal waters and deep seas. Situations where a classification system needs to include both coastal and oceanic ecoregions occur, for example, in the Philippine archipelago and in the Pacific islands and between many national EEZs and deeper waters. The creation of a harmonized interface between coastal classification systems and oceanic/deep sea classifications, such as the Global Open Oceans and Deep Seabed (GOODS) biogeographic classification, could help in facilitating the spatial management of connected ecosystems and species that cross from one area to another.

In order for a biogeographic classification system to be broadly used, it will need to be easily accessible to all user groups through, for example, an internet portal. Ancillary information relating to the data, methods and tools used in the development of the biogeographic classification could also be made available, and could assist in making the process transparent and easily replicable by others. Providing an easy-to-understand summary of the content of the classification and the nature of the different biogeographic units will facilitate use by a variety of groups.

B. Considerations specific to the further use and development of the Global Open Ocean and Deep Seabed (GOODS) classification

The GOODS classification, made available in early 2009, is still very new. Even so, a few examples of its application already exist. At least one country (Canada) has successfully considered aspects of the GOODS classification, such as the classification principles, in the development of their national biogeographic classification systems. In addition, a global seamount classification developed by the Global Census of Marine Life on Seamounts (CenSeam) group was based on the GOODS classification. Finally, the World Ocean Council, an industry collaborative group, is using the GOODS classification as a basis for organizing information on ocean uses by various industries. Other application nationally has thus far been relatively limited because most countries are focused on managing shallower coastal waters and their EEZs rather than the areas outside them, which GOODS covers.

It is expected that in the future, the GOODS classification will support some of the uses elaborated in section 1 of this annex, including the identification of areas that qualify as EBSAs, as indicated in section 1E of this annex. Other possible future applications include using GOODS to evaluate the data gaps in the Ocean Biogeographic Information System (OBIS). This will help concentrate OBIS efforts of active data gathering. In return, OBIS data can be used in future refinement of the GOODS classification.

In order to encourage the broad application of the GOODS classification, it is recommended that the GIS files containing the classification system, and possibly the underlying data, be placed in an internet portal managed by an organization such as the IOC of UNESCO. Updates to the classification, tools for analysis, standardized data and various publications relating to GOODS should also be easily and publicly accessible.

While the GOODS classification in its present format provides a reasonable basis for management, its refinement in the future with new data could make it even more useful. Some priority areas for refinement include:

- Building a harmonized linkage between the GOODS classification and coastal classification systems in order to provide for improved management of extended continental shelves, of species that migrate from coastal areas to deeper environments, and of connected ecosystems.
- Integrating the new seamount classification produced by the CenSeam project into GOODS, including any existing classification of guyots. Because this seamount classification was based on GOODS, integration will be easy as part of a nested classification system. As improved data become available in the future, other finer-scale classifications (e.g. hydrothermal vents) can be refined and new ones added as feasible.
- Also, as new data become available in the future, the pelagic provinces can be further divided into finer-scale regions. At this point, it may be necessary to address the dynamic nature of pelagic systems on finer scales.
- Addressing the lack of classification for deeper bathypelagic waters, where a large amount of important biodiversity can be found. Very little information exists for these areas (this is also a gap in OBIS), and thus this work will need to wait for further research and/or models of water masses.
- Improving the use of proxies/surrogates to refine the classification in the future, particularly for the mid-water column. Remote sensing data, including data from acoustic remote sensing for benthic areas, can be used as a proxy. Variables such as rugosity, detectable by acoustic remote sensing, may influence species distribution in the deep seabed.

New research and scientific techniques (e.g. scanning for metabolites, metagenomics, barcoding, etc) show promise in increasing our knowledge of the deep marine environment and can prove useful for refining biogeographic classification systems in the future. While such advances are exciting in their promise of new information, there is no need to wait for them in order to begin the process of applying GOODS for various management purposes.

Annex VI

Scientific guidance on the identification of marine areas beyond national jurisdiction, which meet the scientific criteria in annex I to decision IX/20

1. This section of the report addresses the call to "provide scientific and technical guidance on the identification of areas beyond national jurisdiction which meet the scientific criteria in annex 1 to decision IX/20".

2. There has been substantial experience at the national and regional level with the application of some or all of the criteria for identification of ecologically or biologically significant areas (CBD EBSAs) for multiple uses, including protection. While much of the experience is specifically inside national jurisdictions rather than in areas beyond national jurisdiction and may not specifically use all the criteria in annex 1 to COP decision IX/20, the workshop agreed that the experience gained in national processes, and by other intergovernmental agencies (e.g. the FAO criteria for vulnerable marine ecosystems, FAO 2009[8]) and NGOs provide guidance on the use of these criteria. It is concluded that lessons learned about scientific and technical aspects of the application of the criteria within national jurisdictions are informative about likely performance of the criteria in areas beyond national jurisdiction, even if the policy and management responses might be developed through different processes.

3. It is also concluded that there are no inherent incompatibilities between the various sets of criteria that have been applied nationally and by various IGOs (FAO, IMO, ISA) and NGOs (e.g., BirdLife International and Conservation International). Consequently, most of the scientific and technical lessons learned about application of the various sets of criteria can be generalized. Moreover, some of the sets of criteria can act in complementary ways, because unlike the CBD EBSA criteria some of the criteria applied by other UN agencies include considerations of vulnerability to specific activities.

4. It is important that the process of *identification* of CBD EBSAs is understood to be separate from the processes which decide on the policy and management responses that are appropriate for providing the desired level of protection to those areas. The *identification* of areas that are ecologically or biologically significant is a scientific and technical step that takes account of the structure and function of the marine ecosystem. The subsequent steps involve the *selection* of policy and management actions that take account of threats and socio-economic considerations as well as the ecological characteristics of the areas.

5. It is important to view the application of the criteria in annex I to decision IX/20 not only as an end in itself, but also as a contribution to a process that addresses the contents of annexes I, II, and III of this decision. In the application of the criteria in annex I, scientific and technical information, and expertise are central considerations.

6. The application of the criteria should use all the information that is available on the area being considered. "Information" includes scientific and technical data, as well as traditional knowledge and knowledge gained through life-experience of users of the oceans. All information should be subjected to quality assurance methods appropriate for the type of information being considered.

7. Modelling approaches that use ecological relationships quantified in well-studied areas can be applied in more data-poor areas, and these can be an important source of knowledge for application of the criteria.

---

8 FAO.2009 International Guidelines for the Management of Deep-Sea Fisheries in the High Seas.. Rome, FAO. 73p

8. There is likely to be less information available on marine areas beyond national jurisdiction than in many areas within national jurisdiction, and differences in the amount of information available between benthic and pelagic portions of particular marine areas and among marine areas around the globe. Recognizing the value of increased information, challenges due to data limitations in marine areas beyond national jurisdiction may be addressed through a range of scientific information, tools, and resources. A lack of information should not be used as a reason to defer actions to apply the criteria to the best information that is available. Substantial progress has been made in areas where information was quite incomplete. In all areas, the application of the criteria needs to be reviewed periodically, as new information becomes available.

9. An important lesson from national, regional, and international experience is that although the process of applying the criteria needs to be flexible, an orderly and systematic approach to identification of EBSAs in need of protection is superior to an *ad hoc* approach. A systematic approach makes better use of whatever level of information and scientific and technical expertise is available, and is more likely to identify the areas that are most appropriate for enhanced conservation action, including for inclusion in regional networks of MPAs. Therefore it is advised to take a structured step-wise approach to the evaluation of areas against the EBSA criteria and mapping of them in relation to each other, within a larger process that develops goals, objectives, and targets; identifies gaps; considers conservation measures, including networks of protected sites; and has inclusive participation, feedback, and revision.

10. Features of benthic and pelagic portions of marine ecosystems may differ in scale, dominant ecological processes, and key structural properties, and the coupling of the benthic and pelagic portions of these systems is ecologically important, although often poorly characterized. In addition, there may be different amounts of information available on the benthic and pelagic portions of a system. As a consequence, application of the criteria should, to the extent possible, consider both the benthic and pelagic systems separately and as an interacting system. Furthermore ecosystems beyond national jurisdiction can have strong ecological connections to ecosystems within national jurisdictions. Evaluation of the CBD EBSAs beyond national jurisdiction needs to consider these connections.

11. The criteria for CBD EBSAs in annex I to decision IX/20 would usually be applied before the steps in annex II are undertaken. This means that CBD EBSAs generally would be identified before representative areas are selected. This order has two benefits.
    a. Where there is sufficient information to identify CBD EBSAs, selecting representative MPAs that include many significant areas allows more efficiency in management.
    b. Where information is incomplete and there is substantial uncertainty about the location of EBSAs, representative areas included in MPA networks can provide some protection to ecological processes while information is being acquired to allow more targeted protection.

12. The criteria function to rank areas in terms of their priority for protection, and not as an absolute “significant – not significant” choice. As such, an application of absolute thresholds for most criteria is inappropriate.

13. In the subsequent steps of *selection* of areas for enhanced conservation, an area may be in need of protection if it is evaluated as ranking highly on only a single criterion. An area may also be a priority for protection if it ranks relatively highly on multiple criteria, especially if the features which make the areas relatively important are not common elsewhere in the area under consideration. The process of decision-making with multiple criteria is a complex field with a large body of scientific and technical guidance available.

14. It is likely that there will often be insufficient information to use the criteria to delineate the precise boundaries of a CBD EBSA. In such cases the criteria can at least identify the general area in need of protection, with boundaries determined in the selection steps, applying precaution and taking account of potential threats to the features that meet the criteria.

15. Areas which emerge from application of the criteria as in need of protection at regional scales should be treated as conservation priorities in the selection process, even if at the global scale the area would be evaluated as not as important on these criteria. An area which would be a conservation priority at the global scale should be considered as a conservation priority in regional selection processes, even if application of the criterion at a more local scale might not rank the area as a particularly high priority.

16. When applying the criteria at scales where there are very different amounts of information available in different subareas, care should be taken not to bias the evaluation to favour (or discriminate against) the more information-rich parts of the larger region.

17. There may be significant benefits in harmonization of conservation planning and management actions if different bodies with spatially overlapping areas of competence were to coordinate the application of their respective criteria for identification of CBD EBSAs, or areas in need of more risk-averse management. Such coordination would allow all the relevant bodies to start their conservation planning with complementary lists or maps of areas in need of protection.

18. The amount and quality of information that is available about an area, and the degree to which the available information has been brought together systematically affects the time and resources required for scientific and technical experts to apply the criteria. "Expert opinion" processes based on best available knowledge may produce initial indications of ecological values in a given area, and can help prioritize consolidating available information such that a thorough and systematic planning approach can be taken.

19. In order to achieve consistency in the application of the criteria in annex I to decision IX/20, specific guidance on the use of each criterion is included in appendix 1 to this annex. This guidance has been consolidated from the experience reported by Parties, IGOs, NGOs, and experts who have used these or similar criteria in the identification of EBSAs in marine ecosystems. This body of experience also highlighted some generic issues in the application of these criteria, including:
    1. Scale
    2. Relative importance / significance
    3. Spatial and temporal variability
    4. Accuracy, precision and uncertainty
    5. Taxonomic accuracy and uncertainty

Guidance on approaches for addressing these issues is provided appendix 2 to this annex.

Appendix 1

<u>Scientific Guidance on Seven Individual Scientific Criteria (annex I to decision IX/20)</u>

Criterion 1: Uniqueness or rarity

Definition (decision IX/20, annex 1)

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.

Comments on the definition

This criterion is established to identify unique or rare occurrences of species or habitats for consideration. The uniqueness or rarity of a given feature may be determined at a variety of scales, including the global, ocean basin, regional, or local scale. While "uniqueness" by definition cannot be judged on a relative scale (i.e. an object is either unique, or it isn't), "rarity" may be judged relative to other species or habitats.

Comments on the application of this criterion

Uniqueness and rarity are strongly influenced by the scale at which the policy and management jurisdiction is functioning. Global rarity should be taken into account when applying this criterion at regional or local scales, such that a globally rare or unique property is identified as significant even if it is relatively common within the specific region or locality for which the evaluation is conducted. However, a feature that is depleted, rare or unique at the scale of a specific jurisdiction's evaluation should also be considered, even if the feature may be more common elsewhere.

In areas where biological information is scarce, physical data may provide the only basis for application of this criterion. Areas that have unique substrates and bathymetries may be appropriate as EBSAs based on this criterion, even without data on the biological communities present in the physically unique sites. For example, in the eastern Australian margin survey using multibeam bathymetry to map >25,000km^2 of the seabed, only 31 km^2 (0.12%) of seabed comprised hard substrata, while the remaining seabed comprised bioturbated soft-sediment plains. In such a circumstance it is appropriate to assume that the biotic community supported by rare physical geography (i.e. hard substrata in this case) is also rare and should be considered as ecologically or biologically significant.

For most of the deep sea, many species may be fairly rare, and thus "rarity may be common." If this is true, this part of the criterion for deep-sea areas may pose some initial difficulties. That said, some deep-sea species are likely to be *more rare* than others.

Methods

Application of the *uniqueness or rarity* criterion may be based on biological, ecological and oceanographic information from peer-reviewed literature, technical reports and data sets. Areas containing similar features may be compared to assess the ways in which one area is different or unique. Uniqueness or rarity can also be based on similar comparisons of survey data.

Approaches that seek to identify different morphological features and "seascapes" can also indicate unusual features which may satisfy this criterion. However, care must be taken to ensure that unusual classes that emerge from such work meaningfully reflect features in the sea.

Criterion 2: Special importance for life-history stages of species

Definition (decision IX/20, annex 1)

Areas that are required for a population to survive and thrive.

Comments on the definition

This criterion is intended to identify specific areas that support critical life-history stages of individual species. This is an inclusive definition that incorporates all life-history stages of a species or population, but which leaves open the question of how an area can be determined to be "required" for survival and reproduction.

Comments on the application of this criterion

The application of this criterion will focus on the reliability and exclusivity of use of an area for a particular life-history function of one or more species. The "significance" of an area increases as either factor (reliability over time, exclusivity relative to alternative areas) increases; i.e. "significance" increases as a greater percentage of the species use an area more regularly (in time and space) for an important life-history function. It is also noted that sex, age and other biological variables can influence where these important areas exist within a single species (i.e., females with nursing offspring vs. single males), so caution should be taken when looking at this criterion across one species or population.

Application of this criterion for deep-sea species can be difficult because specialized sampling gears are needed to sample early life stages of deep-water species such that they are without contamination from other depths. Species identifications of immature life-history stages of deep-water species are also poorly described in many areas, making it hard to identify areas of special significance at the species level when dealing with immature stages.

Methods

The two EBSA criteria, *Special importance for life-history stages of species* and *Importance for threatened, endangered or declining species and/or habitats*, are similar in nature, sharing the same examples listed in annex I to decision IX/20: "(i) breeding grounds, spawning areas, nursery areas, juvenile habitat or other areas important for life-history stages of species; or (ii) habitats of migratory species (feeding, wintering or resting areas, breeding, moulting, migratory routes)." Due to this similarity, they will be considered together to aid understanding of the analytical techniques necessary to identify important areas related to a species or habitat.

The primary sources of data for application of these criteria are either survey data or satellite tracking data. Where coverage is adequate, survey data can be used directly to determine abundance and density of animals within a particular area. In evaluating whether data are adequate for direct evaluation of the functional importance of an area, consideration must be given to how well the data capture the likely degree of natural variation in a species' distribution and behaviour. Areas of occupancy or performance of specific life-history activities may vary greatly from year to year, season to season or at even shorter time scales. Consequently, the degree to which the available data are merely "snapshots" (i.e., representative of conditions at a single point in time) affects whether observed absences can be used as justification that an area is not used by a species, or observed presences can be used as justification that an area is *necessary* for that life-history function. The less representative in space and time the available data are considered to be, the more likely it is that an evaluation should at least augment direct observational data with tested models. Where there are insufficient data or knowledge for direct estimates, models can be used to predict the likelihood of occurrence or abundance of a species from physical and biological oceanographic data.

Satellite tracking data offers more detailed information about a single organism's movement and can be used to identify core use areas for individuals or aggregated to better understand the importance of areas to a population(s). The more consistent the data are from multiple tracked animals, the more valuable such data are for identifying core use areas for individuals or populations through home range analyses, predictive habitat models or resource selection models. Some general techniques that can be used on tracking data are listed below in order from the least complex and least data-intensive, to the most complex and most data-intensive methods:

- Sinuosity Analysis (Bell 1991; Grémillet et al. 2004)

- Fractal Analysis (Laidrea et al. 2004)
- First-Passage Time Analysis (Fauchald & Tveraa 2003)
- Kernel Analyses (Laver & Kelly 2008)
- Regression, Autocovariate and other Habitat Modelling (Guisan & Zimmermann 2000, Dormann et al. 2007)
- State-Space Models (SSM) (Morales et al. 2004, Jonsen et al. 2005)

Criterion 3: Importance for threatened, endangered or declining species and/or habitats

Definition (decision IX/20 annex 1)

Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.

Comments on the definition

This criterion targets threatened, endangered or declining species and their habitats for consideration. As in the above criterion, the linkage between the area of concern and the endangered species is one of the relative factors in the application of this criterion. The greater the persistence of use of an area, and the greater the number of individuals from a threatened population that use the area, the more important the area must be considered. The definition of a "significant assemblage" is not made explicit in the definition of the criterion.

Comments on the application of this criterion

In the deep-seas, assessment of species against criteria for risk of extinction is still in early stages, and the ecological requirements of most such species are poorly known. As studies to determine the population trend of a species are long-term, data-intensive processes, the application of this criterion must be based on pre-existing determinations of the population status of a given species. In particular, use of the IUCN RedList (http://www.iucnredlist.org) is clearly fundamental to understanding to which species this criterion applies. In data-deficient situations, the listing for organisms with similar life-history traits should be used until further information on the status of the species is available.

Methods

See discussion under previous criterion, *Special importance for life-history stages of species.*

Criterion 4: Vulnerability, fragility, sensitivity, or slow recovery

Definition (decision IX/20, annex 1)

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.

Comments on the definition

This EBSA criterion focuses on the inherent sensitivity of habitats or species to disruption. The core concept here is that resilience to perturbations (physical or chemical) varies amongst habitats and species; for example, species with low reproductive rates exhibit an inherently higher level of risk to impacts than other species. Assessing vulnerability of benthic ecosystems in relation to bottom contact fisheries has been elaborated upon by the FAO (2009).

Comments on the application of this criterion

"Fragility" and recovery time can be quantified by examining the life-history characteristics of a species or the inherent properties of the ecosystem features themselves in the face of adverse impacts of any type (physical, chemical, biological). In general, maximum lifespan and age-at-first-reproduction are positively correlated, and those species that also produce few offspring are likely to be considered sensitive and require long time periods to recover from perturbation. Structure-forming organisms, or habitats that require geologic time periods to form, are also likely to be slow to recover. "Vulnerability" can only be evaluated relative to threats, which makes this aspect of this criterion different from all other EBSA criteria that address intrinsic properties of an ecosystem independent of threats. However, ecosystem features that are fragile, sensitive, or slow to recover are likely to be vulnerable to a wide range of threats. Viewed in that context, this criterion can be applied in the absence of information about threats. Expert advice and the literature should be sought to explain the nature of the features' properties that are considered sensitive, vulnerable, fragile or slow to recover (e.g., FAO 2009).

Ideally, maps of the potentially sensitive or vulnerable features would be available. Lacking adequate data for such mapping, it would still be possible to identify the areas where features that were sensitive, vulnerable, fragile or slow to recover were known or likely to occur, based on predictive modelling or extrapolation of expert knowledge from better known areas.

Methods

Information on which species or biomes qualify as vulnerable, fragile, sensitive or slow to recover should be based on peer-reviewed scientific literature to the extent possible. Regardless, the fragility of certain features to certain pressures (e.g., ice-dependent communities to the effects of climate change) can be taken as self-evident, unless data indicating the contrary are produced. In some cases, expert opinion can be used where vulnerabilities or sensitivities are only just beginning to enter the peer-review process. As with previous criteria, this criterion can be informed by survey data and models by using physical features known to be associated with biotic features that are sensitive or slow to recover.

Application of models that extrapolate results of studies in one area to other areas of similar features will be particularly helpful for evaluating sensitivity or recovery rate. In cases of particularly sensitive benthic features, such as deep-water corals, merely documenting the presence of the feature using the best applicable method above may be sufficient to conclude that the area would be highly relevant to this criterion. Although such inferences seem obvious for features such as corals, similar evaluations are not straightforward for some other features of marine communities, including communities composed of a range of co-existing life-history strategies. In such applications, models that predict the sensitivity or fragility of particular community types would be helpful.

Criterion 5: Biological productivity

Definition (decision IX/2, annex 1)

Area containing species, populations or communities with comparatively higher natural biological productivity.

Comments on the definition

This criterion is specified to identify regions in the open oceans which regularly exhibit high primary or secondary productivity. These highly productive regions are here assumed to provide core ecosystem services and are also generally assumed to support significant abundances of higher trophic-level species. The phrase "comparatively higher" highlights the relative (rather than absolute) nature of this criterion. How much "higher" is left open to interpretation.

Comments on the application of this criterion

Productivity is not the same as abundance, but in many instances, abundance could be used as a surrogate for productivity. For this criterion, remote sensing data may be especially helpful, because methods for quantifying primary productivity are well developed. Centres of high primary and secondary productivity are known to vary between years, seasonally, and on short time scales, but overall core centres can be spatially identified.

High primary productivity near the surface may not necessarily mean higher secondary productivity near the seafloor, as currents may transport animals and nutrients hundreds of kilometres before they settle to the bottom, and thus such transport mechanisms should be considered.

Some ecosystems in the deep sea, such as hydrothermal vents and cold seeps, are also areas of high biological productivity through the conversion of specific chemicals into energy that directly supports complex communities and often endemic species.

Methods

A variety of pre-processed biological productivity analyses are available. As such, little analysis needs to be performed in order to apply this criterion to specific areas. For example, global datasets are available for Chlorophyll-a, primary productivity, and secondary productivity. Analytical techniques may be required to identify the patterns of spatial gradients from areas of high productivity to areas of low productivity, or such information may be found in peer-reviewed literature.

The identification of oceanographic features related to higher levels of biological productivity is a more difficult task that does require analysis of oceanographic datasets. Complex algorithms exist to identify sea surface temperature fronts (e.g., Cayula & Cornillon 1992) and warm- and cold-core eddies (e.g., Isern-Fontanet et al. 2003). Fortunately for managers and practitioners, some of these algorithms have been implemented in a user-friendly tool package, Marine Geospatial Ecology Tools, which is freely available online (http://code.env.duke.edu/projects/mget; Roberts et al., in review).

Criterion 6: Biological diversity

Definition (decision IX/20, annex 1)

Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.

Comments on the definition

The question of measuring biological diversity has generated a whole literature base of its own, with no single agreed-upon definition of "diversity." Hence, this criterion could be considered in a number of different ways.

Comments on the application of this criterion

Measures of diversity generally consider one or more of the following factors: 1) number of different elements (i.e., species, communities, also referred to as "richness"); 2) the relative abundance of the elements ("evenness" and other related measures); and 3) how different or varied the elements are when considered as a whole (e.g., taxonomic distinctness). In applying this EBSA criterion, all three factors could be taken into consideration. When comparing measures of species diversity among areas, sampling should be sufficient to statistically support such comparisons, for example, by ensuring that species accumulation curves (when considering richness) are saturated prior to conducting pair-wise comparisons. Otherwise there is a danger of identifying areas with more research effort.

When species survey data are lacking, habitat characteristics can provide indications of diversity. Owing to the greater number of possible niches, habitats of higher complexity (heterogeneity) are believed to also harbour higher species diversity. For benthic habitats, this can be approximated by measuring physical topographic complexity or rugosity (e.g., Ardron 2002, Dunn & Halpin 2009). For pelagic habitats, this can be estimated by identifying convergences of differing water masses. Interactions of differing water masses generally support higher biological diversity than the individual water masses, and areas of high physical energy may also have relatively high biological diversity, consistent with the diversity-disturbance relationship that has been established for many terrestrial systems. However, because of the complexity of the concept of biological diversity, and the large variance around the often statistically significant relationships between diversity and specific features of the physical environment, application of this criterion will probably be most usefully conducted with biological data, rather than relying on physical covariates of diversity.

Methods

Analytical techniques to measure of biodiversity have been a recurrent theme in ecology for many years. A number of indices exist to examine this concept:

- Berger-Parker Index (Berger & Parker 1970, May 1975)
- Simpson's Index (Simpson 1949)
- Shannon-Wiener Index (Shannon 1948)
- Pielou's Evenness Index (Pielou 1969)
- Hurlbert (ES50) Index (Hurlbert 1971)
- Rank Abundance Curves (Foster & Dunston 2009)

Criterion 7: Naturalness

Definition (decision IX/20, annex 1)

Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.

Comments on the definition

This criterion measures the relative "naturalness" of open-ocean and deep-sea areas compared to other representative examples of the habitat type. This criterion is a relative measure, and it is not required that an area be pristine in order for it to be identified as an EBSA. "Comparatively higher" highlights the relative (rather than absolute) nature of this criterion. How much "higher" is left open to interpretation, but presupposes that one has at least some information or indications on historic states of the ecosystems where the criterion is being applied.

Comments on the application of this criterion

The "natural" state of ecosystems or communities or features in an area is often not known, even for many well-studied areas, but inferences of this status can be gleaned from other areas. There is even less information on the "natural" state of open-ocean and deep-sea ecosystems. In practice, application of this criterion will probably consider the history of human activity in an area where EBSA evaluations are being conducted. Areas where there is a documented or suspected history of human activities associated with certain impacts will be considered less "natural" than areas where there has been little human activity. Application of the criterion will also require taking account of what is known of the impacts of each human activity on specific ecosystem features – such as the impacts of bottom trawling on benthic habitats, populations, and communities; the effects of shipping noise and ship strikes on wildlife aggregations and migrations; and collisions.

Methods

Mapping and analysing the cumulative effects of human maritime activities is a new and emerging field of research. Recent studies have paved the way for analyses of human impacts globally (Halpern et al. 2007, 2008a, 2008b), and regionally (Eastwood et al. 2007; Ban & Alder 2008; Tallis et al. 2008; Halpern et al. 2009). Though methodologies are still developing, promising approaches stratify effects according to their type (i.e., physical, chemical, biological), taking into consideration both intensity and effect-distance of the given stressor on a given habitat type (Ban et al., in review).

In most studies to date, stressors are considered additive or incremental when impacts are repeated. However, stressors can be synergistic or interactive when the combined effect is larger than the additive effect each stressor would predict (Folt et al. 1999; Cooper 2004; Vinebrooke et al. 2004). Stressors can also be antagonistic when the impact is less than expected (Folt et al. 1999; Vinebrooke et al. 2004).

Given the largely unpredictable nature of cumulative effects (Crain et al. 2008; Darling & Cote 2008), in the absence of additional information, assuming an additive mechanism is perhaps the best way forward, though it could underestimate some effects. Bearing in mind that naturalness is a relative measure, regardless of the analytical details, the mapping of cumulative stressors should reveal overall patterns that would be useful to identify possibly (more) natural areas of a given habitat type. Stressors can be mapped using a GIS and overlaid on habitat maps to predict the 'naturalness' of an area.

Appendix 2. Additional Advice on Scale, Significance and Variability

Based on input provided and comments received during the workshop, some further considerations should be taken into account in applying the criteria, given the limitations of the existing data and information available for most of the world's open oceans and deep seas:

1. **scale** of application of each criterion;
2. the **relative importance / significance** of an area for a given criterion;
3. **spatial and temporal variability**;
4. **precision, accuracy and uncertainty;** and
5. **taxonomic accuracy and uncertainty**

Further information is provided in background document, "*Defining Ecologically or Biologically Significant Areas in the Open Oceans and Deep Seas: Analysis, Tools, Resources and Illustrations" (available at* https://www.cbd.int/doc/meetings/mar/ewbcsima-01/other/ewbcsima-01-multiorgs-en.pdf).

Scale

There is no single or correct scale for application of any of the EBSA criteria. Modern GIS technology allows users to work at multiple scales; similarly, modelling (such as predictive habitat or biogeographic classifications) does not need to be at a uniform scale, with some places reflecting better input data and confidence (less uncertainty) than others. Common scientific good practices for addressing scale and uncertainty are readily available and should be applied. When dealing with maps and data of varying scales and quality, the use of estimated confidence layers in GIS analyses is highly recommended

Relative importance / significance

All of the EBSA criteria (except for "uniqueness") are *relative* measures; i.e., they comparatively order places that are more "significant" than surrounding areas based on the *ecological or biological* role played by the area within the larger region where an evaluation of EBSAs is occurring. In applying the criteria it will be necessary to determine the relative importance of specific features or places in a given ecological region on each of the criteria.

Spatial and temporal variability

It is well understood that most aspects of the marine environment are highly dynamic. In evaluating the ecological or biological significance of an area based on a particular criterion, the spatial and temporal variability of that feature should be taken into account. For many criteria, some places will have substantial variation in how they would be evaluated from year to year, season to season, or on even shorter time periods. Understanding the magnitude and time-scale of these variations and how variability is incorporated into EBSA evaluation can be achieved through use of specific scientific techniques. It was also raised at the meeting that it may become necessary to consider variability induced by climate change and other global processes

Precision, accuracy, and uncertainty

Precision, accuracy, and uncertainty of data are inter-related but not interchangeable concerns. Some uncertainty is due to the inherent variability of the feature or area being studied and should be reflected in the choice of conservation and management measures. However, there is also uncertainty due to the nature of the measurements taken. Measurements at too coarse a scale may miss important information about the occurrence of a feature. Measurements at too fine a scale may be dominated by variation at scales far smaller than are relevant to conservation and management. In addition, for many marine features limitations in sampling gears mean that it is not possible to take accurate measures, regardless of the precision of the scale of measurement. Over a century of developments in sampling theory and survey design can be applied to deal with challenges to both the accuracy and precision of ecological data, and reduce the uncertainty in the data.

Taxonomic accuracy and uncertainty

Application of several EBSA criteria can benefit from accurate identification of marine species. It should be noted, however, that taxonomy of organisms in the marine ecosystem is generally not fully developed. This is especially true for the faunae in the deep sea. Also, the status of taxonomic knowledge is very different from taxon to taxon. Generally speaking, small organisms such as meiobenthic taxa, protista are less studied than megabenthos, such as fishes.

References

Ardron, J.A. 2002. A Recipe for Determining Benthic Complexity: An Indicator of Species Richness. In, *Marine Geography: GIS for the Oceans and Seas* (ch. 23, pp 196-175), Joe Breman (ed.). Redlands, CA, USA: ESRI Press.

Ban N. & Alder J. 2008. How wild is the ocean? Assessing the intensity of anthropogenic marine activities in British Columbia, Canada *Aquatic Conservation*, 18, pp. 55-85.

Ban, N.C., Alidina, H.M., Ardron, J.A. In review. Cumulative impact mapping: advances, relevance to marine conservation strategies.

Bell W.J. 1991. *Searching Behaviour : The Behavioural Ecology of Finding Resources*. Chapman & Hall

Berger, W H; F L Parker 1970 Diversity of planktonic Foramenifera in deep sea sediments. *Science* 168:1345-1347.

Cayula, J.-F. and P. Cornillon 1992 Edge detection algorithm for SST images. *Journal of Atmospheric and Oceanic Technology* 9: 67-80

Cooper L.M. 2004. Guidelines for cumulative effects assessment in SEA of plans. In: *EPMG Occasional Paper 04*/LMC/CEA. Imperial College of London London, pp. 1-50.

Crain C.M., Kroeker K. & Halpern B.S. 2008. Interactive and cumulative effects of multiple human stressors in marine systems. *Ecol Lett*, 11, 1304-1315.

Darling E.S. & Côté I.M. 2008. Quantifying the evidence for ecological synergies. Ecol Lett, 11, 1278-1286.Eastwood P.D., Mills C.M., Aldridge J.N., Houghton C.A. & Rogers S.I. (2007). Human activities in UK offshore waters: an assessment of direct, physical pressure on the seabed. *ICES Journal of Marine Science: Journal du Conseil*, 64, 453.

Dormann CF, McPherson JM, Araújo MB, Bivand R, Bolliger J, Carl G, Davies RG, Hirzel A, Jetz W, Kissling WD, Kühn I, Ohlemüller R, Peres-Neto PR, Reineking B, Schröder B, Schurr FM, Wilson R. 2007. Methods to account for spatial autocorrelation in the analysis of species distributional data: a review. *Ecography* 30(5): 609-28.

Dunn, D.C., P.N. Halpin. 2009. Rugosity-based regional modeling of hard-bottom habitat. *Marine Ecology Progress Series* 377:1–11.

Eastwood, P. D., Mills, C. M., Aldridge, J. N., Houghton, C. A., and Rogers, S. I. 2007. Human activities in UK offshore waters: an assessment of direct, physical pressure on the seabed. ICES *Journal of Marine Science*, 64: 453–463.

FAO. 2009. *International Guidelines for the Management of Deep-sea Fisheries in the High Seas*. Food and Agriculture Organization of the United Nations, Rome.

Fauchald, P. & Tveraa, T. 2003. Using first-passage time in the analysis of area-restricted search and habitat selection. *Ecology* 84 (2): 282-288

Folt C.L., Chen C.Y., Moore M.V. & Burnaford J. 1999. Synergism and antagonism among multiple stressors. *Limnol Oceanogr*, 44, 864-877.

Foster, S.D. and P.K. Dunstan 2009. The Analysis of Biodiversity Using Rank Abundance Distributions. *Biometrics*. Available early online May, 2009. DOI: 10.1111/j.1541-0420.2009.01263.x

Grémillet, D., Dell'Omo, G., Ryan, P.G., Peters, G., Ropert-Coudert, Y. & Weeks, S. 2004. Offshore diplomacy, or how seabirds mitigate intraspecific competition : a case study based on GPS tracking of cape gannets from neighbouring breeding sites. *Marine Ecology Progress Series* 268: 265-279

Guisan, A. and Zimmermann, N. E. 2000. Predictive habitat distribution models in ecology. *Ecological Modelling*, 135: 147-186.

Halpern B.S., Kappel C.V., Selkoe K.A., Micheli F., Ebert C., Kontgis C., Crain C.M., Martone R., Shearer C. & Teck S.J. 2009. Mapping cumulative human impacts to California Current marine ecosystems. *Conservation Letters*.

Halpern B.S., McLeod K.L., Rosenberg A.A. & Crowder L.B. 2008a. Managing for cumulative impacts in ecosystem-based management through ocean zoning. *Ocean & Coastal Management*, 51, 203-211.

Halpern B.S., Selkoe K.A., Micheli F. & Kappel C.V. 2007. Evaluating and Ranking the Vulnerability of Global Marine Ecosystems to Anthropogenic Threats. *Conserv Biol*, 21, 1301-1315.

Halpern B.S., Walbridge S., Selkoe K.A., Kappel C.V., Micheli F., D'Agrosa C., Bruno J.F., Casey K.S., Ebert C., Fox H.E., Fujita R., Heinemann D., Lenihan H.S., Madin E.M.P., Perry M.T., Selig E.R., Spalding M., Steneck R. & Watson R. 2008b. A Global Map of Human Impact on Marine Ecosystems. *Science* 319, 948 – 952..

Hurlbert, S.H. 1971. The non-concept of species diversity: a critique and alternative parameters. *Ecology* 52, 577–586.

Isern-Fontanet, J., E. García-Ladona, and J. Font. 2003: Identification of Marine Eddies from Altimetric Maps. *J. Atmos. Oceanic Technol*., 20, 772–778.

Jonsen, I.D., Flemming, J.M. & Myers, R.A. 2005. Robust state-space modelling of animal movement data. *Ecology* 86 (11): 2874-2880

Laidre, K.L., Heide-Jorgensen, M.P., Logsdon, M.L., Hobbs, R.C., Dietz, R. & VanBlaricom, G.R. 2004. Fractal analysis of narwhal space use patterns. *Zoology* 107: 3-11.

Laver, P. N. and Kelly, M. J. 2008. A Critical Review of Home Range Studies. *Journal of Wildlife Management*, 72: 290-298.

Morales, J. M., D. T. Haydon, J. Friar, K. E. Holsinger, and J. M. Fryxell. 2004. Extracting more out of relocation data: building movement models as mixtures of random walks. *Ecology* 85: 2436-2445.

Pielou, E.C. 1969 *An Introduction to Mathematical Ecology*. Wiley, New York.

Roberts, JJ, BD Best, DC Dunn, EA Treml, and PN Halpin (in review) Marine Geospatial Ecology Tools: An integrated framework for ecological geoprocessing with ArcGIS, Python, R, MATLAB, and C++. Environmental Modelling & Software. Available online: http://mgel.env.duke.edu/tools

Shannon, C.E. 1948. A mathematical theory of communication. *Bell System Technical Journal* 27: 379–423 and 623–656

Simpson, E.H. 1949. Measurement of diversity, *Nature* 163 (1949), p. 688.

Tallis H., Ferdana Z. & Gray E. 2008. Linking Terrestrial and Marine Conservation Planning and Threats Analysis. *Conserv Biol*, 22, 120-130.

Vinebrooke R.D., Cottingham K.L., Norberg J., Scheffer M., Dodson S.I., Maberly S.C. & Sommer U. 2004. Impacts of multiple stressors on biodiversity and ecosystem functioning: the role of species co-tolerance. doi:10.1111/j.0030-1299.2004.13255.x. *Oikos*, 104, 451-457.

Annex VII

Capacity-building for identifying EBSAs and Biogeographic Classification Systems

1. Capacity-building is required to improve the ability to identify EBSAs in need of protection and biogeographic classification systems. Capacity-building must address both the capacity to collect information and data about the marine areas, and the capacity to use the available analytical tools effectively and adapt them, when necessary, to specific applications. Many developing countries, small island developing States, and countries with economies in transition may lack the scientific and technical capacity required for the identification of EBSAs, particularly in areas beyond national jurisdiction. It is important to note that these countries may harbour areas of rich biodiversity of global ecological significance. The lack of capacity in those countries may be due to the absence of adequate scientific data; limited access to equipment and technologies necessary to compile such data, relating to physical and biological patterns, such as the distribution of species, habitats and ecosystems within EEZs or beyond; lack of knowledge and training relating to the best processes, methods and tools to use in identifying EBSAs and moving from single sites to networks; limited hardware, software, or connectivity; and inadequate human or financial resources to dedicate to the task. In that sense, sharing expertise and technology transfer are essential steps to achieve a global engagement in the exercise of developing conservation areas beyond national jurisdiction, and therefore fulfil the CBD decision IX/20 that "recognizes the need to increase capacity and to exchange experiences, lessons learned and good practices related to the identification of EBSAs".

2. There are a number of ways in which these capacity-related issues could be addressed. In the short- to medium-term, information regarding what data exists in the public domain and how it can be accessed should be readily available. Short training courses on the process of identifying EBSAs, including the use of methods and tools, should be implemented and offered on a regular basis. Such short courses are particularly useful for practitioners who are not able to arrange for a lengthy leave of absence to pursue university studies. Another option is to foster exchange visits between practitioners to learn first-hand the process of identifying and designating EBSAs. These types of information visits can be arranged bilaterally, or can be part of a broader learning network. Additionally, experiences and case studies should be shared through a dedicated web portal and web-GIS tools, such as http://openoceansdeepseas.org. Any relevant information portals need to be actively promoted through CBD and other international/regional meetings, as well as through other means, in order to become widely used. In the longer term, it is important to create degree programmes and training courses to enhance scientific capacity, not only relating to EBSAs, but to marine conservation biology, spatial ecology and other related disciplines. It is also important to develop a knowledge-sharing network that provides professional expertise and advice to those wishing to identify EBSAs. This network would allow international experts to work directly with practitioners to address issues specific to that country's situation.

3. Defining EBSAs in areas beyond national jurisdiction requires the collection and analysis of a wide variety of data types and the development of synthetic analyses, procedures and tools. Therefore, it is imperative to effectively utilize existing information and to ensure harmonizing with future research. Towards this end, enhanced capacity and better sharing of data and expertise must be encouraged, including through the use of open source or freely available software and tools. Additionally, the availability of global and regional depositories to facilitate access to these data and tools would be an important step to facilitate their wide use by practitioners. Training programmes will be required in some areas to achieve regionally balanced participation. Dialogue among scientists and stakeholders should be stimulated through training and capacity-building in order to ensure deliverable products are understandable, accurate and contain the necessary information to help policy-makers apply the EBSA criteria consistently.

4. Workshop participants recognized the need to promote focused regional efforts, including regional workshops, in order to enhance and harmonize the application of CBD EBSA criteria. Regional workshops are needed in order to bring together the expertise and experience from developing and

developed countries, fostering South-South, North-South and triangular cooperation to access best available information and increase the quality of decisions made for identifying EBSAs. Options for these workshops include integration with regional training in the CBD programme of work on protected areas (POWPA), where lessons learned in coastal areas could be shared and possibly applied in open oceans and deeps seas, including areas beyond national jurisdiction. These workshops could also be stand-alone meetings that focus on gathering technical experts with knowledge on available data, information, and methods.

5. It is crucial to consider the long-term financing needs for further work in these areas and to develop mechanisms to support them. Funding is required to support the identification of potential EBSAs, and donors should be encouraged to support this work in collaboration with international, intergovernmental, non-governmental organization and other relevant technical and scientific institutions.

Annex VIII

Data and Analysis for Identifying EBSAs and Biogeographic Classification Systems

1. Data analysis is the process by which raw data is transformed into operational information to be understood and used by stakeholders. Open access to data contributes greatly to informed management of the environment. Data are the supporting layer of the wisdom pyramid—the wider this basis, the higher the ultimate knowledge will take us.

2. With regard to the marine realm, there are specific challenges that have to be addressed and have precipitated the development and use of specific tools. Defining EBSAs in areas beyond national jurisdiction will require the application of a wide variety of data types and the development of synthetic analyses. Because the open oceans and deep seas are distant, deep and dynamic environments, prioritization of significant areas in these ecosystems will rely heavily on aggregated collections of observation data, statistical models, and remote sensing imagery. In addition, the selection of EBSAs beyond national jurisdiction will require cooperative, international approaches.

3. Data collection and analysis in areas beyond national jurisdiction differ from many terrestrial assessments in that they require, *inter alia*, increased:

- understanding of species distribution patterns and flows in open ecosystems;
- broad-scale monitoring of common-use resources and areas;
- understanding of complex trophic systems across multiple scales;
- coupled models linking physical, chemical and biological processes in space and time;
- tracking of highly migratory species; and
- representation of the four-dimensional nature of marine ecosystems.

4. It is imperative to effectively utilize existing information and ensure that future research efforts are aligned. Towards this end, enhanced capacity and better sharing of data and expertise must be encouraged. This includes the need for enhanced capacity-building centred around open source tools, free availability of data, standardized processes to integrate, unify and control data quality and standardized procedures to address data gaps. We stress the need for clear and understandable products to be developed in close consultation between scientists and the users of the information products.

5. This section on data and analysis is intended to support the GOODS biogeographic classification (annex V to this report), the application of criteria to help define EBSAs (annex VI to this report) and the discussion of capacity-building (annex VII to this report).

Capacity-building, sharing of data, expertise and tools

6. Both biodiversity and the expertise to study biodiversity are unequally distributed over the globe. Many places that harbour areas of high global biodiversity fall within, or in areas beyond national jurisdiction (ABNJ) adjacent to, nations requiring enhanced capacity to gather, manage and interpret relevant data. Capacity-building, including the sharing of expertise, is therefore essential. Any activities regarding capacity-building should take into account existing efforts, such as the Global Taxonomy Initiative (GTI).

7. Capacity-building involving analytical tools and software should, as much as possible, rely on open source or at least freely available tools. Many open source tools have matured to the point that they match the functionality and stability of proprietary systems, and are supported by a large development community. Their obvious advantage in the context of capacity-building is that they are, without any licensing issues, available to all. Having global and regional repositories to facilitate the access to and knowledge about these tools is an important step to facilitate their adoption. Similar to other aspects of capacity-building, training programmes in the use of the tools and the analytical methods will be required.

Availability of data

8. Primary data should be openly available, preferably in accepted, standardised formats. Data should include proper documentation ("metadata") including known limitations, data origin and producers. Policies or restrictions on use, if appropriate, should be made clear. It is in the interest of all parties to provide access to data that is as open as possible, without compromising the intellectual property rights or commercial interests of the original data collector.

9. Application of the EBSA criteria will require access to physical, chemical, and biological oceanographic data, from both remotely sensed and *in-situ* sources. In addition, data sources, such as species occurrence, surveys and satellite tracking data can be used to identify specific regions that may be of biological interest, due to rarity of species or ecotype, or because the region is particularly important to one or more at-risk species. Such data are necessary components of the indices used to assess the importance of an area relative to these criteria (e.g., the calculation of Hurlbert's rare faction index based on species occurrence data or range maps to describe the biological diversity criterion). The data may be on species presences and/or abundances as well as on their spatial dynamics, seabed and substrate features, physical, chemical, and biological oceanography, and may be observed directly, remotely sensed, or collected through systematic surveys or opportunistically. Traditional and experiential knowledge of users of the environment can also play an important role.

10. Data collections should be listed using accessible data discovery systems, such as the Global Change Master Directory (GCMD). These data discovery systems serve as inventories and can be used to develop gap analysis of data needed. These gap analyses can inform priorities for further data collection, and direct projects of data archaeology and rescue. Data and information all too often still reside in sources that are not easily accessible, such as museum catalogues or the primary and secondary literature. Projects to mobilize data from these sources have to be encouraged; this will increase the data volume available and also extend the timeline, thereby enhancing the predictive power of the models. Data resulting from these programmes have to be interoperable with, or integrated in, existing data and information systems.

11. Data repositories should be set up to provide standardised access to primary data. Archiving the primary data in international repositories is essential to guarantee the long-term physical integrity of the data files. Extensive metadata has to accompany any holdings of the data repositories, and appropriate parts of these metadata shared with the data discovery systems described above.

12. If data have to serve as the basis for decisions on environmental management, there should be a formal process of quality control and vetting. Data warehouses, such as the Ocean Biogeographic Information System (OBIS, http://www.iobis.org), integrate data from very different individual providers, making possible an extra step of quality control, validation and integration of data, by looking at issues of consistency between different datasets. Such facilities should be interlinked in order to facilitate access and contain all the necessary information to acknowledge the primary origin of data and policy access associated with it. The final objective of aggregation of data in data warehouses is making new types of analyses possible, by providing access to data on a larger scale than the individual data sets. In addition, when data have been used to identify EBSAs, mechanisms should exist to ensure those data are archived and clearly linked to the EBSAs and subsequent management plans.

Data gaps

13. Due to the vastness of the ocean, there are significant temporal and spatial gaps in knowledge related to both open ocean and deep sea habitats and associated taxa; sometimes, it is not efficient or even possible to observe biodiversity directly, but we can rely on proxies. For example, ocean colour can be used as proxy for productivity; physical seabed complexity can be correlated with habitat diversity. The ongoing progress in molecular biology (metagenomics, population genetics and genomics) offers new promise for improving our knowledge of fine-grained patterns of the spatial distribution of diversity and its dynamics, including connectivity. Additional work needs to be done in order to routinely integrate

those data obtained with the new analytical methods required to transform them into useful and understandable information.

14. Direct observations of species distributions are unevenly distributed across the globe, and this bias, if not dealt with properly, can skew the results of any analysis. Species range mapping models, taking individual observations as input, can expand our knowledge about the distribution of species. Models are not a full substitute for direct observations, but will be necessary and important contributions to the evaluation of EBSAs if they are adequately ground-truthed and validated. Models can also be applied to protect against invalid conclusions caused by observer bias. Using biogeographic classification systems, such as GOODS system, in constraining the predictions would greatly enhance the precision of the modelling.

15. Analysis of ocean ecosystems will always require the application of statistical sampling, proxies and models. These proxies and models, once properly peer-reviewed and validated, will allow the application of the criteria. The use of proxies and models will allow for urgently needed actions to be taken despite the acknowledged gaps. The regional assessment of potential EBSAs can provide opportunities to identify data gaps and prioritise the acquisition of new data to refine the process and to validate the models supporting the process.

Data and information products

16. To be useful in the decision-making process, raw data have to be synthesized into a variety of refined information products. This crucial step requires synergistic efforts of scientists, policy-makers, and stakeholders to ensure products fill the scientific quality requirements on the one hand, and are understandable and accurate for the needs of policy-makers on the other hand. It will be essential that scientists, policy-makers and stakeholders communicate regularly to reach a mutual understanding on the interpretation and accurate use of the information.

17. It is important to be aware of the dynamic nature of both data collection and analysis tools that will likely lead to the need of periodic refinement in the application of the criteria and guidelines. They have to take into account recently gained information – be it information derived from new data, or from improvement of our analysis tools or general understanding of the environment.

18. At a most basic level, coordination might be provided through a common access point to EBSA-related information. Information and experience could be shared through the development of a website portal on open oceans and deep seas. One such portal is already being tested by the Duke University Marine Geospatial Laboratory, as part of their work on the Census of Marine Life project. This portal aims to eventually provide for data and information exchange, collaborative processing and outreach. The prototype portal will be on-line at http://openoceansdeepseas.org/. Another linked component involves mapping habitat features, species information and proposed EBSAs through an interactive web-mapping facility. UNEP – WCMC is currently developing a web-based map viewer of marine areas beyond national jurisdiction, which would incorporate geographically referenced data layers.

19. These two linked websites would provide for the sharing of data, methodologies and experience relating to deep seas and open oceans. Together with sources such as the OBIS data (http://www.iobis.org) and the WCMC website on marine protected areas (http://www.unep-wcmc.org/protected_areas/index.html), they can play an important role in mapping proposed EBSAs and provide for scientific and technical collaboration, as well as capacity-building, with the aim to ensure that policy will be informed by the best available scientific information for the management of remote and shared ocean areas.
