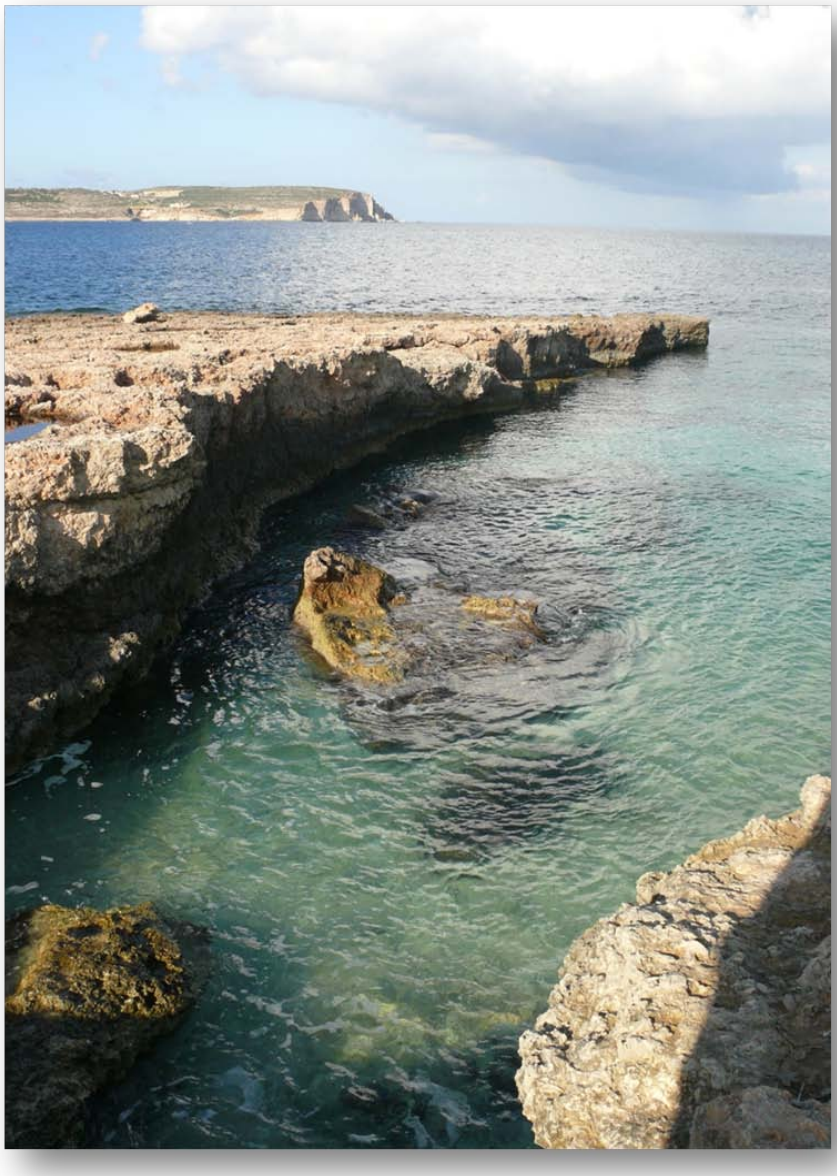
Report of the Experts Meeting on Climate Change impacts on marine biodiversity in the Mediterranean MPAs

22nd-23rdNovember 2011, Malta



Northeast of Malta MPA

Background and aims

This report summarizes the discussions and recommendations from a meeting organized by IUCN Mediterranean Center and the Regional Activity Center for Specially Protected Areas (RAC/SPA) under the initiative of several organisations that participated in the MedPAN North project financed by the European Regional Development Programme and the Spanish Agency for International Cooperation (AECID).

The two-day meeting was conducted to guide the development of biodiversity conservation in MPAs against the threats of climate change. Invited experts from the Mediterranean participated in the meeting.

After a scene-setting review of the expected impacts of changes in the marine environment, the key focus of the meeting was to discuss how to develop MPA tools and indicators to monitor climate change impacts on marine biodiversity and to outline some common strategic orientations at the Mediterranean MPA network level.

Specific discussion focussed on:

- The choice, format and nature of the indicator set needed for the monitoring and management of climate change impacts within MPAs – discussion helped list to choose a preliminary quick and applicable set of indicators
  The development of operational guidelines for a regional monitoring programme for MPAs and climate change
- Collaboration with other Mediterranean programmes to understand and agree how MPA management may best be coordinated with the Mediterranean climate change monitoring system

The meeting also focussed on sharing climate change information, the range of adaptation tools available, and how and what forms of information can be delivered to the MPAs and other stakeholders.

This report gives an overview of the issues raised and the recommendations made. A full list of participants and the agenda of the meeting are attached as appendix 1 and 2.

Presentations and general discussion of the outcomes and actions

The opening presentations provided background knowledge on future climate change conditions in the Mediterranean, as described simulated by different modeling tools as well as documenting the the range of current and possible future impacts. The uncertainties and varying confidence of regional projections provided by different model resolutions mean that actual values and the detailed spatial distribution of changes in the Mediterranean remain unknown in many cases.

Future changes in Mediterranean Sea will affect water temperature and chemistry (pH, $CaCO_3$ saturation states,…), sea level rise, water stratification, weather conditions, marine ecosystems and species, among others. Shifts in species geographical distribution including northward

migration of warm-water species, retreat of cold-water species and expansion of alien species (including dinoflagellates) as well as physiological stress and disease could produce cascading biological effects in the ecosystems and degrade biodiversity. Presentation of case studies demonstrated how past anomalies of sea surface temperature in the South and Western Mediterranean had direct effects on Mediterranean fisheries and caused disease outbreaks, emergence of bacterial pathogens and mass mortality events of coralligeneous species and other invertebrates.

A number of monitoring activities are conducted by different national, regional and international scientific and research organizations in the Med. Some are undertaken regularly while others are the result of one-off studies with various degrees of complexity, geographical context, duration and measured variables, with the resulting reports being in many cases too difficult to understand by outsiders. Though several countries have advanced with the development of tools for monitoring the marine environment in general and its related climate change modifications in particular, there is still no general understanding of the possible impacts on MPAs.

Marked differences also exist between countries and the individual MPAs themselves, when it comes to data gathering activities and monitoring efforts. Some countries already have monitoring programmes in place that also involve MPAs sites and it would be efficient if this information was shared between protected areas. Overall, it seems there is fragmentation of monitoring efforts at the regional/local scale, and projections and climate change scenarios are still limited to the Mediterranean level.

The Marine Climate Change Impacts Partnership from UK provided a good example of a programme to transmit climate change related information and establish links among different stakeholders.

In organizing this work on climate change impact indicators for MPAs, the key recommendation of this meeting was to form a volunteer group of interested institutions that could help further develop and consolidate the proposed monitoring program through a "Strategic Monitoring Action Framework" with the following elements:

Strategic Monitoring Action Framework:

Goal: Preparation and implementation of indicators for monitoring climate change impacts on marine biodiversity in MPAs

Guiding principles and working assumptions:

There was a general recognition that there are a number of critical elements that are important in the development of climate change indicators:

1. Indicators should be few and simple. A good indicator is one that is easy to survey and monitor, scientifically sound and technically feasible, inexpensive and reliable, help regional monitoring and modeling and projection efforts as well as focus on issues of management relevant to the MPAs and answer key questions for Mediterranean MPA managers to understand biodiversity impacts and/or adaptation planning.

2. The implementation of climate change monitoring builds on the assumption that individual MPAs are already undertaking general monitoring and surveillance of their management area on habitat and species (area, extent, quality, population numbers)
3. There exist an understanding of trends from time series data to support the assessment of climate change impacts
4. An understanding on the different vulnerabilities on MPA features (habitats, species) is available at various resolutions across the network, taking into consideration the exposure to the different geographical information from different modeling and projections.
5. The results of climate change monitoring are supplemented by measures made by others on physical effects and weather, etc to help determine causes and effects when changes are seen.
6. A broad communication strategy on the impacts of marine climate change should be achieved to give a context and essential information on the likely impacts, phenomena such anomalies and variations on the stratification as well as the confidence and certainty of expected changes and impacts in the future.

Indicators

Different categories were defined to accommodate a broad range of indicators. Each indicator might vary across the network in type and intensity of effort. Therefore, the preliminary proposed list of indicators resulted from the expert's discussions includes both basic and additional indicators based on the current knowledge of climate change impacts. Future findings and scientific knowledge will require the revision of the present preliminary proposal and the possible identification of new indicators more suited to the information available and the MPAs.

These indicators should have:

- a definition and rationale for their importance
- information on data sources, if information is already collected by others through existing monitoring programmes
- a proposal for who should lead and take responsibility for a given indicator (who will be expected to lead the indicator)
- a proposed methodology taking into account experience and methodologies within or outside the network that could enable a common protocol to be used
- climate rational and background (essential information from scientists explaining why the indicator is relevant and important in assessing climate change impacts)
- be able to integrate the indicators into policy monitoring, communication, evaluation and in predictive scenarios to improve policy effectiveness.

Finally, the proposed indicators to be used for the development of a monitoring programme on climate change impacts are presented in the following table. The indicators are considered as part of the strategy for monitoring implementation at the MPA network to detect trends allowing for different degree of implementation in individual sites (see following table).

Preliminary list of categories and indicators to track climate change impacts across the MPA network

Category	Indicator	Methodology	Data Source	Responsibility
SW Temperature	Anomalies of Surface T	- Temp loggers as recommended at different depths (T-Med protocols) - Oceanographic buoys on surface and bottom if already in place	Link to existing temperature efforts i.e. existing measurements like those collected from scuba divers	TMedNet and others
Episodic events	Presence of jellyfish blooms and species	Jellywatch, Spanish programme		
	Presence of coral bleaching and necrosis (pathogen driven) of other species	National/MPAs efforts, protocols already available		
	Algal blooms			
	Mass mortality events i.e. from hypoxia and anoxia caused by stratification and overturn of water masses			
	Aggregation of organic matter like mucilaginous events			
Reproductive change	Occurrence of *Posidonia* flowering and seeds			
	Changes in sea turtle and sea birds breeding time	Date of the first egg in relation to historic records		
Migration changes	Changes in migration patterns	Timing of migration (earliest or latest occurrence of seasonal species in relation to historic records)		
	Changes in ranges, distributions and abundance of temperature sensitive species	CIESM Tropical Signals Protocols		CIESM
	Changes in abundance and distribution of aliens			

Other possible indicators: Important and charismatic “climate sensitive” habitat and species (because for eg cascade effects including changes in predator-prey relationships etc….), anomalies of pH (relevant to sentinel sites, see below).

Conclusions and outline of future work

From the meeting discussions, the need was highlighted for a proposal for a joint action group to improve the knowledge, information sharing, data analysis, and understanding of climate change. The results from this effort will assist to increase awareness, understand the present and future impacts as well as serve as a mechanism to work together in a more strategic manner.

Further discussions need to agree how information will be bought together and analyzed at the MPA network level. Findings and results will need feedback and communication to MPAs. From here we should examine how this information is followed up and actions are taken at local level.

In addition to the above and based on a better understanding of vulnerability across the network we could consider introducing “sentinel sites” where more detail studies are undertaken. The selection of these “sentinel sites” could perhaps be due to the opportunistic situation of research institutions or existing historical information in the site.

Anomalies of pH: This is probably the indicator least feasible at present, although experts at the meeting showed the potential for this indicator for sentinel sites as well as for other sites when new more simple methods become available. Other indicators were not discussed in depth during the meeting and further revision will need to be done. Following work will also be devoted to develop the rational for each indicator, as explained above, appropriate protocols for monitoring and possible links with other monitoring programmes and data analysis.

As models become more precise through acquisition of local and regional information, different scenarios could assist in describing the varying vulnerabilities of the MPA network. These results with the knowledge of direct and indirect effects of climate change will help to determine the range of mitigation measures and adaptive strategies in the MPAs.

RACSPA will continue collaborating in this process and assist in the consultation for the official adoption of Climate change indicators by the contracted parties of the Barcelona Convention.

Time Schedule for Preparation:

Issue	Responsible	Timeframe
Report of meeting	IUCN Med-RAC/SPA	Dec 2011
Framework document for CC: benefits and actions	IUCN Med/all experts	Ongoing-Dec 2012
Indicator categories and relation to Directive and other type of agreements and ongoing initiatives including timing of reporting cycle	Leonardo Tunesi	April 2012
Indicator categories link to a scientific rational of CC	All experts	March 2012
Presentation to MedPAN		March 2012
Compile a list of initiatives for MPAs with a hyperlink Research for joint actions and synergies	All experts	June 2012
Brochure of CC	WWF with IUCN, Junta, MedPAN Secr.	March 2012
Guidelines for CC setting	IUCN Med-RAC/SPA	March 2013

Annex 1. List of Participants

Mr Aybars Altiparmak
Turkish Ministry of Forest and Water Affairs
E-mail: altiparmakaybars@gmail.com

Ms Marilena Aplikioti
Marine Environment Division
Dept. of Fisheries and Marine Research,
Ministry of Agriculture, Natural Resources and the Environment
101 Bethlehem Street,
1416 Nicosia, Cyprus
Tel: 357 22 807 811
E-mail: maplikioti@dfmr.moa.gov.cy

Mr. Sami Ben Haj
Cabinet Thétis
Bizerta, Tunisia
sbh@thetis-conseil.com

Ms Josephine Camilleri
Economics Officer, EU Affairs
Ministry for Resources and Rural Affairs
Block B, Triq Francesco Buonamici
Floriana FRN 1700, Malta
Tel: (+356) 2299 7791
E-mail:josephine.g.camilleri@gov.mt

Mr Daniel Cebrian
Programme Officer
Regional Activity Centre for Specially Protected Areas (RAC/SPA)
Boulevard du Leader Yasser Arafat
BP 337 –1080 Tunis Cedex –Tunisia
E-mail:daniel.cebrian@rac-spa.org

Mr Christopher Cousin
Malta Environment and Planning Authority
St. Francis Ravelin
Floriana, Malta
Tel: (+356) 2290 7104
Fax: (+356) 2122 8438
E-mail: Christopher.Cousin@mepa.org.mt

Mr Giuseppe di Carlo
WWF Mediterranean Programme Office
Via Po 25/c, 00198 Rome
Tel: 39 06 844 97 227
Fax: 39 06 841 38 66
E-mail: gdicarlo@wwf.panda.org

Ms Bella S. Galil
National Institute of Oceanography
Israel Oceanographic & Limnological Research,
POB. 8030, Haifa 31080, Israel.
Tel: 04- 8565272
bella@ocean.org.il

Ms Mª del Carmen García Martínez
Instituto Español de Oceanografía
Grupo Mediterráneo de Cambio Climático
Puerto Pesquero de Fuengirola s/n
29640 Fuengirola, Málaga, Spain
Tel: 34 952197124
E-mail: mcarmen.garcia@ma.ieo.es

Mr Joaquim Garrabou
Institut de Ciències del Mar
Passeig Marítim de la Barceloneta 37-49
08003 Barcelona
Tel: (+34) 932 309 500
E-mail: garrabou@icm.csic.es

Mr. Dan Laffoley
Marine Vice Chair
IUCN's World Commission on Protected Areas
E-mail: danlaffoley@btinternet.com

Mr. Christophe Lejeusne
Estación Biológica de Doñana-CSIC
Seville, Spain
DIMAR-CNRS, France
E-mail: lejeusne@ebd.csic.es

Mr. Piero Lionello
Associate Professor
Department of Science of Materials
University of Salento, Italy
Tel: 39 0832 297085
Fax: 39 0832 297100
Email:piero.lionello@unisalento.it

Ms Paula Moschella
Commission Internationale Pour l'Exploration Scientifique de la Mer Méditerranée (CIESM)
16, boulevard de Suisse
MC 98000 - Mónaco
Tel +377 93 30 38 79
Fax +377 92 16 11 95
E-mail: pmoschella@ciesm.org

Ms Maria del Mar Otero Villanueva
Marine Conservation Programme
IUCN Centre for Mediterranean Cooperation
C/ Marie Curie 22
29590 Campanillas (PTA)
Málaga, Spain
Tel +34 952 028 430
Fax +34 952 028 145
E-mail: mariadelmar.otero@iucn.org

Ms. Petra Rodic Baranovic
State Institute for Nature Protection
Trg Mažuranića 5
10000 Zagreb, Croatia
Tel: +385 (0)1 5502 930
Fax: +385 (0)1 5502 901
E-mail: petra.rodic@dzzp.hr

Ms Maria Salomidi
Institute of Oceanography
Hellenic Centre for Marine Research
MavroLithari, 19013 Anavyssos,
Greece
Tel: 30 22910 76374
Fax: 0030 22910 76323
E-mail: msal@ath.hcmr.gr

Ms Nadia Suda Lanzon
Malta Environment and Planning Authority
St. Francis Ravelin Floriana, Malta
Tel: (+356) 2290 7104
Fax: (+356) 2122 8438
E-mail: Nadia.SudaLanzon@mepa.org.mt>

Mr. Leonardo Tunesi
Head of the 3rd Department "Marine
Habitats and Biodiversity Protection"
ISPRA
Via Casalotti, 300 - 00166 - Roma - Italy
Tel: 39 0661570465
Fax: 39 06 61561906
E-mail: leonardo.tunesi@isprambiente.it

Mr. Robert Turk
Institute of the Republic of Slovenia for Nature Conservation,
Regional Unit Piran
Trg Etbina Kristana 1, 6310 Izola, R Slovenia
Tel: 386 (0)5 6710 901
Fax: 386 (0)5 6710 905
Gsm: 386 (0)31 358 883
E-mail: robert.turk@zrsvn.si

Mr. Marcello Vichi
Euro-Mediterranean Centre for Climate Change
Via Aldo Moro, 44, 40127 Bologna, Italy
Tel: 39-051-3782631
Fax: 39-051-3782656
E-mail: marcello.vichi@cmcc.it

Annex 2. Agenda

Day 1: 22nd November 2011

9.00am- Opening address by Dr. Petra Bianchi, Malta Environment & Planning Authority

9.15- 9.45- Introduction to the MedPAN North project and its relevance to assessing the impacts of climate change for MPA managers followed by a brief introduction of participants- *Mar Otero, IUCN Mediterranean Centre*

9.50-10.30- Likely scenarios for CO_2 emissions and related climate change in the Mediterranean Sea region and impact on hydrography of the Mediterranean Sea. - *Piero Lionello, University of Salento, Italy*

10.30-10.45 Coffee break

10.45-11:15 Future projections of climate change impacts on the Mediterranean biogeochemistry: results from past and current EU research projects.- *Marcello Vichi, Euro-Mediterranean Centre for Climate Change, Italy.*

11:20-11:40 Discussion on results from research on climate change impacts at the Mediterranean level and future scenarios.

Facilitator: Giuseppe di Carlo

Session 1- The SPA/BD Protocol on climate change

Objective: *To provide information on the current existing work frame and activities within the Parties to the SPA/BD Protocol of the Barcelona Convention*

11:40-12:00. Introduction to national, sub-regional and regional overviews on vulnerability and impacts of climate change on marine and coastal biological diversity in the Mediterranean Region.
Current SAP BIO priority actions update on climate change issues
Daniel Cebrián, RAC/SPA Tunisia

12:00-12:30. Development of monitoring indicators for climate change in the Mediterranean region *Sami Ben Haj, RAC/SPA's International Consultant*

12:30-1:00. Questions and discussion

13:00-14:30. Lunch

Session 2- Impacts of climate change and biological responses
Objective: *Provide a platform for discussions in order to assess the knowledge of climate change induced impacts on biodiversity and the following key themes:*

14:30-15:00. Impacts of climate change and biological responses: vulnerable/priority key habitats, marine species and ecosystems
Christophe Lejeusne, *Doñana Biological Station-CSIC, Spain; DIMAR-CNRS, France*

15:00- 15:20. Some like it hot - thermophilic aliens in the Mediterranean Sea
Bella Galil, National Institute of Oceanography, Israel

15:20-15:40. Case study: Marine climate change impacts in the UK
Dan Laffoley, WCPA marine

15:45-17:30. Discussion. *Indicators for the monitoring and management of Climate change impacts within MPAs*

Day 2: 23rd November 2011

Session 3- Monitoring changes (including climate changes) in MPAs and proposing orientations for management and adaptation
Objective: *Discussions on the present knowledge and the definition and application of suitable indicators to assess marine biodiversity impacts driven by climate change.*

9:00-9:20. Mainstreaming MPAs into climate change monitoring – potential synergies with existing programmes in the Mediterranean and the case of CIESM Tropical Signals
Paula Moschella, CIESM Scientific officer

9:20-11.00 Discussion on Existing programmes and synergies on climate change impacts

11.00-11.15. Coffee break

11.15-11.30. Possibilities of guidance for management and adaptation.
Dan Laffoley, WCPA marine

11.30-13.00. Discussions: Suitable indicators and operational guidelines for a regional monitoring programme and adaptation alternatives for MPAs

13:00-14:40. Lunch

Session 4- Presentation and general discussion of the outcomes and actions
Objective: ***Brief presentation on key advice and concluding discussions***

Facilitator: *Dan Laffoley*

15: 40-17:40 Presentation of findings and general discussion on the way forward from this meeting, including:

- Physical and financial constrains of indicators
- Geographical relevance and spatial consideration
- Outputs and products
- Dissemination and scientific coordination – building the overall picture of impacts