Informal Summary of the EcAp Biodiversity Scientific Expert Workshop

Informal Scientific Workshop, 28-30 April 2014, Anavissos, Greece

The purpose of the EcAp Biodiversity Expert Workshop (the Workshop) was to

- ensure policy-science interaction and strengthen scientific input of various EcAp related projects taking place in the Mediterranean;
- follow up on the recommendations of the February 2014 Integrated Correspondence Group on EcAp GES and Targets, asking the Secretariat to consult international experts, for developing the draft Integrated Monitoring Guidance, especially in relation to biodiversity.

The Workshop was co-organized with the above purpose by PERSEUS and UNEP-MAP, together with COCONET, DEVOTES and IRIS-SES, and was attended by scientists working in the field of biodiversity on EcAp related research projects taking place in the Mediterranean.

The Workshop has resulted in some general scientific recommendations, applicable for all biodiversity related common indicators, as well as in some specific recommendations related to the specific common indicators and addressed both overall status of aspects of biodiversity monitoring in the Mediterranean, monitoring needs, challenges, methodologies, cost-efficiency, feasibility in light of relevant recent scientific developments.

Participants and organizers both agreed on the added value of the Workshop, not only in relation to the EcAp process, but also for coordination purposes and proposed further follow-up Workshops to ensure that EcAp related scientific projects are coordinated and feed into the work of the Barcelona Convention/EcAp policy process.

The general scientific recommendations of the Workshop are as follows (applicable to all biodiversity related common indicators):

1. Monitoring of biodiversity in the Mediterranean marine environment (open and coastal waters) needs to build on:
   - existing national databases such as checklists, lists of species at representative sites including ones for invasive species, information from existing national monitoring networks (i.e. WFD), data on stranding of cetaceans, maps on the distribution of habitats, etc.;
   - existing time-series, e.g. minimum 20 years
   - existing network of MPAs;
   - existing networks of observation systems, such as LTER, EMBOS, LIFEWATCH, CIESM Jelly Watch;
   - existing network of laboratories.

2. In order to ensure feasibility and cost efficiency and at the same time scientific accuracy, the following realistic approach was recommended:
• agreement of a de minimis common monitoring specifics, most cost-efficient methodologies that could be applicable for the whole Mediterranean;
• use of already existing and in place methods, tools or indices should be preferred or adopted;
• building on the existing network of MPAs, have them as key areas for monitoring, as they can showcase those changes likely due to anthropogenic sources in the status of the environment in the different sub-regions of the Mediterranean;
• using the MPA’s monitoring data also as a comparison, a point to calibrate level of difference or as a baseline in cases historical data do not exist;
• identification of key specific sites, so-called representative sites for biodiversity monitoring per country (and ideally also sub-regional stations with joint monitoring, possibly on a pilot basis).

3. Key areas of monitoring were recommended to be (as described by point 2), the MPAs and representative sites, with indicative criteria as broad guidelines for their selection, the existence of:
  • most information/including historical data on biodiversity/NIS
  • well established monitoring (not only for biodiversity)
  • high biodiversity (already documented or supposed)
  • expert opinion
  • (multiple) pressures related to biodiversity, as well as
  • habitats included in the indicative list (as revised in attached Annex I)
  • sites that mimic resembling regions/areas for which no data could be collected or only insufficient data and information would be available

4. In order to ensure both cost-efficiency and scientific accuracy, the recommendation, also in line with points 1-3 was to differentiate monitoring ambitions, with a de minimis approach, applicable for all the Mediterranean at representative sites and with more detailed monitoring (more numerous variables/ more taxonomic identification) whenever the expertise is already available, where MPAs data would showcase major sub-regional, regional changes and would serve at the same time as a baseline in cases, where historical data is not available.

5. Regarding applicable methodologies in light of cost-efficiency and scientific accuracy, the following methods were recommended as most relevant:
  • As a "de minimis" approach, applicable for the whole Mediterranean, carrying out Rapid Assessment Surveys was identified, which can be a useful and cost efficient way of monitoring of various biodiversity related common indicators, as well as NIS;
  • Mapping was mentioned as a key challenge in non-EU countries in relation to biodiversity monitoring;
Remote sensing (satellite images) was identified as a useful tool not only for chlorophyll monitoring, but also for mapping habitats such as the upper level of seagrass meadows;

Continuous Plankton Recorder (CPR) was mentioned as a specific method, which could be replicated, based on the current experience of the “PERSEUS” Project, in other parts of the Mediterranean (in case of available funding);

The importance of inter-calibration was highlighted, as well as of taxonomy (especially in relation to NIS) and quality control;

The adoption of lower taxonomic resolution methods was also advised, whenever its use would not compromise the robustness of the assessment (for cost-efficiency and also due to Contracting Parties differential taxonomical expertise availability). Specific literature supporting this was advised for inclusion in the annex. It is commonly acknowledged that family-level identification may be sufficient to examine variation in marine assemblages exposed to environmental impacts in routine monitoring programmes. Family is also likely to be a good predictor of species-level variation related to natural environmental gradients.

Monitoring of plankton communities was seen as a recommended additional area where important changes in biodiversity could be identified;

The importance of the use of Citizen Science support (especially in the case of NIS) was highlighted.

Monitoring should be carried out on the basis of a suite of experimental designs able to tease apart the natural variability of ecological systems from the effects driven by human impacts.

6. While keeping in mind the overall objective of the EcAp monitoring (i.e. cost-efficient, feasible way of monitoring in a common way all over the Mediterranean the status of marine and coastal environment), the Workshop gave further specific recommendations on updating the indicative lists of habitats and species to optimize monitoring effort and results, as listed in Annex I of this Informal Summary).

7. The importance of addressing key communities for monitoring biodiversity in the Mediterranean has been highlighted and specific recommendations were given on this (please also see point 3 under specific scientific recommendations on "condition of the habitat's typical species and communities" common indicator).

8. Regarding country capacities, it was noted that not only capacities differ greatly between the different parts of the Mediterranean for monitoring biodiversity and NIS, but also in case of NIS some specific countries (entry-points) would need to have more efforts for ensuring Mediterranean-wide NIS monitoring. Specific country-capacity building needs were identified as follows:

- capacity building on Rapid Assessment Surveys were identified as an important and cost-efficient first step needed for implementing common
monitoring of biodiversity in the Mediterranean (with specific emphasis on NIS in the countries of entry-point);

- taxonomic knowledge strengthening (cost-efficient first step was proposed to be an exchange programme between Mediterranean taxonomists while investigating the possibility to fund courses on taxonomy focused on Mediterranean marine organisms);

- "training the trainers" for Citizen's Science support initiatives and other specific initiatives aiming to involve greater part or specific parts of society (e.g. students of different school and university levels) in biodiversity monitoring.

9. Regarding data availability, the scientists in the Workshop noted that data is in most of the cases available, but the common methodologies, sampling methods and tools are the biggest gaps to ensure common monitoring practice in the area of biodiversity. Furthermore, the Workshop recommended to build on existing studies, projects related to biodiversity in the scope of EcAp in the Mediterranean and especially highlighted the already available outcomes of:

- PERSEUS, regarding its analysis of pressures, processes, impacts on SES in open and coastal waters, the definition of eco-regions, pressures mapping, review of ocean observing and remote sensing systems, review of EU MSFD descriptors applicability to non-EU countries, as well as upcoming capacity-building activities on monitoring, such as the 2015 Summer school on EcAp monitoring implementation;

- DEVOTES, regarding its catalogue of existing marine indicators and their respective relation to biological diversity, non-indigenous species, food-web and seafloor integrity, their adequacy to address pressures, and geographic areas of application – its free software allows for e.g. to search, select and rank indicators applicable in the Mediterranean. And also its catalogue of monitoring networks on biodiversity, covering both historical monitoring and currently in place programmes, namely in the Mediterranean area;

- COCONET, regarding the systematic analysis on the distribution and extent of critical Mediterranean habitats such as coraligenous formations, seagrasses, the habitat formers Cystoseira, barrens, the study on connectivity among marine protected areas taking into account genetics and hydrographic conditions, the matrix of assessment of community human pressures and scenarios of environmental change; training and capacity building on habitat classifications, meta-analyses, etc.;

- IRIS-SES, regarding its analysis of monitoring programmes carried out in the framework of European/Regional/National legislation in relation to MSFD, its assessment of multidisciplinary and multi-state monitoring programs and e-Training platform.

- SCALES project regarding the geographical scales and aggregation rules in assessment and monitoring of GEnS http://ec.europa.eu/environment/marine/publications/Prins et al., 2013).
• ACCOBAMS, its’ Scientific Committee, and of course the RAC/SPA, including in its capacity as the ACCOBAMS Sub-Regional Coordinating Unit for the Mediterranean, as the most effective and institutionally sound mechanism to support the EcAp process with scientific advice on cetaceans. This, as far as the use of cetaceans as indicators on population abundance of selected species, as well as species distributional range and demographic characteristics is concerned. All these aspects are systematically treated within the ACCOBAMS framework, existing knowledge inventoried, and - insofar as possible - the collection of new knowledge stimulated;

• Further scientific literature, as listed in Annex II of this Informal Summary.

10. Regarding the specific link between biodiversity and fisheries, the importance to build on available fisheries data that can be useful for monitoring biodiversity and NIS was highlighted (as also specifically mentioned later under specific scientific recommendations).

11. The importance of inter-comparison and inter-calibration was emphasized, especially in view of existing (i.e. through the Water Framework Directive MED GIG) methodologies potentially already applicable to the entire Mediterranean.

The specific scientific recommendations of the Workshop are as follows (applicable to specific biodiversity related common indicators):

1. Regarding the NIS common indicator (common indicator on “trends in abundance, temporal occurrence and spatial distribution of non-indigenous species, particularly invasive, non-indigenous species, notably in risk areas):

- Important to note that not all NIS are invasive and have negative impacts on biodiversity and some have positive economic impact (socio-economic analysis especially important regarding NIS) and that we seldom know the exact pathway of introduction, but all data show increasing trends their number, except in aquaculture;
- Specific key invasive species to monitor should be selected for "de minimis" monitoring;
- Rapid Assessment Surveys were identified here as the most cost-efficient method of monitoring, while at the same time noting that relevant taxonomic knowledge still needs to exist at country level;
- Input of Citizen Science support has been proven key here (see ELNAIS experience), as well as involvement of fishermen;
- MAMIAS was mentioned as an important database on NIS especially for the Mediterranean, which could be a useful tool for EcAp monitoring as well, in case it could be updated and enlarged with more modules (not been updated from 2012 on, due to lack of finances);
- Andromeda under the PERSEUS project is a new database for the area, which is being developed currently, also covering Black Sea (to be operational by end of 2014).
• ESENIA is another specific NIS database to check list for South-Eastern European Seas;
• Even though developing data-bases, still a lot of information is missing, fisheries data would be key to cover NIS too (is done through CFP for EU countries, could be possible also through GFCM for whole Mediterranean);
• NIS monitoring could be integrated in the general biodiversity monitoring, also building on fisheries data;
• Regarding prospective future ECAP monitoring of the impact of NIS in the Mediterranean, the Turkish project mentioned was seen as a very interesting approach;
• The importance of creating national NIS databases all around the Mediterranean was highlighted;
• Jellyfish increase has been specifically mentioned as an important reason for monitoring this pelagic component; offshore areas where platforms, i.e. of oil riggs for attachment of jellyfish polyps were mentioned as an area where jellyfish may be more present and therefore interesting sites to monitor.

2. Regarding the common indicator on Habitat distributional range:
   • the recommendation was to update the initial list of habitats (as seen in Annex I);
   • mapping of extent, range, bathymetry were found most relevant for habitat distribution;
   • a more detailed monitoring in MPAs and a de minimis approach at representative sites was proposed here too as an overall approach;
   • it was mentioned that 10 networks exist already in the Mediterranean for Posidonia monitoring under the SPA/BD Action Plan for the conservation of marine vegetation in the Mediterranean Sea;
   • the Italian Marine Biological Society Monitoring Manual was recommended as a past practice to look at;
   • the 4 Indicators on distributional range listed in the DEVOTES project which refer to maximum and minimum latitude or longitude of selected habitats, were mentioned also as relevant information to build on.

3. Regarding the common indicator on condition of habitat defining species, and communities:
   • the importance of soft bottom benthic communities was highlighted and the list of habitats was further defined and re-structured accordingly, as reflected in Annex I;
   • monitoring based on microscopic identification was recommended as the most cost effective method for plankton taxonomic identification at group level at de minimis and at species level whenever possible, where capacities can be further strengthened in the laboratories across the Mediterranean;
   • a specific emphasis was given to address also pelagic neritic habitats for monitoring plankton communities along the coasts and in areas under specific relevant pressures;
regarding lists of characteristic species, it was highlighted that the lists exist, but may have a qualitative or descriptive use for biodiversity monitoring;

biotic indices (listed also under the DEVOTES tool) based on ecological groups theory were defined as useful, providing their conceptual design in relation to regions or subregions is taken into careful consideration; In this line the results of the Mediterranean Geographical Intercalibration Group exercise conducted for the purposes of the WFD (MED-GIG, 2013) should be taken into account.

regarding the plankton species the need of accurate quality control and inter-comparison among different data sources/experts/operators was highlighted.

the importance of addressing this common indicator and to touch upon related capacity-building needs was identified, for which the 2015 PERSEUS specific training course targeting Southern Mediterranean countries was highlighted, that could be complemented by the upcoming implementation of the RAC/SPA Project “Med Key Habitats” on habitat cartography.

4. Regarding the common indicator on species distributional range, it was recommended that:

- for the monk seal, sightings based on citizen science support (port authorities, fishermen, tourists etc) provide reliable information, notably in low seal density areas. Caves actively used by seals are key for monitoring;
- for cetaceans it was highlighted that aerial surveys existing methodology, combined with ship survey could be interesting to look at for monitoring under EcAp too, under this common indicator;
- regarding marine turtles, the long-term practice in some Mediterranean countries, the good exchange with GFCM (which will start monitoring their incidental catches) were highlighted and stranding, tagging and genetic monitoring were mentioned as best practices; it was recommended to exclude Trionyx tiunguis, as this species is not monitored widely in the Mediterranean and may not be seen as the best indicator for GES regarding this common indicator from a scientific point of view; regarding seabird species to be considered, the importance of shortening the list, to ensure cost-efficient and Mediterranean-wide monitoring, which at the same time can showcase GES regarding the current common indicator was also highlighted and the list of seabird species to be considered was recommended to be updated, as presented in Annex I.

5. Regarding the common indicator on population abundance of selected species:

- for cetaceans, the scientific recommendation was to carry out monitoring on the regional, sub-regional level, with the involvement of relevant organizations, such as ACCOBAMS and RAC-SPA, especially in relation to data-provision
- for monk seals, monitoring would be carried out at a national level, and the most affordable recommended method discussed was camera traps in active caves, which allows individuals’ photo identification for estimations by capture-recapture methods) in combination with on the spot monitoring;
• for **seabirds** it was noted that there is a greater confidence in the case of monitoring population abundance, through monitoring breeding colonies and winter aggregation sites, complemented with by-catch information as the most recommended monitoring methodology, with some already available guidelines by RAC/SPA; in case national data are scarce, institutions can also rely on the various bird societies, which are internationally coordinated and can provide data for the Mediterranean;

• for **marine turtles** there is as an efficient methodology for monitoring population abundance already available, but for some non-EU countries, especially Syria, Lebanon Tunisia and Libya further support to monitoring would be needed (noting that LIFE in the current financial cycle is also available for non-EU countries);

Furthermore, it was recommended to look into existing satellite data of the French company “ARGO” for all functional groups under this common indicator.

6. Regarding the common indicator on **demographic characteristics**:

• fecundity and mortality rates were pointed out as the most essential aspects to focus on to optimize effort while monitoring for this indicator;

• regarding **marine turtles**, the interest of monitoring rookeries sand temperature, considering a possible impact of climate change, along with sex ratio monitoring was pointed out to verify possible correlation between the two. Aerial surveys to detect male marine turtles was also recommended as an important periodic tool, during breeding season to determine population parameters, while for fecundity rates the estimation of number of failure to hatch out in nesting sites was mentioned as standard procedure; for mortality, stranding and bycatch trends were pointed out;

• regarding **seabirds**, it was found that there is a greater confidence in standard monitoring methodology, for example size differences for sex ratio determination and colour pattern for age classes are key, while for fecundity the number of failure of eggs to hatch out in breeding colonies were mentioned. Effects of fisheries and marine litter on mortality were stressed. Counting of number of active nests was also mentioned as standard methodology:

• in the case of the **monk seal**, the photo camera traps were mentioned as an important method in breeding caves, and pup counting was mentioned for fecundity rates, as well swimming into caves to complement camera trap records. It was also mentioned that the monitoring methodology would need to be unified, to enable Mediterranean countries all over the Mediterranean to implement one approach regarding monk seal;

• regarding **cetaceans**, by-catch and stranding data were mentioned as the most important methodologies, along with the need to develop capacity in the Mediterranean for undertaking necropsy procedures (keeping in mind cost), to determine mortality causes.
Annex I

Revised indicative list of habitat types and associated biological communities, for ECAP biodiversity monitoring

Pelagic oceanic

Upwelling areas

Fronts

Gyres

Pelagic neritic

Benthic Infralittoral (=photophilic, e.g. 0-50m)

Rocky

1. Hard beds associated with communities of photophilic algae, with special attention to:

   certain *Cystoseira* belts.

   Note: Overgrazed barren areas need to be taken into account

2. Communities of infralittoral algae (organogenic trottoir with Lithophyllum spp), with special attention to:

   facies with vermetids ("trottoir” with vermetids)

Sedimentary

1. Meadows of sea grass (*Posidonia oceanica, Cymodocea nodosa, Zostera* spp), with special attention to:

   Barrier reefs of *Posidonia*,

   Tiger meadows of *Posidonia, Cymodocea*

2. Communities of infrallitoral sands or muddy sands

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1 Regarding pelagic oceanic habitats, document UNEP(DEPI)/MED WG.382/11 “Towards the Identification and Reference List of Pelagic Habitat Types in the Mediterranean Sea” was prepared on behalf of RAC/SPA, to advance in the compilation of a list of such habitats in support to the implementation of the EcAp roadmap. In the conclusions to this document it has been recommended that an effort be undertaken at compiling a reference list of pelagic habitat types through in-depth multidisciplinary expert consultations.
Benthic Circalitoral (=Sciaphilic, e.g. 50-200 m)

Rocky

1. Hard beds associated with Coralligenous communities and semi dark caves,

Sedimentary

1. Communities of the coastal detritic bottom
2. Communities of shelf-edge detritic bottoms (facies with *Leptometra phalangium*),

Benthic Bathyal (=dark, e.g. >200 m)

1. Communities of deep-sea corals
2. Seeps and communities associated with bathyal muds (facies with *Isidella elongata*)
3. Communities associated with Seamounts
Revised indicative list of seabirds for ECAP biodiversity monitoring

- *Larus audouinii* (Payraudeau, 1826)
- *Phalacrocorax aristotelis* (Linnaeus, 1761)
- *Puffinus mauretanicus* (Lowe, PR, 1921)
- *Puffinus yelkouan* (Brünnich, 1764)
- *Sternula albifrons*, or *Sternula nilotica* (Gmelin, JF, 1789) or *Sternula sandvicensis* (Latham, 1878)

Revised indicative list of marine turtles for ECAP biodiversity monitoring

- *Caretta caretta* (Linnaeus, 1758)
- *Chelonia mydas* (Linnaeus, 1758)
Annex II

RESOURCES


UNEP, RAC/SPA (2013) Towards the Identification and Reference List of Pelagic Habitat Types in the Mediterranean Sea. UNEP(DEPI)/MED WG.382/11.