



**GENERAL FISHERIES COMMISSION FOR
THE MEDITERRANEAN**

**COMMISSION GÉNÉRALE DES PÊCHES
POUR LA MÉDITERRANÉE**



GENERAL FISHERIES COMMISSION FOR THE MEDITERRANEAN

SCIENTIFIC ADVISORY COMMITTEE (SAC)

**Fourteenth Session
Sophia, Bulgaria 20-24 February 2012**

**REPORT OF THE TRANSVERSAL WORKSHOP ON
SPATIAL BASED APPROACH TO FISHERY MANAGEMENT
6-8 February 2012, Rome (Italy)**

OPENING AND ADOPTION OF THE AGENDA

1. The meeting of the Transversal Workshop on Spatial Based Approach to Fishery Management was held at the GFCM Headquarters. It was attended by 19 participants from 4 countries as well as representatives of the GFCM Secretariat (see List of participants in Appendix I).
2. Mr Abdellah Srour, Executive Secretary of the GFCM Secretariat, welcomed the participants and warmly thanked Mr Carlo Pipitone for chairing the meeting. Mr Srour underlined the importance of the topic and recalled the framework whereby the workshop is being carried out. He underlined the need to give clear management indications to the Commission for the correct implementation of the spatial based approach to fisheries.
3. Mr Carlo Pipitone was introduced as Moderator of the Workshop.
4. The agenda was presented and adopted with minor changes (see Agenda in Appendix II). Ms Pilar Hernandez and Ms Aurora Nastasi from GFCM Secretariat, assisted by Mr Jordi Leonart, were appointed as rapporteurs.

SPATIAL BASED APPROACH TO FISHERIES MANAGEMENT IN THE MEDITERRANEAN: CONCEPTS AND APPLICATIONS, CASE STUDIES

5. Six presentations were introduced under this point of the agenda. Titles, abstracts and main points of discussions are provided here below. The moderator introduced the background

document about the current state of Spatial based Fisheries Management options in the Mediterranean.

Spatial management of fisheries in the Mediterranean region (by Pipitone C.)

Spatial planning aims at reducing or avoiding user-user or user-environment conflicts whenever multiple uses of space and resources occur, which is generally the case in fisheries. Spatial approaches in fisheries management make use of a number of initiatives that span from marine reserves to temporal or permanent single-gear restrictions. Mediterranean fisheries, which are multispecies and multi-gear, call definitely for a spatial approach to their management. This paper briefly reviews Mediterranean marine protected areas (MPAs) and their main fisheries benefits, which include effects on abundance and size of commercial species and biomass export. Case studies from France, Greece, Spain, Italy and Malta are presented. The results are highly encouraging but more effort is needed in terms of data collection, enforcement, surveillance and scientific monitoring.

6. After this comprehensive presentation, some participants provided additional information on some aspects that were only partially touched. Details on the Fisheries Restricted Area (FRA) of the Gulf of Lions were provided by J. Leonart who indicated that it was not a French initiative, but a proposal signed by Spanish and French scientists, finally adopted, by the GFCM in 2009¹. It states that fishing effort for demersal stocks of vessels using towed nets, bottom and mid-water longlines, bottom-set nets shall not exceed the level of fishing effort applied in 2008. It was also remarked that this FRA is addressed to protect not only hake spawners but those of some other species commercially important.
7. Some participants intervened to underline the most relevant aspects to be considered on the management plan for an MPA or fisheries reserve that are quite often not tackled appropriately. The workshop agreed on: enforcement, control and surveillance, effort displacement among others. Suggestions to consider more aspects on the socio-economic side were of great consensus, for instance envisaging complementary activities to compensate fishermen affected by restrictive measures. The benefits for artisanal fishers are clear in the medium term but, at the beginning, they are always reluctant to adopt the rules. The WS considered that socio-economic issues are definitely under rated.
8. Co-management and Territorial Use Right of Fisheries should be guaranteed to artisanal fishers.
9. Moroccan expert highlighted the difference between North and South countries and hence strategies to be adopted must be planned accordingly, thinking of possible ways of compensation depending of the area, and always reinforcing cultural aspects and giving added value to the artisanal fisheries marketed products.

¹ http://151.1.154.86/GfcmWebSite/docs/RecRes/GFCM_2009_RecRes_en.pdf

Artisanal fisheries and Marine Protected Areas in Italy: the case study of Torre Guaceto (SE Apulia) in the Mediterranean context (by Guidetti P.)

In SE Apulia, a study that involved the Torre Guaceto MPA management authority and the local community of artisanal fishermen started in 2005 and is still ongoing. The study was *de facto* an experiment of adaptive co-management of an artisanal fishery within the buffer zone of an MPA. The 'adaptive' component is related to the fact that fishermen accepted (on a voluntarily base) to be monitored by scientific personnel, in charge of setting the fishing effort year by year. The 'co-management' component is related to the fact that fishermen participated as peers in taking decisions (e.g. using selective gears, larger mesh size and shorter nets) and sharing the objectives (long-term sustainability). In short, this case study shows that: fishing yields (i.e. throughout 6-7 years of study) remain 2-3 times higher in the buffer zone of the MPA than outside; a competitive approach is going to be replaced by a cooperative approach among fishermen (avoiding the 'race to fish'); fishermen are more and more aware that the MPA authority, police authorities, scientists and environmental associations (e.g. WWF, Slow Food) may help them.

10. The key point outlined by the participants was the importance of making the fishers more and more aware that they have the responsibility to be part in the sustainable management of their fishing grounds. To support their common feeling about the fact that all together they were doing something positive they have been publically prized, which make also them to feel to be protagonists of the story. To this aim, fishermen were also invited to give their opinion and tell the story at several TV programs besides public meetings. Some questions were asked about the way the new adopted gears (larger mesh trammel nets) were financed. The fishermen paid for the larger mesh sizes when they understood that it had a positive repercussion on their revenues.

Spanish Marine Reserves for fisheries, 25 years of history (by Revenga S. et al.)

The Spanish Secretariat for fisheries is managing since 1986, marine reserves for fisheries enhancement in a network with now 10 marine reserves, 7 of which are in the Mediterranean Sea. Good results from follow up show that the benefits go far beyond fisheries enhancement, as marine reserves show that public funds on protection measures and tools on the spot, contribute to biodiversity protection as well as to improve knowledge on global change. Meanwhile marine reserves are too case studies for governance, good practices, precautionary approach and even marine spatial planning at a small scale. All marine reserves in Spain are fisheries oriented and most of them successfully working in collaboration with small scale fishers.

11. The representative of Federación Española de Actividades Subacuáticas (FEDAS) Spain stressed that some recreational activities in Spanish Marine Reserves have been strictly limited like scuba diving or forbidden like spearfishing. Better planning with the implication of divers and leisure fishers was claimed. Between the situation of the activity prior to the establishment of an MPA and the total prohibition there is a wide range of different management measures that could be applied, always after a dialogue with potential users.
12. Some discussion raised about the confluence of interests that is especially critical between some sectors like spear fishers and artisanal fishers. More dialogue with the actors would be beneficial to find ways others than just binding the activity. The complexity of the spatial management planning is evidenced by the discussion opened. Some of the most important issues to be addressed are enforcement and control and surveillance. The importance of local authorities and NGOs is underlined as main actors on the enforcement process.

Marine Park Planning and Recreational Fishing: Is the Science Lost at Sea? Case Studies from Australia (by McPhee D., presented by Sagué Pla O.)

A number of Australian marine park case studies were presented. The creation of an MPA network of no-take marine parks has excluded the public from recreational fishing in large areas of the Australian coast. While there is a clearly documented and accepted need to engage stakeholders through consultation and participation, there has been little focus in considering how the marine science associated with marine parks is communicated to, and interpreted by, recreational fishers. Potential solutions to challenges and contentions that have been encountered and were presented.

13. Some participants commented on the reliability of the data presented in the sense that MPAs were showed as not always being useful tools for recovery or for spill-over, what has been largely demonstrated in scientific literature. It was evidenced that in most of the Australian cases studies presented, costs were hardly taken into consideration neither the opinion of some stakeholders like recreational fishers. A general agreement was reached on the lack of socio-economic studies in most of areas of the world. A few exceptions were mentioned in Spain and Italy where some research projects are addressing also these aspects.

Overview on Moroccan experiences on SBAFM (by Malouli I.M. and Faraj A.)

The space management is a key component in the fisheries management. It includes the most classic technical measures which consist of establishing a geographic restrictions up to the more holistic approaches that are the marine protected areas. Although their interest is certain, the application in Morocco of this kind of measures has not always given the expected results for various reasons: i) the objectives are sometimes difficult to reconcile towards the biological, environmental and socioeconomic factors which interact; ii) the expected impacts can be complex to predict and to quantify; iii) the implementation can also constitute a major hindrance as the actors and the technical constraints can be numerous. This presentation focused on the Moroccan experience on zoning systems in the case of octopus fishery targeted by artisanal as well as by industrial fleet and on some case of MPA.

14. The conflict among different segment of fleets is for the first time put forward in the workshop. Industrial vs artisanal segments target shrimp spawners and recruits respectively (especially in the Moroccan Atlantic). The conflict could be addressed by identifying spawning grounds and protecting them. Closing areas and seasons should be a measure to be considered when facing different types of overfishing: growth overfishing protecting nursery areas that are usually targeted by coastal fisheries or recruitment overfishing protecting spawning grounds usually affected by industrial fleet.
15. The case of some very specific fisheries such as the Red shrimp fishery in Spain which is very targeted to this species and only performed on a compact muddy bottom was mentioned and is being considered compatible within future high-seas MPAs, always after a sound study on a case-by-case basis.

METHODS FOR THE EVALUATION AND MONITORING OF THE IMPACTS OF FISHERY RESTRICTED AREAS AND OTHER SPATIAL BASED FISHERIES MANAGEMENT TOOLS ON FISHERIES, ECOSYSTEMS AND SOCIETY

Application of the ecosystem model ATLANTIS as a fisheries management tool in the Sicily Channel (by Sinerchia M.)

ATLANTIS is an ecosystem box-model intended for use in management strategy evaluation. It has been applied to multiple marine systems (from single bays to millions of square kilometres) in Australia and the United States. Current work is being done on the construction and implementation of a version of the model for the Sicily Channel ecosystem and fisheries. This model tracks the nutrient (usually nitrogen and silica) flows through the main biological groups. The primary ecological processes considered in the model are consumption, production, waste production and cycling, migration, predation, recruitment, habitat dependency, and mortality. The physical environment is also represented explicitly - via a set of polygons matched to the major geographical and bioregional features of the simulated marine system. Polygonal maps are used as they allow for the model to focus the spatial attention where needed. Atlantis also features a detailed exploitation model. It allows for multiple fleets, each with its own characteristics (regarding gear selectivity, habitat association, targeting, effort allocation and management structures). It includes economic drivers, compliance decisions, exploratory fishing and other complicated real world concerns (such as quota trading). The exploitation model also supplies 'simulated data' to feed other assessment models used in reality (including Surplus Production, Adapt VPA and Bayesian integrated assessments). The output of the assessment models are fed to the management model (typically a set of decision rules and management levers) for action that may include an extensive list of potential management measures (including gear restrictions, days at sea, quotas, spatial and temporal zoning, discarding restrictions, size limits, bycatch mitigation, and dynamic reference points).

16. Some questions were posed on the characteristics and volume of data needed and on the validation process in different areas. Some experts from southern countries asked about the possibilities of exchange programs between Mediterranean countries to improve capacity building on the use of this type of models.
17. The moderator did a summary of the main points raised in previous discussions as a way of wrapping up the first day session and to steer the discussion on these points
 - Spatial-based fisheries management is aimed, among others, at addressing spatial conflicts among fleet sectors
 - Need for effective enforcement followed by monitoring, surveillance and control
 - Need to involve fishermen from the beginning: they are generally reluctant to accept fishery restrictions, at least in the initial stage of an MPA
 - Need of socio-economic studies in the planning phase
 - Effort displacement is a major issue after the creation of an MPA
 - Territorial User Rights can be used as a mean for ensuring fishermen participation and compliance
 - Adaptive co-management is a promising approach to the management of MPAs
 - Recreational fishermen are often disregarded during the decisional and management phase.
18. Some participants added some aspects of legislation which are still very vague and unresolved. They highlighted that protection figures are usually under the management of national bodies, but for the case of international areas, regulation is still missing.

Progress in the use of Vessel Monitoring System (VMS) data for spatial management of fishing activity (by Russo T., Parisi, A., Fiorentino F. and Cataudella S.).

A series of R routines have been developed for the processing of VMS data for evaluation and analysis of fishing patterns generated by the Italian commercial fishing fleet, as required by the Data Collection Framework. It requires computation of pressure indicators, that is evaluation of the spatial extension and aggregation of fishing effort. The work flow consist mainly of: Disaggregation of VMS dataset into single "tracks; Interpolation at an adequate frequency (i.e. 20 minutes) in order to realistically represent fishing activity; Recognize fishing activity with respect to targeted resources (i.e. Métiers classification). A series of libraries and routines in R code were developed in order to obtain high frequency tracks from VMS signals natively characterized by low frequency (e.g. 2 hours, that is the default for Italian fleet) furthermore fishing points can be interpolated to obtain a pattern, via temporal aggregation.

19. Some questions were posed about the availability of VMS data. The importance of this new source of data on the fleet behavior for different management-related purposes was stressed by all the participants. From stock assessment to effort allocation as well as for the identification of the most visited areas when finding the boundaries for the establishment of FRAs were outlined as potential uses of these data. The participants suggested that VMS data should be available to the scientists at least on a primarily processed way since raw data are difficult to understand and are unlikely to be available in the short term.
20. Ms Hernandez recalled the main outcomes of the GFCM workshop on VMS held last November in Zagreb stating that a GFCM roadmap to design the way forward on the management of VMS data from member countries is in progress, but still much work needs to be done.

GIS of Maritime jurisdiction and GFCM GSAs in the Mediterranean Sea (by Piron M., Odorico R., Castellarin C. and Marashi S. H. S.)

The aim of the Geographical information System implemented is the collection in the same database of the official information on the jurisdiction of the Mediterranean Sea and the Task 1. The areas described in the layers concern: i) the maritime boundaries linked to the correspondent legislative reference as made available in the official website of UNCLOS (claims of territorial waters, contiguous zones, EPZ, etc.); ii) the GSAs and the Task 1 available information; iii) the areas of main IUCN interest. As agreed during the SCSI sub-Committee, the GIS representing the Task 1 results (and the VMS data in the future) can be a useful tool to improve the data collection of GFCM Secretariat by the Countries.

21. The issue of showing jurisdictional boundaries is always very sensitive as outlined by the participants, and there are always difficulties on precisely defining boundaries that in some cases are still under revision. Thus, in order to avoid complaints, proper disclaimers should be considered.
22. GIS tools have been acknowledged as one of the most useful instruments for the planning of spatial management.

Research and participatory planning in the artisan fisheries sector through the systemic and prospective analysis for sustainability in the National Park of Al Hoceima (by Nibani H.)

This study contributed to establish an actual evaluation on the state of the marine resources conservation. A series of workshop were organized in a participative approach to identify sustainable indicators, and then establishing relationships among various workshops in order to validate the data provided by the fishermen. The targeted groups were fishermen and the local population, as well as the administrative actors, coming from various horizons but concerned with the same territory, in this case the Marine zone National Park of Al-Hoceima. The Stakeholders were able to set goals according to a participative action plan in order to activate the zoning of the marine part of the ZMPNAH, then we adapted it to the needs of the current situation by choosing the priority and strategic actions.

23. This initiative is acknowledged as a big step forward on the eco-socio systemic approach for the management of MPAs. The participation of fishermen in the data acquisition and in the process of assessing the status through the establishment of indicators is rendering good results with a great deal of voluntary effort and with the support from the administration. Although the methodology has showed to be useful in this case, extrapolation to other areas should be taken with caution and after a case-by-case analysis. The Al-Hoceima National Park is a very important site for biodiversity but very small compared to the total area of the whole Moroccan coast and with very particular socio-economic and ecological characteristics.

THE ROLE OF SPATIAL BASED TOOLS AND APPROACHES IN FISHERIES MANAGEMENT PLANNING: EXPERIENCE GAINED FROM REAL-LIFE APPLICATIONS ESPECIALLY IN THE GFCM AREA

Effects of protection in fishery restricted areas: compendium of some Spanish MPA projects (by Deudero S. and Goñi R.)

The work described some case studies concerning protection effects derived from fishery regulations at marine protected areas off the Spanish Mediterranean: Marine Reserves of the Columbretes Islands, Cala Ratjada, Masía Blanca and Cabrera Archipelago National Park. Spatial management requires an understanding of species responses to protection as well as ecosystem uses and benefits. Issues regarding taxonomic responses (decapods, fishes, bivalves) and time responses of MPAs were discussed. Future scenarios of offshore wind parks as fishery restricted areas were also presented. Spillover of large decapods, endemic species as indicators of good environmental status and fish responses have been addressed. Some MPA lessons have been obtained from several studies, either from mid-term studies to long-term monitoring.

24. The installation of wind farms promoted a discussion on the considerations that needs to be accounted for before deploying these offshore wind farms on a large scale basis. Location of these installations should be looked at with caution. Some examples of foreseen projects are presented which would use floatable mills, what would avoid damaging the bottom. On the other hand an existing wind farm plan for the western Strait of Sicily considers the use of bottom-fixed mills. The compatibility of these installations with the conservation purposes needs to be further investigated.

Fisheries management/conservation and step-relief areas in the Mediterranean open seas, including deep seas (by de Juan S. and Leonart J.)

Marine ecosystems in Mediterranean high seas are poorly known in relation to coastal and continental shelves. These ecosystems are currently threaten by fishing activities, including the vulnerable associations of sessile organisms, such as cold coral reefs, mostly detected in continental slopes, seamounts and on the walls of submarine canyons. Many geological features are also vulnerable to fishing as hotspots of diversity and as habitat of vulnerable fauna, like cold seeps, hydrothermal vents and submarine canyons. Essential habitats for pelagic species are mostly determined by oceanographic features like upwelling areas that create productive areas, and we highlight spawning areas and migratory routes of the overexploited bluefin tuna, swordfish, and albacore, that are of high conservation interest. The work presented proposed that in a context of difficult management of fisheries in Mediterranean high seas, vulnerable habitats should be protected through establishment a web of Marine Protected Areas.

25. The gap in legal coverage for the protection of high seas was put forward. GFCM is called as the appropriate authority to regulate the management measures (directed to fisheries activities) to be eventually applied in Mediterranean high seas. Suggestions in order to regulate international waters where stocks are shared among several GFCM countries were outlined. The key role of GFCM is underlined to progress on the establishment of fishing agreements and on making the member countries to respect the existing laws.

The Ecosystem services provided by the Italian Marine Protected Areas: benefits for fishing (by F. Blasi)

Scientific studies of Marine Protected Areas have focused on the effects of ecosystem protection and, to a lesser but increasing extent in recent years, on the economic and social consequences of establishment of the MPAs. In this context ecological economics can play a very important role, as it can: attribute an economic value to services provided by the MPA ecosystems; promote sustainable use of fish resources. To evaluate the economic benefits of biodiversity conservation via an MPA, we use the Cost-benefit analysis tool (CBA). CBA compares the benefits which society will enjoy with the costs which society has to sustain for the realization of a project. CBA allows to show the benefits for society to the conservation of ecosystems. If CBA is extended to a wider perspective, i.e. beyond the boundaries of the protected area, it can also contribute to evaluation of the social value of an MPA (and an MPA system) on a national and/or community scale. One of the most important activities affected by the establishment of an MPA is fishing. The establishment of an MPA entails costs and benefits for fishing. The benefits can be calculated by adopting the evaluation methods used in ecological economics. In particular, must be evaluated the following fishing ecosystem services of the ecosystems protected by the MPAs: *Fish catching* ecosystem service (connected with the Food production ecosystem function), *Maintenance of fish species* (connected with the Refugium function and the Nursery Function), *Cultural heritage and identity* (conservation and recovery of traditional fishing) and the ecosystem services connected with the Cognitive function (benefits for fishing sciences). The economic evaluation of biodiversity of the MPAs can offer a useful support for decisions concerning the design and management of Marine Protected Areas. More specifically, monetary evaluation of the fishing ecosystem services in Italian MPAs can contribute to sustainable use of the ecosystems and fish resources in our seas, showing that the MPAs, by contributing to protecting the fish stocks from excessive exploitation and protecting the habitats that sustain them from damage, can generate long-term and large scale economic benefits for fishing. A case study was presented on the monetary value of the ecosystem services provided by the *Posidonia oceanica* meadows.

26. The study was welcome by the workshop as one of the few cases of this type of analysis that are very useful for the planning process of any MPA. Some questions were posed on the technicalities of the model and on the way the values (in terms of price) are assigned to social variables.

CRITERIA AND REQUIREMENTS TO IMPLEMENT SPATIAL BASED FISHERIES MANAGEMENT BY DESIGNATING FISHERY RESTRICTED AREAS

27. A series of criteria were identified and discussed. Finally a list was selected by the workshop, details are presented in the section of Conclusions of this report here below.

CONCLUSIONS AND RECOMMENDATIONS

28. GFCM presented the activities and actions undertaken in the promotion of fisheries restricted areas.

Review of Marine Protected Areas (MPAs) of the Mediterranean Sea and actions undertaken by the GFCM (by Nastasi A.)

The presentation introduced the meeting organized and the actions undertaken by the GFCM on the issue of protecting sensitive marine habitats. A brief review of the Marine Protected Areas (MPAs) of the Mediterranean Sea was presented. In addition, in the last years, the Commission identified four special high-sea areas and several recommendations were issued to guarantee their protection. In particular: the REC.GFCM/2006/3 “On the establishment of fisheries restrictive areas in order to protect the deep sea sensitive habitats” which bans fisheries activities in delimited sites off Santa Maria di Leuca (Italy), Nile delta (Egypt), Eratosthemes Seamounts (Cyprus) and the REC.GFCM/33/2009/1 “On the establishment of a fisheries restricted area in the Gulf of Lion to protect spawning aggregations and deep sea sensitive habitats” which establishes a list of authorized vessels to operate in the area and a fishing effort quota that has not to be exceeded. The GFCM thus recognizes the importance of the spatial approach to fisheries management and continues operating with its partner organization and means towards the protection and the correct management of sensitive marine habitats.

29. Based on the overview of the existing information and on the results and projects presented by the participants the following conclusions were outlined:

- Spatial-based fisheries management is considered a crucial part of the ecosystem-based approach to fisheries (EAF) and a potentially useful and powerful tool to address conflicts among resource users, especially in complex multispecies multi-gear fisheries like those present in the Mediterranean Sea. The implementation of effective MPAs (no paper parks) is fundamental in meeting both biodiversity conservation and sustainable fishing objectives.
- Fisheries benefits of MPAs are not always observed or clearly assessed. Benefits depend on a number of ecological, biological, economic and societal factors and are subject to global change effects and to unpredictable natural and anthropogenic events. A monitoring and assessment plan is necessary to evaluate the effects of a MPA and is a necessary requisite for any adaptive management.
- A number of criteria and requirements that should be taken into account in the design stage of a MPA have been identified:
 - Location
 - Size

- Connectivity among MPAs when a network of protected areas is designed
 - Life cycles and mobility of species
 - Information on the spatial occurrence and distribution of human and natural components of the ecosystem:
 - Fish populations
 - Sensitive and essential fish habitats
 - Benthic communities
 - Seabed morphology
 - Oceanographic features
 - Professional fishing fleet and activity pattern
 - Recreational fishing activity pattern
 - Cables, pipelines, oil platforms, wind mills
 - Shipping routes
 - Identification of environmental hazards and risks
 - Expected effects on fish dynamics, fisheries performance, fleet patterns
 - Socio-economic analysis
 - Funds availability for monitoring, control, surveillance
- MPAs are likely to have higher acceptance from society and from fishermen if (1) stakeholders are engaged whenever possible in the planning phase and monitoring, (2) management objectives and expected results are clearly stated and possibly shared, and (3) the public is informed on the results obtained.
 - Adaptive co-management with fishermen can be very effective in terms of compliance and results obtained; it can be further enhanced through publicity and public rewarding of the fishermen's collaboration.
 - Whenever applicable, territorial user rights are fostered as a way to ensure fishermen's participation to management and to share with them responsibilities and results obtained from a MPA.
 - A socio-economic study is envisaged as a mean to estimate social and economic costs and benefits in the planning phase. Several different tools are available, including cost-benefit analysis, ecological-economical assessments, bio-economic modeling, analysis of ecosystem services, etc.
 - Fleet displacement and "fishing the line" patterns are commonly observed after the creation of a MPA. While fishing at the border of a MPA can be a symptom of fishery benefit (=spillover), fleet displacement can have detrimental effects on the resources due to an increase of fishing effort on the portion of stocks located outside the MPA.

- The use of VMS data shows large potential in spatial-based fisheries management. The main limitations that still hamper their effective use remain the availability of data to scientists and the lack of guidance to elaborate the raw data sets.
 - The Mediterranean high seas (=international waters) are recognized as an important area for the conservation of demersal and large-sized pelagic species. While bottoms deeper than 1000 m are already protected from trawling, efforts should be made to protect trawlable offshore areas that are recognized as natural refuge and act as a source for adjacent fishing grounds. High-sea FRAs already exist in the Mediterranean, but the enforcement of international agreements and legislative measures as well as the means for surveillance and control should be strengthened.
 - It is recognized that a portion of the submerged ecosystems should be protected from the removal of living resources. The suggested percentage of sea to be protected, as taken from published studies and reviews ranges from 10% of marine ecosystems to 20% of fishing grounds, in order to have a significant effect on fished stocks.
 - Despite the existence of a legal framework, the jurisdictional aspects in the Mediterranean Sea (territorial waters limits, EEZ, etc.) are not always clearly defined. This could hamper and slow the creation and enforcement of international management initiatives.
 - Countries on the southern side of the Mediterranean experience a dramatic shortage of funds in all stages of MPAs (planning, enforcement and surveillance). Yet there are successful and promising initiatives of fishermen involvement by NGOs, in an attempt to increase and organize their awareness of common problems.
30. The workshop agreed on the following recommendations to be addressed to the SAC for its consideration
- In order to assess the consequences and to enhance social acceptability of implementing spatial fishery restrictions, socio-economic studies as well as options for co-management and/or territorial user rights should be considered during the design stage. Inputs from stakeholders should be taken into account in the process.
 - To ensure the effectiveness of any fishery restricted areas: i) the scientific monitoring (based on a robust sampling design) ii) the enforcement and surveillance on a routine basis, iii) the dissemination of results of these activities to all stakeholders, as well as adequate funding should be provided.
 - When limited fishing activities are allowed within a restricted area, fishing effort should be monitored on a regular basis;
 - Geographic Information Systems (GIS) are an essential tool for spatial based approach to fisheries management. With this aim a group of experts with specific ToRs should be identified by the GFCM Secretariat.

- VMS data are acknowledged as a powerful tool when investigating the spatial distribution of fishing effort, the Workshop strongly recommended to make them available to science.
- At least 10% of demersal fishing grounds should be protected from bottom-towed fishing gear in order to contribute to Target 11 of the Strategic Plan for Biodiversity (2011-2020) of the Convention on Biological Diversity² which urges the protection of 10% of coastal and marine areas by 2020;
- Parties involved in the rejection of FRA proposals, which importance has been recognized by the SAC, are called to report on the eventual progress of the initiatives through the Annual National Reports;

ADOPTION OF THE REPORT

31. The Conclusions and Recommendations were adopted by the Working Group on the 8th of February 2012. The whole report was adopted after revisions and amendments by electronic correspondence within the following week.

² Convention on Biological Diversity, target 11: <http://www.cbd.int/sp/targets>

List of participants

Filippo **BLASI**
 University of Molise
 Largo T. Solera 10
 00199 Rome, Italy
 Email: blasifilippo@gmail.com

Jonathan **CASSAR**
 MRRA
 Fort San Lucjan,
 Marsaxlokk, BBG1283, Malta
 Email: jonathan.b.cassar@gov.mt

Pierpaolo **CONSOLI**
 ISPRA
 Via dei Mille 44,
 98057 Milazzo (ME), Italy
 Email: pierpaoloconsoli@hotmail.com

Salud **DEUDERO**
 Instituto Español de Oceanografía
 Muelle de Poniente s/n 07015
 Palma de Mallorca, Spain
 Email: salud.deudero@ba.ieo.es

Silvia **GARCÍA**
 OCEANA
 Leganitos 47, 6^a floor
 28013 Madrid, Spain
 Email: sgarcia@oceana.org

Paolo **GUIDETTI**
 Laboratory of Conservation and
 Management of Marine and Coastal
 Resources, DiSTeBA (Department of
 Biological and Environmental Sciences and
 Technologies), University of Salento,
 73100 Lecce, Italy
 Email: paolo.guidetti@unile.it

Jordi **LLEONART**
 ICM/CSIC
 Passeig Marítim de la Barceloneta, 37-49.
 08003 Barcelona, Spain
 Email: lleonart@icm.csic.es

Idrissi Mohammed **MALOULI**
 INRH
 Centre Régional de Tanger
 BP 5268 Dradeb Tanger
 90000 Morocco
 Email: malouliinrh@yahoo.fr

Houssine **NIBANI**
 AGIR
 Association de Gestion
 Intégrée des Ressources
 N° 1 Rue Oujda
 Quartier Al Menzeh
 Al Hoceiame, Morocco
 Email: agirnibani@gmail.com

Marzia **PIRON**
 Shoreline Soc. Coop.
 Area Science Park
 Padriciano, 99
 34149 Trieste, Italy
 Email: marzia_piron@hotmail.it

Silvia **REVENGA**
 Secretaría General de Pesca
 Velázquez, 144,
 28006 Madrid, Spain
 Email: srevenga@marm.es

Tommaso **RUSSO**
 Tor Vergata University of Rome
 via della ricerca scientifica snc
 Rome, Italy
 Email: tommaso.russo@uniroma2.it

Oscar **SAGUÉ PLA**
Federación Española
de Actividades Subacuáticas
Santaló 15, 3º 1ª
08021 Barcelona, Spain
Email: oscarsague@gmail.com

Matteo **SINERCHIA**
IAMC-CNR
Località Sa Mardini
09072 Torregrande (OR), Italy
Email: matteo.sinerchia@iamc.cnr.it

Mauro **SINOPOLI**
ISPRA
Via S.Puglisi 9
90143 Palermo, Italy
Email: mauro.sinopoli@isprambiente.it

Moderator

Carlo **PIPITONE**
CNR-IAMC
Head of Unit
Sede di Castellammare del Golfo
via Giovanni da Verrazzano 17
91014 Castellammare del Golfo (TP), Italy
Email: carlo.pipitone@iamc.cnr.it

SCSA Coordinator

Fabio **FIorentino**
CNR-IAMC
Via L. Vaccara 61,
91026 Mazara del Vallo (TP), Italy
Ph: +39 3346555182
Email: fabio.fiorentino@iamc.cnr.it

GFCM Secretariat

Pilar **HERNANDEZ**
Information Management Officer
Palazzo Blumenstihl,
Via Vittoria Colonna, 1
00193 Rome, Italy
Ph: +39 0657054617
Fax: +39 06 57053256
Email: pilar.hernandez@fao.org

Aurora **NASTASI**
Consultant
Palazzo Blumenstihl,
Via Vittoria Colonna 1
00193 Rome, Italy
Ph: +39 06 57052054
Fax: +39 06 57053256
Email: aurora.nastasi@fao.org

Agenda

Monday, 6th February

1. Opening and arrangement of meeting

- *Introduction of participants*
- *Designation of the rapporteur(s)*
- *Adoption of the agenda*

2. Spatial based approach to fisheries management in the Mediterranean: concepts and applications, case studies

- *Spatial management of fisheries in the Mediterranean region* (by the Moderator)
- *Artisanal fisheries and Marine Protected Areas in Italy: the case study of Torre Guaceto (SE Apulia) in the Mediterranean context* (by Guidetti P.)
- *Spanish marine reserves for fisheries, 25 years of history* (by Revenga S. et al.)
- *Marine Park Planning and Recreational Fishing: Is the Science Lost at Sea? Case Studies from Australia* (by McPhee D., presented by Sagué Pla O.)
- *Aperçu sur l'expérience marocaine de la composante spatiale de l'aménagement des pêches* (by Malouli I.M. and Faraj A.)

3. Methods for the evaluation and monitoring of the impacts of fishery restricted areas and other spatial based fisheries management tools on fisheries, ecosystems and society

- *Application of the ecosystem model ATLANTIS as a fisheries management tool in the Sicily Channel* (by Sinerchia M.)

Tuesday, 7th February

Methods for the evaluation and monitoring of the impacts of fishery restricted areas and other spatial based fisheries management tools on fisheries, ecosystems and society (Cont')

- *Progress in the use of VMS data for spatial management of fishing activity* (by Russo T. et al.)
- *GIS of Maritime jurisdiction and GFCM GSAs in the Mediterranean Sea* (by Piron M. et al.)

- *Research and participatory planning in the artisan fisheries sector through the systemic and prospective analysis for sustainability in the National Park of Al Hoceima* (by Nibani H.)
- 4. The role of spatial based tools and approaches in fisheries management planning: experience gained from real-life applications especially in the GFCM area**
 - *Effects of protection in fishery restricted areas: compendium of some Spanish MPA projects* (by Deudero S. and Goñi R.)
 - *Fisheries management/conservation and step-relief areas in the Mediterranean open seas, including deep seas* (by De Juan S. and Leonart J.)
 - *The Ecosystem services provided by the Italian Marine Protected Areas: benefits for fishing* (by Blasi F.)
 - 5. Criteria and requirements to implement spatial based fisheries management by designating fishery restricted areas**

Wednesday, 8th February

- 6. General conclusions and recommendations based on the workshop output**
- 7. Any other matters**
- 8. Adoption of the Report**