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GENERAL FISHERIES COMMISSION FOR THE MEDITERRANEAN

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**NARRATIVE REPORT OF THE THE FIRST YEAR OF ACTIVITIES OF
SHoCMed**

INTRODUCTION

This paper represents the narrative of the activities of the Project on “Developing siting and carrying capacity guidelines for the Mediterranean aquaculture within aquaculture appropriate areas” (SHoCMed). The project attempts to support the Committee on Aquaculture (CAQ) of the General Fisheries Commission for the Mediterranean (GFCM) in its efforts to address some of the priority issues identified, as endorsed by the GFCM at its 31st session (January 2007). During the 32nd session of the GFCM (Rome, February 2008) the project work plan presented by the CAQ was approved by the Commission.

The SHoCMed Project is funded with the contribution of the European Union (EU) DG Mare, it started on 22nd October 2008 and has a duration of 40 months. The funds are annually provided on the basis of the achievements and workplan that are yearly based. A strategic revision could be performed every year on the basis of the priority gaps identified.

The narrative report includes: summary and context of the Action; the activities carried out during the reporting period; difficulties encountered and measures taken to overcome problems; changes introduced in implementation; achievement/results. The report also includes a work plan for the second year of the project, with outputs and a description of related activities.

SUMMARY AND CONTEXT OF THE ACTION

The SHoCMed Project on “*Developing siting and carrying capacity for the Mediterranean aquaculture within aquaculture appropriate areas*” was designed and developed within the Working Group on Siting and Carrying Capacity (WGSC). The project proposes to explore the potential for using Allocated Zones for Aquaculture as a means for improving sustainable growth of the sector. It aims at exploring the

consequences of site selection and holding capacity under increasing production scenarios, and identifying bottlenecks for production related to site selection and carrying capacity.

Project objective

The SHoCMed Project aims at defining criteria for enhancing the integration of aquaculture in coastal areas by improving site selection and holding capacity benchmarks and reference points. This will also provide a base for harmonisation of standards and appropriate aquaculture policy and legal frameworks for aquaculture sustainable development across the Mediterranean region, ensuring equal terms of competition and minimal environmental impact. The project also aims at designing a strategy for a consensus on site selection criteria in the region, also at establishing standards, agreed and harmonised methodology adapted to the GFCM region at different levels.

Strategy and methodology applied during the first year of activities

The first year activities were concentrated on defining criteria and identifying priorities to improve the knowledge and reviewing extensively the scientific knowledge available on site selection and carrying capacity of aquaculture, for the development of sustainable marine aquaculture within the Mediterranean context and within an ecosystem perspective along coastal areas. Particular attention was paid on the analysis and better understanding of the existing legal framework on site selection procedures in Mediterranean countries.

This methodology implied the involvement of the other CAQ subsidiary bodies: WGSA (Working Group on Sustainability on Aquaculture) and SIPAM¹, and different Mediterranean experts in the site selection and carrying capacity in marine aquaculture. Particular cooperation was established by the WGSA and IUCN on these issues. SHoCMed took also advantage of the most recent technical outputs and guidelines, such as the ones published by IUCN², in particular the guidelines on “The interaction of the aquaculture with the environment” and on “Site selection and site management” that IUCN carried out in collaboration with FEAP and with support from the Spanish Ministry of Agriculture, Fisheries and Food. SHoCMed also considered some relevant and recent projects and initiatives covering a larger area than the GFCM region, or not specifically focused on the Mediterranean area.

Particular links have been established with the other CAQ subsidiary bodies: such as the Working Group on Sustainability on Aquaculture (WGSA) and the InDAM³ project for the identification of indicators on aquaculture for the environmental dimension, and with SIPAM. for the component related to Data Banks

The methodology also permitted to identify knowledge gaps and priorities issues to be addressed for the 2nd year of SHoCMed, towards the definition of a methodology for exploring the possibility to use the Allocated Zones for Aquaculture as a means for improving sustainable marine aquaculture in the Mediterranean.

For the above most Fisheries Directorates of the Mediterranean countries were involved for the data collection, relation has been established with research scientists involved in site selection and carrying capacity in marine aquaculture, namely from the Centro Tecnológico del Mar Fundación CETEMAR (Vigo - Spain), Haifa University (Israel) Marine Ecology Laboratory (University of Crete –Greece); Department of Ichthyology and Aquatic Environment (University of Thessaly, Greece), University of Izmir (Turkey), University of Alicante (Spain).

¹ SIPAM . Information System for the Promotion on Aquaculture on Mediterranean www.faosipam.org

² *Interaction between Aquaculture and the Environment* (2007). IUCN, Gland, Switzerland and Malaga, Spain. 107 pages; and *Aquaculture Site Selection and Site Management* (2009) IUCN, Gland, Switzerland and Malaga, Spain. 303 pages

³ InDAM “ *Indicators for Sustainable Development of Aquaculture and Guidelines for their use in the Mediterranean (InDAM) GFCM/CAQ*” is a project in support to the activities of the GFCM Committee on Aquaculture (CAQ) which is co-funded by European Union DG-MARE.

A wide participation to the WGSC-SHoCMed meetings also permitted the involvement of different stakeholders in sharing the results of the project and in the identification of priorities (the list of participants to the different meetings is attached in Appendix).

ACTIVITIES CARRIED OUT DURING THE REPORTING PERIOD

The activities carried out during the first year of SHoCMed (22 October 2008 – 5 November 2009) followed the work programme that integrates the following outputs of the whole SHoCMed project as outlined below.

OUTPUT 1- *Preliminary study to design the best strategy for a consensus on site selection and establishment of Mediterranean standards for carrying/holding capacity of aquaculture farms*

Activity 1.1. Identify issues that need to be addressed (e.g. sensitive habitats, use of the coastal zone, environmental peculiarities of Mediterranean marine ecosystems, etc) and organize first planning meeting and working group.

The priorities as well as the main issues to be addressed for the WGSC-SHoCMed were discussed during a preliminary meeting held at the University of Biology of Crete (Greece) from 21st to 23rd October 2008. The Working group focused its discussions on the parameters for monitoring aquaculture activities, on salient aquaculture impact on the environment and on gaps concerning the legal framework for site selection. The work plan for the implementation of *SHoCMed* for the period 2008-2009 as well as the main lines for the activities to be implemented in 2010 were discussed. The following were considered as priorities: environmental regulation in support to sustainable aquaculture; developing aquaculture zoning and participatory and integrated approach; monitoring environment and environmental parameters to be addressed; monitoring programmes and sensitive habitats such as: posidonia beds (*Posidonia oceanica*) and maerl habitats; interaction between aquaculture and capture fisheries, and FAD (fish attracting-devices) effect. In addition, the Working group formulated specific recommendations for the CAQ to consider: implementation of a programme for monitoring the environment in relation to marine finfish aquaculture; introduction of a procedure for EIA; and proposal for the limitation of new aquaculture installations in sensitive habitats.

The meeting permitted the identification of priorities of SHoCMed as well as the main issues to be addressed during the SHoCMed first year of activities According to its workplan. The main outcomes as well as the conclusions of the workshop were also presented to the seventh session of the CAQ held in Tirana, Albania (17-19 December 2008).

Activity 1.2. Compile a review on relevant sources of information and scientific evidence for thresholds related to major environmental changes (this also includes the preparation of the structure to develop a data base of scientific information on aquaculture/environment interactions in Mediterranean marine ecosystems).

A review was made on the ecological thresholds related to the changes in an ecosystem quality, taking into consideration spatial and temporal scales. Thresholds were considered also as legal framework, with the point beyond which pollution load becomes unacceptable and example of typology of the scales indicated. The main subject covered by the scientific literature concerned mostly aquaculture and interaction with the environment, fish farming, shellfish farming and their relationship with the benthos, nutrients and plankton, wild fish' disease parasite and alien species. The major environmental changes were referred to: oxygen; sedimentation and allowable zone of effects; effects on benthic fauna; nutrients and chlorophyll content; seagrass meadows.

Structure was designed for the SHoCMed data-bank on the basis of the main criteria identified, and is to be included in the SIPAM Information System. By selecting one or more key words it would be possible to retrieve the list of documents (article, publications, etc...) which match with the criteria previously selected. For each document retrieved, additional information, apart from the title, authors, type of document and publication info, will be easily made accessible to the user: abstract, species, structure, country, Mediterranean Geographical-Sub-areas-GSA (with the related map) and environment.

Activity 1.3. Compile a review on major gaps in regulation, reporting and communication of monitoring program.

On the basis of available information, a first review on Mediterranean laws and regulations related to aquaculture was made. This permitted the identification of the main legal issues and enabled the preparation of a questionnaire on existing procedures and rules for site selection used across Mediterranean countries. The questionnaire included information on the kind of tools applied for aquaculture planning; the criteria and licenses and procedures for aquaculture planning; environmental protection and site selection.

Activity 1.4. Refine SHoCMed strategy in terms of data gathering and analysis process as well as in overall procedures. Prepare and organize the multi-stakeholder workshop.

Relationships with fisheries directorates and research institutions from Mediterranean countries were established for receiving a preliminary questionnaire feed-back from stakeholders for the involvement in the further planning of the SHoCMed activities based on the questionnaire results and on the data collected. As follow up a *Workshop on National legislation on Siting, Monitoring program and on Environmental Impact Assessment for finfish marine aquaculture was held on 13-14 July 2009* in Vigo, Spain. The workshop had the function of a first synthesis and planning meeting in which the experts and participants discussed and planned the priorities to present to the first year multistakeholder meeting. On the basis of the feedback received on the data collected, the structure of the questionnaire was partially redesigned, especially as far as the terms used were concerned. The case studies presented were essential to design the SHoCMed strategy and during the meeting in Spain the structure of the multi-stakeholder workshop was also decided in terms of participation and contributions to be presented. In the same occasion relations were established with the Moroccan institution for the organization of the meeting.

OUTPUT 2 – Production of criteria and related guidelines (including standards) for aquaculture site selection in the GCFM region

Activity 2.1. Compile a review on existing procedures for site selection used across the Mediterranean and evaluation of the regulatory schemes and EIA procedures

As follow up of Activity 1.3 and Activity 1.4, the reviews focused on the analysis of the results of the survey performed through the questionnaires sent to the experts of the Mediterranean countries on the national legal and administrative aspects related to monitoring of aquaculture activities and to site selection. Fourteen questionnaires were filled up by experts from: Morocco, Tunisia, Egypt, Israel, Greece, Cyprus, Italy, Albania, Slovenia, Montenegro, Croatia, Cyprus, Turkey and Lebanon.

The main gaps for site selection and site management identified were related to the lack of a specific legal framework for aquaculture activities; in particular the example of the cumbersome situation of administrative regulations and procedures. Some recommendations were suggested: the implementation of specific regulations for aquaculture and the simplification of licensing procedures including, for instance, the creation of a “window or one-stop shop” in which the different administrations are involved for granting licensing procedures; the definition of common concepts or standards in aquaculture; indicators and tools helping policy makers for policy design and implementation of aquaculture policies. License procedures and the lack of an integrated legal framework represent a further limit of the development of aquaculture in the Mediterranean region. The simplification of the legislative

environment and procedures should be promoted; the planning of aquaculture activities within coastal zone management also needs to be developed within a legislative framework in order to facilitate the integration of aquaculture with the other coastal activities.

Activity 2.2. Compile reviews on the following general issues: a) aquaculture – environment interactions and exclusion criteria for site selection, taking into account recent research findings (including biodiversity, escapes, effects on wildlife, etc b) safety (staff, stocks, third parties) and risk analysis c) infrastructural needs (harbors, transport, etc), interactions with other uses of the coastal zone (including sensitive habitats and fisheries).

On the basis of available information, reviews were made on the different issues above listed by different experts involved in the SHoCMed project. Reviews were made on the main environmental challenges of aquaculture related to site selection and carrying capacity, on the environmental aspects to be considered for site selection in coastal areas, on the interaction of aquaculture with other uses of the coastal zone, including sensitive habitats and marine protected areas.

WGSC experts considered the relationship between the coastal aquaculture and marine ecosystems, as well as the definition of exclusion criteria were considered. The different types of aquaculture production with use of space were correlated, including the linking of the pelagic and benthic compartments. Different exclusion criteria as water quality, affection of protected species were analyzed. Organic matter and nutrients included in the feed pellets and in the fish fecal pellets affects the mass balance, increasing oxygen consumption by heterotrophic processes and availability of N and P. This may influence pelagic systems that could be therefore affecting at a wider scale (even for kilometers). The difficulty to detect some of the potential environmental factors as the increase of dissolved or particulates organic matter as well as the increase of chlorophyll-a in high depth and turbulent waters. Benthos communities are heavily affected, especially the most sensitive habitats like seagrass meadows, with an impact that can expand over ten or hundreds kilometers. Other ecological values, such as the presence of sea birds and marine mammals, can be also affected. Coastal aquaculture also interacts with fisheries and wild fish communities because it influences the spatial and temporal distribution of fish assemblages.

With reference to the interaction of aquaculture and the other uses of the coastal areas, experts brought the attention on the heavy use of space, for leisure to extractive economical activities, which affects the ecosystems. As the presence of aquaculture activities in coastal areas in recent years produced conflicts with the other users of the resources, planning is a hot point to avoid conflicts. The use of space, water quality, affection of landscape, use of port facilities and the positive and negative interactions with fisheries are some of the key aspects for site selection and spatial planning for avoiding conflicts among users. Different uses of marine resources as shipping, tourism and leisure, fisheries and agriculture were considered. Aquaculture activities are also affected by other uses, as for example the effects of sewages or oil spill on water quality.

The importance to assess the interaction of intensive marine aquaculture with the surrounding environment and in particular with specific sensible marine habitats and species such as posidonia beds (*Posidonia oceanica*) and maerl beds (*Rhodophyta spp*) is stressed. The important role of posidonia seagrass as protected habitats in the Mediterranean ecosystem as well as an essential habitat for juvenile stages of marine species and for fisheries resources should be recalled.

OUTPUT 3 – Elaboration of carrying capacity standards for aquaculture with the view of harmonization within the GFCM region

Activity 3.1. Review (environmental, social, economic) bottlenecks for aquaculture production in the Mediterranean with reference to site selection

The reviews report the most important environmental bottlenecks for further development of aquaculture for the next decades that are categorized into three main clusters: resource cluster (availability of resources such as space, feed and energy); attitudinal cluster (public and consumer attitudes, legislation, etc) and innovation cluster (new technologies and market developments). For instance Mediterranean mariculture is an exporting industry and therefore consumers tend to be more interested in product quality rather than in the impacts of the production system, as with salmon. In many countries specific and well defined environmental quality standards related to aquaculture are missing. This deficit occasionally affects the environment, but more often affects aquaculture, since it leaves the industry vulnerable to sudden political decisions (e.g. orders to move offshore at very short notice), not because environmental standards were exceeded, but simply because other users of the coastal zone are more politically powerful than fish farmers.

Reviews also examine the actual and potential economic bottlenecks facing the Mediterranean mariculture sector. Particular emphasis was placed on finfish cage aquaculture as it is the dominant form of mariculture in the region. The four types of bottlenecks discussed were related to: site selection and licensing; market issues; spillovers with social or environmental effects and impacts on wild fish stocks. The full range of welfare impacts were considered: those that can be measured through market activity and those that are derived from outside the market; those that involve direct use such as the production and consumption of fish and those that involve its indirect use. Many of these effects have yet to be quantified and therefore the discussion is concentrated on identifying important issues that should guide future research and action. In some cases, especially in the case of governance and market development, concrete action has been ongoing and directions are relatively clear. In other cases, such as the management of interactions between aquaculture and wild fish stocks, direction is less clear and would certainly benefit from increased discussion and research.

For the economic bottleneck reference should also be made with the CAQ GFCM Project MedAquaMarket “Regional Synthesis of the Mediterranean Marine Aquaculture Sector and Development of a Strategy for Marketing and Promotion of Mediterranean Aquaculture”.. Project funded by Spain and in support of the activities of the WG on Marketing on Aquaculture products (WGMA)

Activity 3.2. Identify environmental attributes affected by and affecting aquaculture with particular reference to Mediterranean marine ecosystems (e.g. as a function of depth, distance from shore, current regime, etc)

Aquaculture has been accused of polluting the coastal zone because it produces a certain amount of wastes and it will probably continue to do so regardless of any progress in feed technology, genetic improvement of the stocks, or farming practices. However, the release of wastes (and particularly of C, N, P compounds) does not necessarily cause pollution: pollution needs to be defined in relation to agreed environmental standards and limits, beyond which action should be taken. Although some fish farmers may think that postponing the adoption of such standards may reduce pressures on the industry, it is probably to their benefit to have such an agreement with society would probably benefit them.

Marine aquaculture requires a clean and unpolluted environment because it produces food for a concerned and critical market, where food safety issues has been on the political agenda for a decade, particularly in industrialized countries. In this context, mariculture production is completely incompatible with industrial pollution and with pollution that originates from mariculture activities.

Some studies reported an increase of fish aggregation and subsequent fishing activities around some fish farms.. In general there is an aggregation of wild fish from various species under the fish cages during feed supply. Biomass and species richness of aggregating fish assemblage are negatively correlated to the distance from shore and positively with the farm size. The interaction of farmed and wild fish has also been addressed by several studies.

The definition of EQS for carrying and holding capacity for aquaculture purposes still meets difficulties for having common values for the benthic effects, due to the interaction of many physical variables (current, depth zones, and sediment). The definition of EQS and reference points for carrying and holding capacity for aquaculture will be part of SHoCMed second phase.

All the main results and achievements of the reviews and data analysis were presented and discussed during the Multistakeholder Workshop on Siting and Carrying Capacity (SHoCMed) held from 29 to 30 October 2009 and hosted by the Centre Regional de l'Institut National de Recherche Halieutique (INRH) Malabata – Tangier (Morocco). Detailed conclusions and recommendation are reported at page 11 of this report.

MAIN OUTCOMES

Within the reference to the abovementioned Outputs and Activities carried out during the first year of SHoCMed, a series of meetings reviews and case studies presentations were prepared on the available information relevant for SHoCMed purposes. A compendium of seven reports and reviews was prepared by experts (annexed to this narrative report) and will be edited for finalisation and printing during the SHoCMed second year of activities.

The following reports and reviews were prepared:

- Aquaculture and the environment in the Mediterranean, tools and key issues, by Ioannis Karakassis and Angel Dror
- Thresholds related to major environmental changes, by Ioannis Karakassis
- Interaction of aquaculture with other uses of the coastal zone related to the sensitive habitats and marine protected areas, by Ioannis Karakassis
- Review of interaction of aquaculture and other uses of the coastal zone, by Dror Angel and Shirra Freeman
- Aquaculture – environment interactions and exclusion criteria for site selection taking into account recent research findings (including biodiversity, escapes, effects on wildlife etc., by Pablo Sanchez Jerez
- Environmental bottlenecks for aquaculture production in the Mediterranean with reference to siting, by Ioannis Karakassis
- Economic bottlenecks, by Dror Angel
- Review on: aquaculture – environment interactions, scientific evidence and exclusion criteria for site selection; recent research findings; interactions with other uses of the coastal zone (including sensitive habitats and fisheries), by Ioannis Karakassis
- Review on existing procedures for site selection used across the Mediterranean and evaluation of the affectivity of regulatory schemes and EIA procedures, by Rosa Chapela and Marta Ballesteros
- Collection and analysis of questionnaires filled by 14 different Mediterranean experts for their respective countries (Spain, Morocco, Tunisia, Egypt, Lebanon, Cyprus, Albania, Croatia, Slovenia, Greece, France, Italy, Montenegro and Turkey) on the legal and administrative national aspects of aquaculture monitoring activities and the main environmental aspects of aquaculture site selection.
- A search tool was designed to provide a web application with structured documents and metadata from articles and publications on the interaction with aquaculture and environment. A web portal on the SHoCMed project was posted on the SIPAM portal.

Within the context of CAQ – WGSC and in support to the activities of SHoCMed, a series of meetings and events were organised:

- a) The meeting of the *Working Group on Siting and Carrying Capacity (WGSC) of the GFCM-CAQ* was held at the University of Biology of Crete (Greece) from 21st to 23rd October 2008. The main outcomes as well as the conclusions of the workshop were also presented to the seventh session of the CAQ held in Tirana, Albania (17-19 December 2008).
- b) The *Workshop on National legislation on Siting, Monitoring program and on Environmental Impact Assessment for finfish marine aquaculture (SHoCMed)* organised in support of the Working Group on Siting and Carrying Capacity (WGSC) on the 13-14 July 2009 in Vigo (Spain). The workshop was organized with the cooperation of the Centro Tecnológico del Mar-Fundación CETMAR of Vigo (Spain).
- c) The *Multistakeholder Workshop on Siting and Carrying Capacity (SHoCMed)* was held from 29 to 30 October 2009 and was hosted by the Centre Regional de l'Institut National de Recherche Halieutique (INRH) Malabata – Tangier (Morocco).

ACHIEVEMENTS/RESULTS OF THE FIRST YEAR OF SHoCMed

The reviews made by the experts and the work carried out by the WGSC within the SHoCMed project firstly permitted to make a synthesis of the available scientific knowledge on the main issues related to site selection and carrying capacity within Mediterranean countries. Secondly the meetings carried out permitted the establishment of a network of experts and stakeholders from different Mediterranean countries, to share and discuss on the main aspects related to the site selection and to environmental impact and monitoring in the framework of integrated coastal management. Thirdly the review made on *Existing procedures for site selection used across the Mediterranean and evaluation of the affectivity of regulation schemes* permitted to make a regional analysis and to identify gaps on the current state of the licensing procedures applied in the GFCM region.

The priorities issues of the CAQ-WGSC identified through the activities and the achievements of SHoCMed were presented and discussed during the 34th Session of the GFCM. The importance of an harmonised environmental monitoring system towards the sustainable development of aquaculture within the GFCM region was recalled during such session. .

The main conclusions of the meetings are summarised hereafter:

1. MEETING OF THE WORKING GROUP ON SITING AND CARRYING CAPACITY

- The Working Group confirmed the need for proper site selection protocols for marine finfish aquaculture in the Mediterranean region and insisted that these should be considered as a priority. This should be implemented following the coordination of the numerous initiatives present at Mediterranean level, taking advantage of the scientific achievements in the different dimensions of the aquaculture sector (governance, economic, social, and environmental) and in an interdisciplinary manner.
- The development of aquaculture in the coastal zone should be considered within the framework of Integrated Coastal Zone Management and in an ecosystem perspective using as much as possible the development of aquaculture zoning and participatory and integrated approaches.
- Monitoring marine finfish aquaculture is essential to evaluate the effects and impacts of aquaculture on the environment and on aquaculture itself. A minimum list of variables to be monitored, that may have an impact on the water column and on the sediments, should include: sediment sampling, redox potential, organic and inorganic nutrients, sediment organic matter, total phosphorus in sediment, sediment grain size, benthic community, water quality.

- The monitoring of capture fisheries activities (i.e. fisheries landing and surveys of fisheries resources) in the aquaculture areas could contribute to their better identification, evaluation and assessment, for a positive interaction between aquaculture activities and local fishing communities.
- For the Working Group purposes, it is necessary to take more advantage of the outputs and achievement of different experiences, pilot projects, studies and research programs carried out in the Mediterranean area concerning site selection, with particular attention to aspects concerning marine aquaculture in relation to the environment and to carrying capacity;

2. THE WORKSHOP ON NATIONAL LEGISLATION ON SITING, MONITORING PROGRAM AND ON ENVIRONMENTAL IMPACT ASSESSMENT FOR FINFISH MARINE AQUACULTURE (SHoCMed) was held 13-14 July 2009 in Vigo (Spain) and organized with the cooperation of the Centro Tecnológico del Mar-Fundación CETMAR of Vigo (Spain).

The workshop had the function of a planning meeting, in which priorities were identified. The discussion focused on the current situation of the aquaculture licensing procedures currently applied in different Mediterranean countries. Particular attention was also given to environmental aspects, to site selection criteria and related regulations, to local aquaculture planning and to environmental monitoring plans. Presentations were given by experts (scientists, farmers and staff from national fisheries directorates) from Albania, Croatia, Greece, Italy, Morocco, Spain and Turkey.

The experts from CETMAR presented the preliminary results of the SHoCMed questionnaire on legal and administrative national frameworks sent to Mediterranean experts. The presentation was followed by discussion on some national case studies on aquaculture zoning and space allocation of aquaculture activities on the coastal zone, including aspects related to the interaction with the other users of the coastal zone. Some discrepancies were noted on the terms used, that are not the common to all countries. As follow up, a revised and implementation strategy for SHoCMed was discussed and a new questionnaire should be sent to the countries experts in order have more homogeneous answers.

SHoCMed planning activities were discussed at the end of the meeting, for a fine tuning of the activities planned. The questionnaire for the legal aspect and procedures were updated and finalised.

The main topics highlighted during the discussion, as well as the main aspects related to the workshop (planning, monitoring and legal aspects) to be taken into consideration within the SHoCMed Project and the WGSC program, are hereunder summarised:

- The case studies of Galicia and Andalusia Region (Spain), Sicily and Veneto Regions (Italy), Bodrum (Turkey), Mali Stone and Velebiti Channel Areas (Croatia), as well as the general presentation given for Greece, Turkey and Albania, provided a heterogeneous picture of the experience on aquaculture zoning and planning approach in the Mediterranean region.
- All the presentations highlighted the evident need to integrate aquaculture activities in the coastal zone. The experience on allocation zone for aquaculture areas is still limited and, as stated in all the cases presented, there is still no consideration of this issue at national level.
- Participants agreed that a correct sectorial planning should be based on a sound level of knowledge of the sector, level of development, growth potential and market capacity. It is necessary to strike a balance between aquaculture's operation and all other activities operating in the public domain in order to achieve an organised development of the sector. The sector's growth potential in each geographic area should also be considered as an essential point for site selection. Planning activities can be on a regulatory base and/or on a consultative and participatory base, and/or a combination of both, within the context of a coastal zone management and in an ecosystem perspective.
- There was a wide consensus that space is a limiting factor for further development of Mediterranean aquaculture in many areas, and that a good sectorial planning should be based on: availability of human and financial resources; knowledge of the sector and its potential; knowledge of potential sites; availability of strategic development plans; presence of appropriate administrative systems and

useful regulations. GIS applications were considered one of the main tools in supporting the sectorial planning to perform an appropriate time and space analysis.

- The economic, social, spatial and environmental analysis and the participatory and integrated approaches remain the main aspects to be considered when aquaculture zoning is planned.

The preliminary analysis, made from the discussion and on the basis of the 10 questionnaires from different Mediterranean countries analysed by CETMAR, showed the heterogeneity of the existing procedure and regulatory schemes for site selection assessment: norms, rules and regulations on legal aspects on aquaculture and on the concepts and terms used. This heterogeneity could be considered on the basis of a difficulty in view of a harmonisation of aquaculture legal aspects within the GFCM region and to be deeply investigated by SHoCMed during the next steps.

3. THE MULTISTAKEHOLDER WORKSHOP ON SITING AND CARRYING CAPACITY (SHOCMED) HELD ON 29- 30 OCTOBER 2009 AND HOSTED BY INRH MALABATA – TANGIER (MOROCCO).

The meeting discussed and presented the main achievements of the WGSC and related on the SHoCMed first year activities. The conclusion and recommendations of the meeting including the summary of the workplan proposal for the SHoCMed second year of activities are also reported hereunder.

Conclusions and recommendations

Space availability, space allocation (a), and license procedures for farms allocation (b) still remain the main constrains and issues to be addressed for any further development of Mediterranean sustainable aquaculture.

(a) Space allocation and monitoring

- Site selection should be considered for the sustainable marine and coastal aquaculture development, by analyzing the environmental conditions, the economic feasibility and the social acceptability.
- The multi disciplinary and multistakeholder approach is essential for a better integration of marine aquaculture into coastal zone management and toward an ecosystem approach for aquaculture management. If this approach is used for aquaculture, it could also be considered as a model of sustainability along coastal areas;
- Aquaculture procedures of Environmental Impact Assessment should be mandatory for site selection in the Mediterranean region. However the EIA is not sufficient and should be supported by a risk analysis as well as a monitoring program of the environment and of the activities surrounding the environment;
- Aquaculture growth potentiality and monitoring should be accompanied by the use of tools such as Geographic Information System (GIS) applications; this will allow zoning and planning approach for decision makers and other interested parties. For the areas suitable for aquaculture activities, attention should be paid for planning Allocated Zone for Aquaculture. The use of GIS at the most appropriate level (local, national, regional) should also be increased as a tool to vehiculate information in a transparent way and enhance communication between decision makers and different stakeholders.. Public Administrations should also be involved in the collection of data for site selection, or in the process of making them available.
- Particular attention should be paid in monitoring marine aquaculture and capture fisheries for the evaluation of the positive interaction (environmental and socio economic) between these activities where small scale fishery and aquaculture operate in the same areas. The near-

shore areas in which traditional extensive aquaculture practices exist should be censured and valorised. This could be done by underlining the more evident case studies, highlighting their socio-economic contribution to the local communities and to the maintenance of biodiversity;

- Monitoring the physical environment surrounding aquaculture activities still remains a priority for the evaluation of the effect/interaction/impact of aquaculture on the environment and on aquaculture itself. Major attention should be paid to the monitoring of the sediments rather than of the water column. To this extent the list of variables identified by the WGSC (sediment sampling, redox potential, organic and inorganic nutrients, sediment organic matter, total phosphorus in sediment, sediment grain size, benthic community, water quality) were confirmed.
- The definition of EQS for carrying and holding capacity for aquaculture purposes still meets difficulties in having common values for the benthic effects, due to the interaction of many physical variables (current, depth zones, and sediment). The harmonization of data collection of environmental parameters at Mediterranean level will however facilitate the monitoring in order to avoid that such parameters do not exceed the reference points that will be established for aquaculture environment.
- The set up of new aquaculture farms should be avoided or limited in or around sensitive habitats; these installations should be accompanied by a restricted monitoring or by mitigation plans;

(b) License procedures and on Mediterranean legislation on siting:

The main gaps identified by the analysis of the aquaculture legislative framework in the Mediterranean region, according to the data obtained by the SHoCMed survey, can be summarized in the following conclusions and recommendations:

- the survey shows heterogeneity in the legal framework regulating to aquaculture: concepts, definition, competence, right, institutions, etc.; the absence of specific regulations can operate as constraint for aquaculture development;
- the definition of aquaculture legal frameworks does not include a comprehensive concept, which should consider not only the activity itself but should include typologies, production systems and other relevant criteria;
- cumbersome institutional settings, which call for simplification of both regulation; and administrative procedures and lack of coordination tools for solving overlapping competence of agencies involved in aquaculture planning;
- in some countries aquaculture planning is limited to technical studies or recommendations; aquaculture site selection is generally focused on administrative criteria or environmental criteria; social and economic studies are not normally included as tools for aquaculture planning; integrated coastal zone management is limited to regional or local lack of common criteria and standards (monitoring and EIA);
- lack of stakeholders participation mechanisms which ensure proactive input and accountability of the actors involved;
- the implementation of specific regulations for aquaculture is essential to promote and facilitate aquaculture development;
- the regulatory framework should also take into consideration aquaculture related laws, including land, water and environmental legislation; the legislative framework should also include all the conditions for its practice as well as guarantees of the rights and obligations of aquaculture licenses holders;

- coordination should be developed among the agencies involved in the aquaculture planning; instruments must be prepared to coordinate administrative procedures for the granting of the various authorizations; the creation of simple window or one stop shops should be promoted, to centralize license-granting procedures, thus reducing procedures and for granting authorizations;
- the improvement of the governance should be pursued by including aquaculture in strategic policy, by ensuring the stakeholders a proactive participation in the decision making process and stakeholder's accountability. The utilization of indicators should be promoted to assess the impact of aquaculture planning on the activity (production, value, employment); the main steps for the inclusion of aquaculture activities on coastal zone management should be identified;
- the building of the national capacity at institutions level for the monitoring activities, for the legal issues and GIS application regarding site selection and site monitoring should be improved through the implementation of cooperative trainings;
- the positive experience within Mediterranean countries on marine aquaculture planning and integration of the marine aquaculture into the coastal zone planning should be considered, and detailed guidelines for the development and establishment of aquaculture coastal planning procedures should be prepared;
- identification of reliable indicators related to the governance dimension of sustainable aquaculture to evaluate the impact of aquaculture planning, including indicators to evaluate results from policies and to plan in the medium and short term.

WORKPLAN FOR THE FOLLOWING PERIOD OF SHOCMED INCLUDING OUTPUTS AND RELATED ACTIVITIES

As follow up of the first year of activities of SHoCMed, the workplan of the WGSA was discussed during the *Multistakeholder Workshop on Siting and Carrying Capacity (SHoCMed)* held on 29- 30 October 2009 hosted by INRH Malabata – Tangier (Morocco) and finalized during the Coordination Meeting of the Working Group. The workplan was presented to and endorsed by the 34th Session of the GFCM (14-17 April, Athens, Greece).

For the SHoCMed second year of activities, the workplan programme is hereunder listed:

OUTPUT 1

Completion of the preliminary study to design the best strategy to achieve consensus on site selection on the establishment of Mediterranean standards for carrying/holding capacity of aquaculture farms

Activity 1.1 Organization of a workshop on AZA legislation. The main aims of the workshop can be summarised as: *a) Review and make synthesis of Mediterranean experience on Allocated Zones for Aquaculture; b) Review technical and legal procedures applied within the different coastal areas and related to the AZA; c) Consider the different formats and experiences on GIS techniques for planning aquaculture activities in coastal areas.* A common template to be sent to selected participants for presentation of the case studies will be prepared as case studies.

Activity 1.2 Preparation of a review on the experience and knowledge on Allocated Zones for Aquaculture (AZA) activities and the integration of aquaculture into coastal zone management and guidelines (legal aspects, methodologies, procedures). A technical document on the AZA in the Mediterranean will be based on the discussion/synthesis held in the AZA workshop and on

information on AZA that will be collected in other Mediterranean areas and not presented during Activity 1.1.

Activity 1.3 Finalization of a review on legal aspects related to site selection and carrying capacity collected during the SHoCMed first year of activities. Further attention will be given on gaps in reporting and communication of monitoring programmes and the legal procedures implemented for improving the governance and the participation of the different stakeholders. Information included in the report should be improved to cover some countries not yet included in the document. In addition, national experts already contacted during the first year of SHoCMed, will be again contacted for updating the information if necessary. The report will be translated into French and published as *GFCM Studies and Reviews* for a wider diffusion within the GFCM Members.

OUTPUT 2

Production of criteria and related guidelines (including standards) for aquaculture site selection in the GFCM region

Activity 2.1 Improvement of the SHoCMed database hosted in the SIPAM website, by including metadata or published information on the interaction between aquaculture and environment. Attempts will be made to enhance cooperation with national research institutions in order to improve/update data and their utilisation. This part should be carried out in close collaboration between the WGSA and SIPAM. The SHoCMed portal hosted by SIPAM will be improved by the GFCM Secretariat.

Activity 2.2 Preparation of a Glossary on Site Selection and Carrying Capacity for aquaculture activities. This glossary should include legal aspects, the different terms used by WGSC, related to the Site Selection Issues. The possibility to open one specific section related to site selection and carrying capacity issues in the FAO Glossary of Aquaculture will be also investigated. The online Glossary could be used as a repository system for new terms and definitions on site selection for aquaculture and put at disposals of the countries.

OUTPUT 3

Issues regarding carrying capacity of aquaculture sites and carrying capacity standards and identification of Environmental Quality Standards (EQS)

Activity 3.1. Strengthening of the network on Site Selection and Carrying Capacity for aquaculture activities in the Mediterranean region

During the first year of activities, the work carried out by the WGSC within the SHoCMed project also permitted the establishment of a network of experts and stakeholders from different Mediterranean countries, to share and discuss on the main aspects of site selection and environmental impact and monitoring of aquaculture activities within CZM. This communication system on site selection and carrying capacity within the WGSC will be further strengthened in support to all SHoCMed activities.

Activity 3.2 Environmental Quality Standards and EQS Delphi method

Activity 3.2.1 The definition of the EQS and to the main environmental parameters identified by the WGSC will be discussed among the experts within the Mediterranean areas. This activity will also be carried out through the Delphi method for determining the EQS values from a panel of experts in the Mediterranean areas. To optimize the work of this activity a specific IT platform will be developed and implemented within the SHoCMed portal.

Activity 3.2.2 A First round discussion on Delphi results will be done by the WGSC by the Organization of a workshop (on Identification on Environmental Quality Standards (EQS) for

Marine fish farms). The main objective of this workshop should be to discuss the results of the first round of Delphi and should be an expert's discussion on the interactive method applied and results. The workshop will be also an opportunity to present the results of the meeting on AZA.

Activity 3.2.3 A Second restricted round with selected experts on Delphi results will be done for fine tuning and follow up.

Activity 3.3 Regional review on carrying capacity of aquaculture sites and carrying capacity standards prepared on the basis of the main environmental parameters identified by the WGSC and the main physical parameters (current, depth, distance from the coastline, etc). This activity will be focused on the collection and synthesis of the existing physical parameters (current, depth, distance from the coastline, etc) and, where they exist, of EQS, within the Mediterranean countries.

Activity 3.4 Collection of review papers (to be added with tables and maps), to be edited and published The compendium including the relevant SHoCMed reports and reviews prepared during the first year of activities will be improved and finalised for a wide diffusion, including printing. Linkages with other regional projects related to aquaculture sustainability and ICZM, will also be created to follow links between sustainability of aquaculture and sustainability of Mediterranean fisheries, in particular coastal fisheries.

The integration of the project in the GFCM framework will be beneficial as GFCM will provide regular fora for discussion of the progress and follow-up, as well as access to donor for ad-hoc actions that will be determined in the course of the programme.

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Appendix I

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**WORKSHOP ON NATIONAL LEGISLATION ON
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29 - 30 OCTOBER 2009
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