



GENERAL FISHERIES COMMISSION  
FOR THE MEDITERRANEAN  
COMMISSION GÉNÉRALE DES PÊCHES  
POUR LA MÉDITERRANÉE



**Committee on Aquaculture (CAQ)**

**Eighth Session**

**Paris, France, 13-15 March 2013**

**Report of the InDAM Regional Workshop on the pilot case studies and guidelines and application of sustainable indicators in aquaculture  
Malaga, Spain, 14-16 November 2011**

**OPENING OF THE MEETING, ARRANGEMENTS FOR THE WORKSHOP  
PRESENTATION AND ADOPTION OF THE AGENDA**

1. The *Workshop on the pilot case studies and guidelines and application of sustainable indicators in aquaculture* of the Working Group on Sustainability of Aquaculture (WGSA) of the CAQ-GFCM, was held in Malaga (Spain) from 14 to 16 November 2011 and was organised with and hosted by the Agencia de Gestión Agraria y Pesquera de Andalucía (AGAPA) de la Junta de Andalucía. The meeting was attended by experts from Croatia, Italy, Montenegro, Morocco, Spain, Tunisia and Turkey and from representatives of the statistical office of the European Union (EUROSTAT) and of the Fundación Observatorio Español de Acuicultura (FOESA).

2. Mr Fabio Massa from the GFCM Secretariat after having thanked the AGAPA and welcomed the participants, opened the Workshop. He underlined the role of the WGSA within the activities of the CAQ and recalled the main objectives of the meeting and the importance of sharing the experience among the different pilot studies and projects on indicators for the development of sustainable aquaculture carried out within the Mediterranean, and for giving advice in the finalisation of the guidelines on indicators that the WGSA is preparing.

3. Mr Pablo Àvila, coordinator of the WGSA and chairman of the meeting, welcomed the participants and introduced the agenda of the workshop to be adopted. The agenda and the list of participants are attached to this report as Appendix 1 and Appendix 2 respectively.

**ACTIVITIES OF THE WORKING GROUP ON SUSTAINABLE AQUACULTURE**

4. Mr Pablo Àvila made a presentation in which a review of the main objectives of the InDAM project was recalled. The project framework, expected outputs and main activities were presented.

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A brief description of the different meetings, workshops and pilot studies was given as well as the synergies with other similar initiatives, such as the one carried out by FOESA.

5. A first brainstorming discussion was made among participants on the main aspects related to the relevance of the indicators and on how the principles and criteria for the selection of such indicators should be shared among the different experiences in the Mediterranean areas.

6. The participants agreed that experience from previous pilot studies developed in Turkey and Tunisia has to be taken into consideration in order to facilitate the implementation in other countries. Experts should develop a minimum set of indicators and reference points. Participation of all stakeholders is needed for pilot studies to be successful. Involvement of local authorities is an important issue, as well as how decision makers would use indicators.

7. Other aspects, such as the consideration of the forthcoming Conference Rio + 20 in 2012 and the possibility of presenting the indicators as a tool to support the equitable and sustainable development of aquaculture in a “Green Economy” were mentioned.

8. Participants from Montenegro, Croatia and Italy suggested that new pilot studies should be carried out in their countries.

#### **PRESENTATION OF THE PROJECT COORDINATED FROM THE SPANISH AQUACULTURE OBSERVATORY FOUNDATION (FOESA)**

9. Mrs Cristina Garcia Diez from FOESA presented the second phase of the Mediterrane-On project, the main objectives of which were to define and develop indicators for marine fish farming in sea cages in the Mediterranean area and to implement the first set of indicators which were already defined during the first phase of the project in Spain<sup>1</sup>. She presented a new definition of sustainable aquaculture for a better understanding of the use of the indicators in the long term. Marine indicators were defined focusing mainly on seabass and seabream and adopting a multidisciplinary approach by involving some 25 experts from the Mediterranean region with different backgrounds (economists, environmentalists and sociologists). During the 3-day multi-stakeholders Workshop held in Madrid in June 2011, indicators and standards were developed as well as a scoring system to assess aquaculture sustainability.

10. Finally, she informed that 27 indicators were adopted within the pillars of sustainability (Economic, Environment and Socio-Territorial) and 3 levels of users (farm/company, national and regional). She also presented the implementation of the indicators previously defined in the case of Spain at two levels: farm/company and national. Mrs Garcia also announced that the 3<sup>rd</sup> year of the project was approved, and that the main goal will be to provide guidelines to the Spanish government on the development of a national sustainable strategic aquaculture plan. The new aquaculture network for all stakeholders involved in this activity hosted at the [www.acuired.es](http://www.acuired.es) website was also presented.

11. The Chairman thanked the members of FOESA and recalled the importance of such cooperation with the WGSA since the implementation of the Mediterrane-On as mentioned during the 7<sup>th</sup> session of the CAQ held in Rome (March 2011).

12. Some comments were made by participants concerning indicators scoring system applied by FOESA. Equilibrium on the number of indicators by dimension and scale was proposed and used on the Mediterrane-On methodology. Synergies are a useful tool to fine tuning on methodology,

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<sup>1</sup> FOESA. 2010. Defining sustainability indicators for Mediterranean Aquaculture. FOESA, Madrid, Spain. 152p.

but it was suggested not to borrow further indicators from other projects. Identification of indicators for end users is needed especially for those from administration and Governments. The applicability of the indicators and the direct involvement of the decision makers is therefore a necessity.

13. The proposal of a Mediterranean Observatory of sustainability for Aquaculture was recalled. The proposal of this project was presented for the first time in the conclusions of the “Workshop on Guidelines and application of indicators for sustainable development of aquaculture (InDAM)”, held on 19-20 November 2009 in Salammbô (Tunisia)<sup>2</sup>.

14. Some comments were made on the importance of Allowable Zones for Aquaculture (AZA) within an Integrated Coastal Zone Management (ICZM) approach. The criteria related to AZA were considered more related to the Governance dimension, whilst criteria for Site Selection for Aquaculture were deemed more technical.

15. Aspects related to alien species were also mentioned, as well as the issue of the EU Regulation on introduction of native and non native species for aquaculture within the Mediterranean basin. Some participants stated that the introduction of alien species in closed farming systems would not generate problems if very strict criteria were adopted. However, the meeting agreed that precautionary approach is needed as well as the consideration of all existing Mediterranean countries regulations. Participants also stressed the necessity of having clear guidelines on the use of alien species as well as the availability of a glossary in support to the definition and terminology normally utilized for the species (alien, exotic, autochthonous, transfauned, allochthonous, etc).

#### **PILOT STUDIES ON SUSTAINABLE INDICATORS IN THE MEDITERRANEAN COUNTRIES AND FOLLOW UP**

16. The Chairman introduced the presentations of the pilot studies which were carried out during the second year of InDAM, namely the pilot studies first step in Spain (Andalucía) and Morocco (M'Diq), and pilot studies second step in Tunisia (Monastir) and Turkey (Muğla).

*Presentation of the pilot study in Turkey, second step (InDAM pilot study in Turkey, Muğla on the identification of indicators for sustainable aquaculture - 21-23 September 2011)*

17. Mr Ferit Rad presented the Turkish pilot study step II (TurPS-II) which was conducted in Muğla on 21-23 September 2011 by a team composed of Mr Rad, Ms Güzel Yücel-Gier and Mr Hayri Deniz. Following the background information on the Turkish pilot study step I (TurPS-I)<sup>3</sup> and its outcomes, Mr Rad explained that TurPS-II was implemented within the second phase of InDAM to assess the applicability of selected indicators during TurPS-I and to come up with a workable set of applicable indicators and methodology sheets. He went on introducing the methodology adapted for the TurPA-II, namely the focus-group discussions and the testing of indicators through field visits in order to reassess existing indicators, propose new ones, as well as identify reference values and apply the traffic light approach.

<sup>2</sup> See report GFCM:CAQ/CMWG/2010/7.

<sup>3</sup> See GFCM. 2011. Indicators for the sustainable development of finfish Mediterranean aquaculture: highlights from the InDAM Project. Studies and Reviews. General Fisheries Commission for the Mediterranean. No. 90 Rome, FAO.218p.

18. An initial set of 116 indicators related to the economic, environmental, social and governance dimensions were discussed and assessed during focus-group meetings using context and data-specific indicator quality attributes. Applicability of indicators was further verified through field visits. 33 indicators (7 economic, 8 environmental, 10 governance and 8 social indicators) were identified as applicable either at enterprise or national level. Mr Rad further underlined the advantages of following a participatory and bottom-up approach during the development and selection process of indicators. However, he also drew the attention on the risks associated with this, in that if a representative cross section of stakeholders (being them farmers, administrators, NGOs, academicians from a variety of disciplines) is lacking, the consultation and selection process may result in set of indicators biased towards some aspects of aquaculture and thus lacking the capacity to adequately monitor sustainability.

19. Other general assessments made during TurPS-II were also presented and including the following: (i) the general perception of stakeholders towards sustainable aquaculture is dominantly ecological/environment oriented and probably due to increasing criticisms being raised against aquaculture; and (ii) Turkish land-based coastal fish farms play an important economic role for local communities. Unlike cage farms which are generally medium to large-scale operations, this segment of marine aquaculture is composed of small-scale family-run enterprises contributing to rural development through job creation and diversification of income. Monitoring the sustainability of these farms is therefore of prime importance from a socio-economic perspective and diversity of production systems in Turkey.

20. Finally Mr Rad presented the outcomes of focus-group discussions and field visits for indicators belonging to the economic dimension. He argued that out of 31 indicators evaluated during TurPA-II, 7 indicators were identified as applicable whilst 3 were regarded to be potentially applicable due to difficulties in accessing to enterprise's financial data. He further stated that 3 new indicators were proposed and developed during focus-group consultations i.e. production value index, concentration ratio ( $CR_4$ ) and output/input price parity.

21. Ms Yücel-Gier presented the results of the analysis of indicators within the environmental dimension. The process followed the same strategy and methodology as for the other dimensions. As a result of the exercise, from the initial total number of 41 indicators, 8 were considered "acceptable", 4 were identified as "potentially acceptable" and 2 new indicators were identified: these were Trix index and *Beggiatoa* bacteri, and both have now been officially adopted in Turkey. Some comments arose from the results of the experience: some indicators need to be the result of a long period of measurement so to establish trends, such as for the benthic index and for hydrodynamics (current); Workshop participants were clearly most interested in the improper use of antibiotic and antifouling products. Furthermore it was proposed that indicators for inland seabass and seabream aquaculture should also be developed. Results from monitoring programmes should be shared with all stakeholders and coastal zone users. Samples and analysis of zones of influence surrounding aquaculture facilities should be done and included in the monitoring programme. Legislation already exists on this issue and more specific indicators should be developed. The environmental indicator could be used for Best Management Practice at the farm level.

22. Finally, results from TurPS-II related to the governance and social dimension ended up respectively with 10 acceptable indicators from the original 32 for the first dimension, and 8 were considered acceptable for the social dimension from the total 12 indicators selected during TurPS-I.

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*Presentation of the pilot study in Tunisia, second step (InDAM pilot study in Tunisia, Monastir on the identification of indicators for sustainable aquaculture - 11 June 2011)*

23. Messrs Hadj Ali Salem Mohamed, Hamza Houssam Auadh and Scander Ben Salem presented the pilot study in Tunisia. The 35<sup>th</sup> session of the GFCM (Rome, May 2011) recommended CAQ to continue the exercise on the selection of indicators for sustainable development of aquaculture in the Mediterranean areas and, amongst other tasks, suggested a second pilot study to be carried out in Tunisia and Turkey as two case studies. The Tunisian pilot study step I (TunPS-I) was implemented in 2009 and led to the selection of 52 indicators amongst the 156 which were identified during previous meetings held in Montpellier. The methodology used for the selection of indicators for sustainable development of aquaculture in the Mediterranean included the ranking of indicators by using four prioritized attributes: relevance to criteria and principle, reliability, data availability and understandability of an indicator.

24. The presenters recalled that in order to go further with the indicators selection, a second phase of the above mentioned pilot study was decided amongst the GFCM-CAQ programme of activities for 2011. The aim of such a second phase was to allow stakeholders to comment and refine the selected indicators and to finalize a set of acceptable indicators deemed to be applicable at national level. A set of indicator methodology sheets were prepared by a panel of three experts (focus group) based on the outcomes of the TunPS-I together with a protocol for the indicator assessment. Consequently, a technical consultation with the participation of different stakeholders was organized to review, evaluate and refine the indicators by using the set of methodology sheets.

25. Participants were also informed that during the TunPS-II, field visits to some fish farmers were organised by the focus group to validate the selected indicators and to agree upon reference points when available. Based on the feedback from the field, indicators were then re-evaluated especially with regard to their applicability and were finalized as a set of indicators applicable at local/national level. The latter set of indicators is composed of a total of thirteen indicators as follows: four for the economic dimension, six for the environment, two covering the social pillar and one for the governance dimension. The traffic light approach was applied when reference points were available.

*Presentation of the pilot study in Spain, first step (InDAM pilot study in Spain, Andalucía on the identification of indicators for sustainable aquaculture - 23-25 May 2011)*

26. Mr Pablo Ávila made a presentation on the results and experiences from the pilot study developed in Spain, Andalucía. The workshop was hosted by the Foundation of the Aquaculture Technology Centre (Ctaqua) in Puerto de Santa María (Cádiz, Region of Andalucía), and it was developed as a joint action together with FOESA and the project Mediterrane-ON. More than 20 participants of different experience and background attended the meeting, including experts from the administration, universities, producer's organizations, fish farms, NGOs and research institutes. An introduction to the project background and the different activities carried out during the intersessional period was given with special attention to the previous pilot studies undertaken in Turkey and Tunisia. The concept of sustainability was presented and discussed as well as a broad explanation about the dimensions of sustainability. The Principle, Criteria and Indicator (PCI) approach was explained in order to understand the methodology to be applied on the exercise. Indicators for each of the dimensions were explained and discussed among participants.

27. During the pilot study, Mr Ávila recalled that an IT platform for the application of Delphi method was developed by the GFCM Secretariat and used to evaluate and rank a list of 170

indicators (whereby to the InDAM 156 indicators, additional ones suggested by the Mediterranean project were also included), and based on the same four prioritized attributes as in TurPS-I and TunPS-I<sup>4</sup>. After participants' discussion and scoring, the following number of indicators resulted below the minimum value: 12 (Economic), 7 (Governance), 5 (Social) and 9 (Environmental) among the four dimensions. Finally results from Delphi were presented and conclusions on the applicability of indicators were proposed. He concluded stating that participants appreciated the efforts made by the GFCM and all the organizations involved in the InDAM project towards the sustainability of the aquaculture sector. Indicators were declared as a useful tool but some refining should be done, especially on reducing their number to a more manageable and realistic size, and reaching a balance among the different dimensions.

28. A discussion on the geographical dimension of indicators (regional, local, national) rise up, and it was said that distinction should be made between geographical dimension and indicators that can be applied at different level. Some comments about Delphi method were made, concerning the applicability at local level. Participants agreed that the use of Delphi is an excellent method to drive the experts' discussion, as well as a practical tool to manage and analyse experts' opinions and to show results in real time. In addition the Delphi, if planned and organized well in advance, would permit to simplify the release of the web platform to be used for this purpose, thus overcoming potential issues that could arise during the first round of the Delphi Process depending on the IT equipment at disposal of participants (e.g. check for nominated users' web browser compatibility). On the contrary participants also stressed that in some cases, such as when participants are not familiar with IT tools and with the indicators, the Delphi method cannot be used and traditional system of discussion should be employed.

*Presentation of the pilot study in Morocco, first step (InDAM pilot study in Morocco, M'Diq on the identification of indicators for sustainable aquaculture - 26-28 October 2011)*

29. Messrs Hassan Nhhala and Mohammed Maloui Idrissi from the Institut National de Recherche Halieutique (INRH) in Morocco presented the pilot study and started by highlighting some key facts of the Moroccan fisheries sector. The potential of the latter is not yet fully exploited and therefore a National Fisheries Strategy (called Halieutis Plan) was established in 2009 with the aim of strengthening the sector and making it real engine of sustainable growth for the national economy. Within this context, aquaculture is considered as a major driver of Moroccan fisheries sector. The Halieutis Plan, which is based on the three strategic axes of sustainability, performance and competitiveness, is being supported by the newly established National Agency of Aquaculture Development (ANDA), and by the INRH through its Strategic Development Plan for research. The national context is therefore favourable to boost sustainable aquaculture development, and initiatives such as InDAM are strongly supported.

30. The pilot study started with a technical meeting held at local level in M'Diq (Morocco) from 26-27 October 2011 within the InDAM project framework. The meeting was attended by some 33 participants including representatives of professional marine aquaculture farms, artisanal and coastal fisheries associations and cooperatives, regional maritime chamber, National Agency for aquaculture Development, Fisheries Department, local and central administration (Food sanitary, Public Works, Tourism, etc.) and research and scientific institutions (INRH and regional universities).

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<sup>4</sup> Relevance to criteria and principle, reliability, data availability and understandability of an indicator.

31. During the technical meeting, background presentations were delivered to inform participants about activities of CAQ, the WGSA, InDAM and others projects (e.g. the IUCN guidelines and Mediterranean-On project), as well as some results from implementing InDAM to explain the definition and the concepts of sustainability in aquaculture. The three pilot studies already undertaken in Turkey, Tunisia and Spain were also briefly presented. Then, a pre-established set of 157 indicators, divided in four dimensions (governance, environment, economy and social), were presented and explained before being discussed among participants in order to assess their relevance, suitability and applicability at local level. Five attributes were selected and the discussion over indicators was very rich. Many relevant remarks were made. Participants stated that the number of indicators was considered too high and had to be reduced to a relevant minimum set. Whilst some indicators were considered not relevant, others were deemed to be rephrased, merged or removed to another dimension. The presentation concluded that participants to the pilot study would need more information and time to fully understand these indicators and to undertake a collective diagnostic of indicators in a local InDAM working group.

32. In the discussion which followed all participants agreed on the importance of implementing pilot studies in several countries to fine-tune the list of indicators for sustainable aquaculture and identify reference points as well as to test their practical applicability. Among the main conclusions and comments on the different pilot studies, some specific aspects were identified by participants as common issues, such as: (i) the necessity of promoting sustainability as a concept and as an approach to implement on process and methodologies; (ii) the interrelation of the different experiences at local level, as well as the results from indicators analysis; (iii) a balance among dimensions is needed, also for the total number of indicators; (iv) indicators of common interest could be identified; (v) the necessity of a joint action among the different Working Groups to exchange experiences and lessons learnt by taking advantages of the different states of implementation of the project at local level.

### **GUIDELINES ON THE APPLICATION OF INDICATORS FOR SUSTAINABLE AQUACULTURE**

33. Mr Davide Fezzardi presented the draft Guidelines on the application of indicators for sustainable aquaculture in the Mediterranean. He informed the participants about the structure of the different chapters focusing on the utility of the guidelines as a reference for countries on the assessment and monitoring of sustainability of aquaculture. In aquaculture indicators are generally used for the assessment & monitoring, to develop Codes (e.g. Code of Conduct (CoC) and Code of Practice (CoP) and Better Management Practices (BMP), in aquaculture certification schemes such as for the Aquaculture Stewardship Council (ASC)<sup>5</sup>, in legislation pertaining to aquaculture and as an incentive means for farmers' compliance to rules and regulations. He also explained the applicability of the traffic light approach for monitoring and assessing aquaculture sustainability through the indicators.

34. When addressing the replicability of the process to develop indicators and based on what was already highlighted earlier during the Workshop, Mr Fezzardi stressed that the multi-stakeholder consensus-based process employed is important as a *means* and as an *end*. As a means, it is useful for reducing, merging and renaming indicators, proposing new ones and moving indicators to other dimensions, testing their practical applicability on the field and identifying reference points and standards. As an end and through a participatory approach, it is instrumental to bring together and build a channel of communication and dialogue among stakeholders (i.e. farmers, fishermen,

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<sup>5</sup> <http://www.ascworldwide.org>.

producers' organizations, institutions, research and civil society). This would result in social capital such as ownership, stewardship & commitment and would arguably allow for an improved compliance to rules and regulations.

35. Concluding the presentation, some questions were proposed to participants in order to improve the Guidelines and including the following: the dimensions of sustainability, the number of indicators and the inclusion of indicators coming from other sustainability initiatives, the nature of the indicators related to applicability, the identification of a suitable scoring system, replicability of indicators selection and new pilot studies.

36. Participants congratulated Mr Fezzardi for the work carried out and highlighted some specific aspects to be addressed in the Guidelines as follows: (i) the scale approach related to the construction of indicators and application, and definition of scale i.e. Regional, National, Local and Farm level. (ii) fine-tuning on the definition of indicators is needed; (iii) indicators have to be clear to participants and end-users; (iv) co-construction of a glossary for common understanding and revision by experts is needed; (v) a common approach and methodology for all the countries has to be clearly defined on the Guidelines, as well as scoring and reference points; (vi) the traffic light approach is considered as a very useful tool to be used and it should be well described in the Guidelines. Radar charts also describe in a simple way the evolution or the state of the values from indicators; (vii) key indicators could be identified from the results of different pilot studies; and (viii) segmentation of indicators related to different production systems or type of culture, and also ecosystem could be done.

37. Participants stressed that all the above aspects should be included in the Guidelines and that a first draft will be distributed among participants of WGSAs for suggestions, comments and revision.

## **REGIONAL INDICATORS FOR SUSTAINABLE DEVELOPMENT OF AQUACULTURE IN THE MEDITERRANEAN REGION**

38. The Chairman introduced this point of the Agenda and recalled that during the Workshop held in Malta from 25-26 November 2010<sup>6</sup>, a minimum set of regional indicators including six indicators for the governance, five for the social, four for the economic and seven for the environmental dimension, was prepared by the experts. These indicators were therefore presented to participants suggesting that the list could be revised taking also into consideration the experience gained during the 2011 pilot studies in the different countries.

39. Participants were divided into three groups to discuss the environmental, economic and governance dimensions of sustainability respectively, while it was decided to address the social dimension in plenary. Each group worked on the indicators identified during the meeting in Malta and results were presented at the end of the exercise (reported in Appendix III). This resulted in a better phrasing of principles, criteria and indicators, as well as in new indicators and reference points/standards. Regrettably, due to time constraints it was not possible to organize the discussion on the social dimension in plenary. Therefore the list of indicators in Appendix III for the social dimension is the same as the one from the meeting in Malta. Participants agreed that the list, including the pending one on the social dimension, should be further circulated among WGSAs for fine tuning and consensus.

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<sup>6</sup> See report GFCM:CAQVII/2011/Inf.16.



40. For the economic dimension, five new indicators were presented. Changes on definition and reference values were applied based on the experience obtained from the development of Methodological Sheets used in the pilot study in Turkey. This confirms the importance of such tools in order to focus the attention on the indicators, their development and application at local level.

41. In the case of the environmental dimension, five indicators were redefined from the original seven. Fine tuning on definitions and avoidance of replicates was done as well as the proposal of reference values. Two main aspects were mentioned concerning the Water Framework Directive and Site Selection criteria as main questions to be considered when defining indicators at regional level.

42. Regarding the governance dimension, five indicators were selected from the six proposed in Malta. Some adjustment was done on the definition and specifications with an overall view adapted to the regional scale.

43. Participants highlighted that despite the consensus on the identified indicators, the lack of reference points at local, national and regional scale generates difficulty on the understandability and consequent applicability of indicators. It was suggested that additional efforts and attention should be paid on addressing these issues. Some participants also stressed that at local level the process for the use of the sustainability indicators should be solicited and that the importance of the reference points should also be included during the first steps of the pilot studies when indicators are identified and discussed among the different stakeholders.

44. Furthermore the discussion focused on the different geographical scale in which the indicators are applied and that some confusion could generate when talking about the local, national and regional scale. Finally consensus was reached among participants about the terms to be applied (see Appendix IV).

## **SYNTHESIS OF THE MAIN ASPECTS RELATED TO AQUACULTURE INDICATORS OF SUSTAINABILITY AND CONCLUSIONS**

45. Many countries where aquaculture is developing and which consider aquaculture as a major driver of growth within fisheries, welcome initiatives such as InDAM which provides a solid and scientifically based knowledge towards sustainability and its monitoring through the use of indicators.

46. Participants agreed about the importance of continuing pilot studies as they provide experience that could be reflected in the InDAM final report and guidelines. Proposals for new pilot studies and follow up for the ones already in process were made. Montenegro, Croatia and Italy showed their interest in implementing new pilot studies. A common methodology should be used taking advantage from previous experiences.

47. InDAM is implemented through a highly participatory process whereby pilot studies provide the project with best practices and lessons learnt. The multi-stakeholder consensus-based process to identify indicators is important as a means and as an end. The former allows tweaking the selection of indicators whilst the latter is crucial to build social capital (ownership, stewardship & commitment) and a lasting dialogue with key stakeholders.

48. Development of Indicators for coastal land-based farms was considered important for the sustainable development of this type of aquaculture systems. Proposals for pilot studies to carry out in those land-base farms were made as for those of Lagoons Areas Management.

49. Communications strategies came out for discussion. All participants agreed upon the necessity of developing a communication strategy to increase visibility of aquaculture, especially towards decision makers and public in general. Indicators should be a tool to improve the image and integration of aquaculture in society. Participants stressed the need to involve civil society especially at local and regional level. Flyers and leaflets should continue to be used. The use of SIPAM could be improved and the list of selected indicators could be linked to the SIPAM website<sup>7</sup>. Another aspect would be the development of BMPs and/or CoP to target farmers. Dissemination of results from pilot studies was considered important especially for those countries that are beginning implementation of pilot studies.

50. Cooperation and exchange of experiences among countries and research institutions is important and should be supported to demonstrate usefulness of what was achieved throughout all the pilot studies and InDAM work. The characteristics of the aquaculture sector in different countries and particularities at local level will help on the exchange of experiences.

51. Synergies and cooperation built with similar initiatives such as Mediterranean-On have proven to be very beneficial and should be continued within the InDAM framework. Although synergies are a useful tool to fine tuning on methodology, it was suggested not to use indicators identified by other projects as the co-construction process takes place from the participation of stakeholders and local perception is important for the definition of indicators.

52. Related to cooperation with other projects and organizations, the relation with FOESA has been very successful in both senses and new projects could be developed together. The idea of a “Mediterranean Observatory of Sustainability for Aquaculture” came up and a strategy and road map could be defined. Terms of Reference should be prepared in close collaboration between FOESA and WGSa to be presented at the next CAQ Coordination Meeting in March/May 2012.

53. Cooperation within CAQ working groups and InDAM countries teams were mentioned and deeply discussed, as it was considered a key issue. Close collaboration with the working group on Site Selection and Carrying Capacity should be fostered. Outputs on indicators for environmental dimension from SHoCMed could benefit the whole project, as InDAM methodologies could facilitate working tools for both activities.

54. The definition of terms regional, national and local level as well as the consideration for boundaries and scales for different dimensions were addressed and agreed upon. Concerning indicators at regional level, they are defined as ‘a minimum common number of indicators that are applicable in each country within the GFCM region’.

55. Some comments were made on the communication channels and procedures of information within the GFCM and subsidiary bodies. Therefore an additional effort should be made to involve and share with end-users the experiences on indicators building and implementing process. Administration should also play an active role in the implementation of sustainable reference system of indicators. Some direct actions could be developed together with governmental bodies

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<sup>7</sup> <http://www.FAOSIPAM.org>

such as workshops in which different steps could be carried out. First step involves building a dialogue and a common approach with stakeholders. Second step would be the assessment of the indicators. Third step is to work with decision makers and different people involved in governance for capacity building. In the case of Tunisia, the work plan would be: 1<sup>st</sup> presentation of indicators/guidelines, 2<sup>nd</sup> adoption of applicability of indicators.

## RECOMMENDATIONS

56. The definition of sustainability needs to be refined and consensus must be reached and agreed upon.

57. Follow-up studies should be carried out in countries where pilot studies were already performed, and new pilot studies should be implemented in other countries which show an interest in doing so such as Montenegro, Croatia and Italy. Synergies among pilot studies in the different countries should be fostered. The exchange of expertise and knowledge among pilot studies in different countries was highly recommended.

58. Pilot studies should be led by a local focus group composed by a group of experts representing different disciplines and a common methodology should be used although an adaptive approach should also be taken into consideration in relation to the specificities of each of the countries. For pilot studies step I, it is advisable to use quantitative tools to perform the major selection. In pilot studies step II it would be better to use a qualitative approach to get in a deeper analysis through focus group consultations (supported by indicator methodology worksheets) and to explore all the many aspects and advantages/disadvantages. Finally field-testing and feedbacks from participants would complete the process.

59. Indicators for coastal land-based farms should be developed along those for marine aquaculture through specific pilot studies.

60. A wide representation of stakeholders (Administration, farmers, scientists and NGOs) is necessary to ensure that a comprehensive set of indicators will be achieved for all dimensions of sustainability. The involvement of civil society especially at local and regional level is encouraged.

61. The whole Panel of 155 Indicators identified by InDAM could serve as a basket in which the large amount of indicators are placed and represents the starting point for further selection processes. Other additional indicators could also be added as appropriate but they should results from an InDAM process and not taken from other projects and/or initiatives.

62. Existing Principles and Criteria should remain as being established since the beginning of InDAM, although rephrasing and adjustments are encouraged.

63. The number of indicators for each dimension should not be limited although some balance among dimensions should be achieved.

64. The process for the implementation of indicators of sustainability could be carried out according to the following steps based on InDAM experience:

- The First Step would serve for an appraisal in order to identify the priorities and attributes with the involvement of the different stakeholders.

- The Second Step would be necessary to assess the performance of the selected indicators the assessment should be done with the different actors according to the disciplines and dimensions considered.
- The Third Step would serve in particular for a deeper involvement of the Administration towards a direct application of the selected indicators.

In particular during the first and second steps, the process should follow a participatory approach; however this approach cannot be a limitation in promoting the sustainability of the sector in particular when all components are not represented. The different steps have to be followed and driven by a “Focus Group Discussion” normally composed by experts with different background (e.g. economic, environmental and social).

65. The list of identified Regional Indicators should be finalised, adopted and used to monitor aquaculture sustainability.

66. Guidelines need to be improved and finalized and experiences from the pilot studies would feed into them. Key aspects to be addressed include: (i) definition of scale and its approach related to the construction of indicators and application; (ii) fine-tuning on the definition of indicators; (iii) indicators need to be clear to participants and end-users; (iv) co-construction of a glossary with agreed terminology and common methodology for common understanding and revision by experts is needed; (v) a common approach and methodology for all the countries has to be clearly defined in the Guidelines, as well as scoring and reference points; (vi) the traffic light approach should be well described as well as the use of Radar graphs; (vii) key indicators could be identified from the results of different pilot studies; and (viii) segmentation of indicators related to different production systems or type of culture, and also ecosystem could be done.

67. Workshops to specifically identify reference points and standards for the selected indicators should be organized while continuing refining the Guidelines.

68. Close collaboration with the working group of Site Selection and Carrying Capacity should be fostered.

69. The Delphi approach should continue to be used as a practical tool for the development of indicators and reference points by driving experts’ discussion, managing and analysing their opinions and showing results in real time.

70. Terms of Reference for the establishment of a Mediterranean Observatory of Sustainability for Aquaculture should be prepared by WGSA in collaboration with FOESA and presented during the next CAQ Coordination Meeting (March/May 2012) for consideration.

71. Future InDAM activities should focus on transfer of know-how and the use of indicators among countries through pilot studies within the different steps and the finalisation of guidelines will support this as well as of the glossary. Particular attention should be paid to the identification of reference points. Efforts should be made towards administrators and farmers as end-users on the understandability of indicators and implementation.

72. An efficient and effective communication and dissemination strategy built around the results from InDAM and Pilots should be in place to increase visibility of aquaculture and reduce the public negative perception as indicators should be a tool to improve the image and the integration of aquaculture in society.

73. Strategic cooperation and synergies could be developed further with initiatives and projects linked to Integrated Coastal Zone Management (ICZM), such as AquaMed project within the 7<sup>th</sup> EU Framework Programme as well as with the United Nations Environment Programme - Priority Actions Programme/Regional Activity Centre (UNEP-PAP/RAC).

74. Regarding the introduction of alien species in the Mediterranean and Black Sea area, the precautionary approach and legislations shall be strictly followed. Guidelines on the use of alien species as well as a glossary of definition and terminology normally utilized for the species (alien, exotic, autochthonous, transfauned, allochthonous, etc.) should be developed.

## **INDAM PROGRAMME OF WORK FOR 2012 AND BEYOND**

75. The three outputs of the InDAM project were shown and a revision through the main activities implemented in 2011 for each output was performed. It was recalled that InDAM is a EU funded project and thus activities should be coherent with the expected outputs. Some comments on InDAM duration were made and it was recalled that the project will last for two more years and all actions were discussed and proposed within this time framework. Based on these considerations, the activities for 2012 and beyond were proposed and agreed upon by the participants as follows:

### **Output 1**

**A consensus on the definition of “sustainability” of aquaculture development in the Mediterranean within the framework of an ecosystem approach to aquaculture is established.**

- Implementation of new pilot studies step I (e.g. Italy, Croatia, Montenegro, Albania) according to the agreed methodology for the selection and use of indicators on marine and land-based coastal aquaculture at local level.
- Finalization of the experts’ work on the Regional Indicators for sustainable aquaculture.

### **Output 2**

**Relevant documentation on aquaculture sustainability is gathered and regularly updated and proper synergies between other projects related to sustainable development of aquaculture and the GFCM - Working Group on Aquaculture Sustainability are identified and developed.**

- Develop an efficient and effective communication and dissemination strategy built around the results from InDAM and pilot studies.
- Develop synergies with relevant projects and other regional initiatives related to the sustainable development of aquaculture and Integrated Coastal Zone Management.
- Improve and update InDAM database.

### **Output 3**

**The most suitable and workable sets of indicators and reference points guiding the sustainable development of Mediterranean aquaculture are established (as a result of regional multidisciplinary cooperation and feedback from stakeholders).**

- Finalise the Guidelines on the application of indicators for sustainable aquaculture in the Mediterranean.

- Identify reference points and standards for the selected indicators through *ad hoc* Workshops (Economic and Environment dimensions).
- Test the indicators reference system at local level: follow-up of the pilot studies with: step II Morocco and Spain, step III Turkey and Tunisia.
- Identify strategy for involvement of concerning parties in the use of indicators as appropriate.

#### **ANY OTHER MATTERS**

76. Mr Franco Zampogna, Head of Fishery Statistics Section of the European Union (EUROSTAT) took the floor to thank all for the interesting job done and the interest of learning from InDAM experiences on the building up of indicators and participatory methodology. He offered his contribution for future pilot studies and mentioned the request for having more indicators to be used in the EU website, in addition those already existing for the North Sea.

#### **NOMINATION OF THE WGSA COORDINATOR**

77. Participants proposed and agreed upon the reconfirmation of Pablo Àvila as Coordinator of the Working Group on Sustainability in Aquaculture.

**APPENDIX I****AGENDA**

1. Opening and arrangement of the meeting
2. Adoption of the Agenda
3. Activities of the Working Group on Sustainable Aquaculture
4. Presentation of the project coordinated from the Spanish Aquaculture Observatory Foundation (FOESA)
5. Pilot studies on Sustainable Indicators in the Mediterranean countries and follow up
6. Presentation and submission of the guidelines of the project
7. Selection of regional indicators to be considered for sustainable development of aquaculture in the Mediterranean region
8. WGSA on InDAM Programme of work for 2012 and beyond
9. Conclusions and Recommendations
10. Any other matters
11. Nomination of the WGSA Coordinator

## APPENDIX II

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## APPENDIX III

## LIST OF REGIONAL INDICATORS

ECONOMIC DIMENSION				
PRINCIPLE	CRITERIA	Nº	INDICATORS	Ref. Values
<b>Strengthen financial management of enterprises</b>	Level of profitability	1	Production Value Index (PVI)*	- See trend in value, ±
<b>Strengthen consumer responsive and market oriented aquaculture</b>	Use of branding or quality assurance schemes/labels	2	Use of quality certification schemes by independent bodies for target markets*	- See trend in percentage of enterprises having quality certification scheme/s
<b>Strengthen risk assessment and crisis management capabilities</b>	Level of diversification	3	Number of products*	- See trend in no. of cultured species, size categories and other differentiated or value added products, ±
<b>Strengthen risk assessment and crisis management capabilities</b>	Level of collective marketing and actions	4	Existence of collective actions (collective marketing, market promotion) by Producers Organizations**	- See trend in: - Number of promotional activities and/or -Volume of products marketed through collective marketing; ±
<b>Strengthen financial management of enterprises</b>	Level of profitability	5	Input/output Price parity*	- See trend in parity, ±

**Note:** \* = Methodology sheet prepared  
\*\* = Methodology sheet still to be prepared

ENVIRONMENTAL DIMENSION				
PRINCIPLE	CRITERIA	N°	INDICATORS	Ref. Values
<b>Minimize the global impact of aquaculture</b>	Needs of natural resource for food production (pelagic fish and plants)	1	FCR Feed Conversion Ratio (kg food/kg fish)*	Sea Bass (350-400 gr): > 2.2/2.2-1.8/< 1.8 Sea Bream (300-350 gr): >2.1/2.1-1.6/< 1.6
<b>Maintain the ecological service of ecosystems</b>	Reduction of benthic environmental impact	2	Existence of criteria for the depth (m) of cage applied to site selection. Related to density. Ratio of depth and density (Depth (m)/ Density (kg/m <sup>3</sup> ))	< 1.5 / 1.5 –2 / >2**
<b>Minimize local impact on environmental conditions and biodiversity</b>	Use of chemical products	3	Existence of a national monitoring programme to monitor antibiotics and other chemical residues	Yes/No
	Impact on benthic habitats and communities	4	Implementation of a monitoring system for the evaluation of the level of impact on benthos	Yes/No
	Biological impact on communities	5	Reporting of escapees (number of escape events)	Number of escape events

**Note:** \* = The FCR Ref. Values varies according to the farmed species

\*\* = Higher fish density results in increased organic matter sedimentation, and higher depth would increase the dispersion

<b>GOVERNANCE</b>				
<b>PRINCIPLE</b>	<b>CRITERIA</b>	<b>N°</b>	<b>INDICATORS</b>	<b>Ref. Values</b>
<b>Strengthen integration of aquaculture in local development</b>	Importance of development initiatives	1	Existence of Allocated Zones for Aquaculture (AZA) – (%) (number of farms in AZA/total number of farms *100)	0-25% Red; 25-75% Yellow; 75-100 Green
<b>Promote participatory in decision making process</b>	Level of stakeholders' participation	3	Existence of participatory mechanism in decision making processes	Yes/No
<b>Strengthen research, information systems and extension service</b>	Importance of research and training in aquaculture	4	Existence of funded research and development (R&D) programme and training on aquaculture development	Yes/No
<b>Strengthen institutional capacities</b>	Level of recognition of sustainable development	5	Existence of specific legislation governing aquaculture development in line with the principles of the CCRF	Yes/No
<b>Aquaculture monitoring and reporting mechanism</b>	Capacity of monitoring and reporting on aquaculture development	6	Existence of data collection and dissemination system	Yes/No

<b>SOCIAL DIMENSION*</b>				
<b>PRINCIPLE</b>	<b>CRITERIA</b>	<b>N°</b>	<b>INDICATORS</b>	<b>Ref. Values</b>
<b>Contribute to food security and food safety</b>	Importance of fish availability and supply. Contribution to food security.	1	Relevance of fish produced for domestic markets. Existence of strategies or national plans on the importance of aquaculture regarding food security.	(self-consumption) (kg per capita, trends)
	Employment opportunity and development in unprivileged communities.	2	Employment opportunity and development in unprivileged communities.	Potential number of workers (trends)
	Transparency of production process.	3	Existence of mechanisms for information with regard to the aquaculture production process and its compliance to regulations available and accessible to the public. Existence of legislation or mechanisms to enforce transparency.	Information has to be delivered and available to all. Labelling
<b>Strengthen the role of the Producer Organizations and NGO's to improve image of aquaculture, social awareness and responsibilities</b>	Importance of fish farmer organizations	4	Existence of strategies or initiatives for the training and functioning of producers organizations.	
<b>Strengthen corporate social responsibility</b>		5	Existence of national legislation on employees' welfare fully applied by the aquaculture sector Existence of preventing policies regarding employees' welfare.	Insurances? Access to the system of social protection?

**Note:** \* = As in the report GFCM:CAQVII/2011/Inf.16.

## APPENDIX IV

## DEFINITION AND LEVEL OF APPLICABILITY OF INDICATORS

Level	Definition of level	Level of applicability	Target users
<b>Regional</b>	Indicators applied to monitor or assess the sustainable development of aquaculture at a determined Geographical Region.	The indicators identified at regional level should be considered as appropriate for the whole Mediterranean and Black Sea areas and for the description of aquaculture sustainability at regional level. The set of indicators should be considered as a tool at disposal of GFCM countries to plan and monitor the development of sustainable aquaculture and to harmonize strategies.	RFMO / GFCM / International Organisation /
<b>National</b>	Indicators applied to monitor or assess the sustainable development of aquaculture at a determined country.	National indicators encompass an entire country and describe the state and trend of aquaculture sustainability of a given nation giving a holistic picture of the aquaculture sector and its environment.	National government
<b>Local</b>	Indicators applied to monitor or assess the sustainable development of aquaculture in a specific national area.	Indicators at local level are meant for a homogenous cluster of farms or group of aquaculture operations which for example are in close proximity to each other, for example cages in the same bay, Municipality, share resources or infrastructures, countee, autonomous region etc. These indicators are more linked to the local community in which some specific indicators could be changed according to the requirement and condition for the sustainable development of aquaculture in a specific area. This set of indicators could also be considered as a communication tool between farmers and local communities.	National government / Local Authority / Producers' Organization / Farmer
<b>Farm</b>	Indicators applied to monitor or assess the sustainable development of a single aquaculture farm.	Indicators at farm level are targeting the single aquaculture operation and their close surroundings. Farms can operate in isolation from other farms or be part of a homogenous cluster of farms (i.e. polygon). Some indicators are only applicable at farm level and can provide an operational as well as a strictly managerial tool.	National government / Local authority / Producers' Organisation / Farmer