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REGIONAL COMMISSION FOR FISHERIES

Report of the

REGIONAL TECHNICAL WORKSHOP ON SUSTAINABLE MARINE CAGE AQUACULTURE DEVELOPMENT

Muscat, Sultanate of Oman, 25–26 January 2009

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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PREPARATION OF THIS DOCUMENT

This document is the final report of the Regional Commission for Fisheries (RECOFI) Regional Technical Workshop on Sustainable Marine Cage Aquaculture Development held from 25 to 26 January 2009 in Muscat, Sultanate of Oman. The document lists a series of suggestions and recommendations made by the experts that are considered important to further encourage and support the growth of the aquaculture sector in the region. It also contains the following three review papers prepared as background material for the workshop: 1) RECOFI country reports on marine cage aquaculture; 2) Regulation of Norwegian net-cage fish farming; and 3) Review on cage aquaculture licensing procedures: a focus on Chile, Greece, Spain and the United States of America.

This report was prepared by the WGA Secretariat and endorsed by the WGA.

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Many thanks are due to the Ministry of Fisheries Wealth, Sultanate of Oman, particularly the Directorate General for Fisheries Research for the support and excellent hosting of the workshop.

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ABSTRACT

The Regional Commission for Fisheries (RECOFI) Regional Technical Workshop on Sustainable Marine Cage Aquaculture Development, held from 25 to 26 January 2009 in Muscat, Sultanate of Oman, was organized following the endorsement of the biannual work plan of the Working Group on Aquaculture (WGA) by the Commission at its fourth session (Jeddah, Kingdom of Saudi Arabia, 7–9 May 2007). The activity was endorsed in view of the growing importance and interest of this aquaculture sub-sector across the region. The workshop focus was on environmental impact assessment and monitoring, and aquaculture licensing for marine aquaculture cage systems. It also aimed at identifying constraints and shortcomings that needed to be dealt with to support the development of the cage industry and facilitate investments from the private sector. The document contains a set of suggestions and recommendations made by the experts with regard to technical and policy requirements needed to support the growth of the aquaculture sector as a whole and more specifically cage fish farming. RECOFI members have been encouraging cage aquaculture over the years, however, the current level of development varies considerably among the countries and, in general, cage aquaculture can only be considered an economic activity in its infant stages of development. The major constraints identified in the establishment of fish cages, particularly along the northwestern shores of the Gulf, have been the limited availability of suitable farming sites characterized by shallow waters, highly fluctuating salinity and temperature levels and inadequate sea currents. Other limitations included price competition from wild-caught fish, inadequate farming technologies for the region and the limited availability of endemic candidate species of commercial importance suitable for cage aquaculture. The report also contains three review documents on marine cage aquaculture in the region, regulation of Norwegian net-cage fish farming, and a review on cage aquaculture licensing procedures prepared as background discussion papers for the workshop. With specific regard to environmental impact assessment (EIA), the discussions held at the workshop clearly indicate that there is a need for the region and individual Commission members to develop an ad hoc EIA format based on the conditions of the local marine environment as this would determine the level of detail and elements needed to complete a meaningful and useful EIA study. The experts also agreed on the importance to establish regional Environmental Quality Standards (EQS) for fish farm sites in order to set the limits for maximum permissible impact on the area exploited by the cage farming industry and assist in establishing monitoring programmes. With regard to cage aquaculture licensing, the experts acknowledged that a clear licence system is required for exercising legal and administrative control over aquaculture operations as it confers different rights and obligations, and allows public control with regard to environmental protection and the economic sustainability of the farming practices. Furthermore, it was noted that the legislation involved and process in aquaculture licensing should be transparent, readily available and include information on processing time, payable fees, etc. A proposed cage aquaculture licence procedure was discussed and proposed at the workshop based on the format developed and adopted by the Sultanate of Oman. Other matters discussed at the workshop included the occurrence of hazardous algal blooms in the Gulf and its effects on fish farming and the possibility of establishing a regional fish cage farm for demonstration, research and training purposes.

CONTENTS

	Page
BACKGROUND	1
OPENING OF THE WORKSHOP	1
ADOPTION OF THE AGENDA	2
WORKSHOP PARTICIPATION	2
CAGE AQUACULTURE IN THE RECOFI AREA	2
CAGE AQUACULTURE – ENVIRONMENTAL IMPACT AND MONITORING	4
CAGE AQUACULTURE – LICENSING	6
OTHER MATTERS	8
Review on environmental impact assessment and monitoring in aquaculture	8
Algal blooms and cage aquaculture	9
Fish cage demonstration farm	9
RECOFI-WGA legal aquaculture project proposal	10
CLOSING REMARKS AND ADOPTION OF THE REPORT	10

APPENDIXES

A.	Workshop agenda	11
B.	List of participants	13
C.	Opening speech	17
D.	Summary of workshop suggestions and recommendations	19
E.	Terms of reference – Country review on marine cage farming	21
F.	RECOFI country reports on marine cage aquaculture	23
G.	Regulation of Norwegian net-cage fish farming	77
H.	Proposed environmental impact assessment format	91
I	Review on cage aquaculture licensing procedures: a focus on Chile, Greece, Spain and the United States of America	95
J.	Type of data and information required and recommended prior to submitting a licence application for a fish cage farming site	131
K.	Proposed cage aquaculture licence procedure	133
L.	Group photograph of workshop participants	135

BACKGROUND

1. During the fourth session of the Regional Commission for Fisheries (RECOFI), held from 7 to 9 May 2007 in Jeddah, Kingdom of Saudi Arabia, the Commission endorsed the organization of the "Regional technical workshop on sustainable marine cage aquaculture development" as a priority activity to be included in the biannual work plan of the Working Group on Aquaculture (WGA). The activity was endorsed in view of the growing interest of this aquaculture sub-sector across the region and the strong support of the RECOFI governments in promoting the development of aquaculture.

2. In view of the overall regional concern on the protection of the marine environment and its resources it was agreed that the workshop would initially focus on issues related to site selection, environmental impact assessment and monitoring, and licensing specific to finfish cage aquaculture. The aim of the activity is for the region to develop specific and standardized protocols and procedures related to the aforementioned issues which could be adapted to national needs and conditions, if required, and incorporated in the regulatory framework governing the development of the aquaculture sector.

3. The preparatory work for the workshop included the submission of national reviews on marine cage farming in the region prepared according to an agreed content format. The terms of reference used for the preparation of the review are outlined in Appendix E. Such reports provide an insight on the current status of the industry and the technical and policy-related constraints challenging cage mariculture. They also highlight the different developmental potential among the countries in the region. Two background documents which include a case study on the regulations governing Norwegian cage fish farming, with specific emphasis on environmental impact assessment and monitoring procedures, and a review document on cage aquaculture licensing procedures were also commissioned.

4. This report documents the outputs of the RECOFI-WGA Regional technical workshop on sustainable marine cage aquaculture development held from 25 to 26 January 2009 at the Safeer International Hotel, Muscat, Sultanate of Oman.

OPENING OF THE WORKSHOP

5. Mr Saoud Hamood Al-Habsi, Director General, Directorate General for Fisheries Research of the Ministry of Fisheries Wealth, Sultanate of Oman, officially opened the workshop and welcomed all participants. In his opening address, he recalled that the WGA was established by the Commission in recognition of the growing importance of aquaculture at both global and regional levels. He underlined that the support granted to the WGA by its member countries reflected the common understanding that for the sector to grow sustainably and competitively there is a need to strengthen communication in the region. He anticipated that such cooperation will continue in the future. Mr Al-Habsi highlighted a number of positive developments and activities that have taken place since the establishment of the Working Group such as the establishment of the Regional Aquaculture Information System (RAIS) and the launching of the project on strengthening the aquaculture legal and policy framework in the RECOFI region. He further mentioned that Oman strongly supports the development of the aquaculture industry and is in the process of expanding its research facilities and focus on capacity building. He invited all member countries to effectively coordinate their applied research activities, particularly in the identification of endemic aquaculture candidate species and farming technology development. He finally expressed his

satisfaction with the WGA for organizing the workshop, in particular to the emphasis given to environment protection and monitoring, and thanked the WGA Focal Points, the Secretariat and the Organizing Committee of the Ministry of Fisheries Wealth for their work and support. The text of the opening speech, in English and Arabic, is attached to this report (Appendix C.)

6. The WGA Chairperson, Mr Dawood Suleiman Al-Yahyai, also welcomed participants from the RECOFI members and resource experts and, on behalf of the authorities in Oman, expressed his pleasure in hosting this technical workshop. He expressed his regret that the delegation of the Islamic Republic of Iran was unable to attend the meeting, due to internal administrative issues, as was the case for the previous workshop on aquatic animal health held in Jeddah, Kingdom of Saudi Arabia, from 6 to 10 April 2008. He conveyed his good wishes for a productive workshop and looked forward to concrete results that would assist the concerned authorities in supporting the development of cage farming in the region and provide guidance for future work to be undertaken by the WGA.

7. Mr Alessandro Lovatelli, Fishery Resources Officer (Aquaculture), Aquaculture Management and Conservation Service (FIMA), Food and Agriculture Organization of the United Nations (FAO), and RECOFI-WGA Technical Secretary, welcomed the participants and gave brief background details with regard to the workshop following the outcomes and recommendations made at the third meeting of the WGA held in Jeddah, Kingdom of Saudi Arabia, from 7 to 9 May 2007.[1]

ADOPTION OF THE AGENDA

8. The WGA Chairperson introduced the provisional annotated agenda and reminded participants that the workshop, endorsed by the Commission at its last session (Jeddah, Kingdom of Saudi Arabia, 7–9 May 2007), aimed at identifying specific activities required to accomplish the objective of developing regional standard protocol formats for cage fish farming environmental impact assessment, environmental monitoring and licensing procedures. The agenda shown in Appendix A, was adopted, without changes, by the WGA.

WORKSHOP PARTICIPATION

9. The workshop was attended by experts from seven members of the Commission with a total of 31 participants including selected WGA Focal Points and Alternate Focal Points (Bahrain, Iraq, Oman, Qatar, Saudi Arabia, and the United Arab Emirates), scientists and researchers from the Ministry of Fisheries Wealth and Sultan Qaboos University, Oman, members of the private sector (Asmak Quriyat International LLC, Oman), a representative from the Fish Farming Centre in Jeddah, Saudi Arabia, and members of the Secretariat. The list of participants is provided in Appendix B to this report.

CAGE AQUACULTURE IN THE RECOFI AREA

10. The Secretariat presented an overview of the current status of marine cage aquaculture development in the region based on seven country reports submitted by the WGA Focal Points. The presentation, along with additional information shared by the experts attending the workshop, provided a clear picture on the status of cage culture in the region and the

[1] For details refer to Appendix E of the Report of the fourth session of the Regional Commission for Fisheries. Jeddah, Kingdom of Saudi Arabia, 7–9 May 2007. *FAO Fisheries Report*. No. 847. Rome, FAO. 2007. 46p. Also available at: ftp://ftp.fao.org/docrep/fao/010/a1628b/a1628b00.pdf (English and Arabic versions).

technical, physical and policy constraints currently faced by individual member countries in supporting the further development of the sector. The RECOFI country reports on marine cage aquaculture are reproduced in Appendix F.

11. The RECOFI members have, over the years, been encouraging cage aquaculture, however, the current level of development varies considerably among the countries and, in general, cage aquaculture can only be considered as an economic activity in its early stages of development. Experimental cage culture trials have been carried out by various research institutions in the region (e.g. Bahrain, Kuwait and Oman) however, in some countries, this has not attracted much attention or interest from the private sector.

12. The major constraint identified in the establishment of fish cages, particularly along the northwestern shores of the Gulf, has been the limited availability of suitable farming sites characterized by shallow waters, highly fluctuating salinity and temperature levels and inadequate sea currents. Other limitations identified by the experts included price competition from wild-caught fish, inadequate farming technologies for the region (i.e. introduction and poor adaptation of existing technologies used elsewhere), and the limited availability of endemic candidate species of commercial importance suitable for cage aquaculture (many existing operations currently farm the gilthead seabream, *Sparus aurata*, and the European seabass, *Dicentrachus labrax*, voluntarily introduced from the Mediterranean Sea).

13. The issue of seed supply of commercial finfish species was also recognized as hampering the growth of the sector with only few existing hatcheries mainly operated by the public sector (e.g. Bahrain). Applied research in the region, with regards to developing hatchery technologies for valuable local species, has been ongoing for several decades however to-date only one commercial marine species is effectively mass produced in the region for cage aquaculture and restocking programmes, i.e. the Sobaity seabream (*Sparidentex hasta*). Work on other important market species has been ongoing and includes several species of groupers (e.g. the orange-spotted grouper, *Epinephelus coioides*), the yellowfin seabream (*Acanthopagrus latus*), and the mangrove snapper (*Lutjanus argentimaculatus*). Further research, however, is required to refine such hatchery technologies in order to ensure the production of large quantities of these species.

14. From an institutional point of view the experts acknowledged that not all countries in the region had progressed with developing targeted policy frameworks, rules and regulation to adequately encourage the private sector to invest in cage culture. In fact, many countries in the region lack in-depth regulations focused on governing cage aquaculture, from licensing procedures, environmental impact assessment and monitoring requirements, to site selection procedures, although a number of government incentives are currently in place (including soft loans and subsidies). It was further recognized that in some of the RECOFI countries, where environmental impact assessment regulations exist, these are not tailored for cage aquaculture.

15. In view of the different physical characteristics of the shoreline in the region, it was accepted that the potential for developing a significant cage culture industry may differ between the countries; however, this was very much dependent on the development of suitable farming structures and identification of candidate species. Finally, in view of competing resource users for the coastal areas (e.g. tourism, nature conservation, property development, shipping, petroleum industry and defence), the experts suggested that proper site identification and aquaculture zoning may help reduce conflicts of interest among the

different and potential users of the coastal and marine environment. In order to provide an example of such, participants from Oman cited a case where a number of commercial cage farming applications have been submitted by the private sector but the licences have still to be granted due to administrative delays from other authorities with a jurisdiction on coastal resources.

16. The workshop participants recognized that the potential for cage farming development among the member countries may differ however fully agreed that there is a strong need to develop common environmental protocols (which include the introduction of exotic species) considering that the region shares the same water body.

17. With regards to site selection and identification of suitable areas for fish cage farming in the region, the workshop participants recognized that adequate information on the local natural environment (current conditions and water renewal, tidal ranges, sediment and habitat types, water column depths, seabed topography, salinity and temperature ranges, etc.) and on the occurrence of various environmental conditions such as hyper-nutrification, eutrophication, incidences of red tides, and potential impacts of cages on the seabed, is essential. It was agreed that much of this information is stored and available in reports and databases, however, the experts raised some concern that some of this information might be difficult to access particularly by the private sector. It was therefore recommended that the relevant environmental data be collected, compiled and provided in an accessible form along with information on site selection criteria and area availability for cage fish farming.

18. The experts noted that recommending and finding suitable sites for cage aquaculture in the region has been and will be a challenge for the authorities and the industry. It was agreed that although coastal zoning, through the use of appropriate spatial tools, can be a time consuming and resource demanding process it would allow for the identification and allocation of specific geographical areas to aquaculture practices and hence simplifying the process of farm site selection and subsequent environmental impact assessment requirements. It was strongly recommended that the issue of aquaculture zoning should be taken up at the national level, particularly by those countries in the region that have limited natural resources which are in high demand by competing users. The experts proposed that the WGA should consider including in its next work plan an activity to review the regional competence in the use of spatial planning tools and organize an inception workshop that would synthesize the knowledge acquired in the region and to recommend a road map on how to move forward.

CAGE AQUACULTURE – ENVIRONMENTAL IMPACT AND MONITORING

19. A presentation on the regulation of the Norwegian marine cage aquaculture industry was delivered by Ms Pia Kupka Hansen, a scientist at the Institute of Marine Research (IMR), located in the coastal city of Bergen, Norway (www.imr.no/english/). She presented the developmental events of the Norwegian cage aquaculture industry highlighting the various technical and legal issues which have been dealt with and adjusted over the years. The main elements that should be taken into account to support the sustainable development of a marine fish cage farming industry were also presented and discussed. The complete review and background paper is attached to this report as Appendix G.

20. Ms Hansen in her presentation indicated that parallel to the growth of the Norwegian fish farming industry there has been a development in legislation and regulations covering all aspects of production, as well as management plans and monitoring processes for the control

of diseases and environmental problems. With regard to the Norwegian aquaculture licence she indicated that this legal document comprises a set of rights and obligations. The applications for an aquaculture licence and a farm site have been integrated into a single application form and are issued for a given species and for a maximum allowable production biomass. The application is submitted to the Directorate of Fisheries which is the main authority responsible for processing the application and for coordinating its clearance with other competent authorities (environmental and veterinary authorities), hence streamlining the approval or rejection process.

21. The procedures and contents of an EIA and site selection criteria were raised and discussed extensively, particularly as some countries in the region require a mandatory EIA prior to establishing a cage operation. It was noted that the existing protocols have not been specifically designed for cage aquaculture projects. The experts acknowledged that the literature provides numerous EIA examples, but there is a need for the region and individual Commission members to develop an ad hoc format based on the conditions of the local marine environment as this would determine the level of detail and elements needed to complete a thorough and useful EIA study.

22. Following discussions with the consultants, the contents of an EIA format were developed and are attached hereto as Appendix H. The format presented embraces a more comprehensive set-up than what was dealt with, but includes all of the elements discussed at the workshop. This will enable the individual countries to adapt the format to the national regulations and needs by selecting those elements of relevance. It was however emphasized that the contents of the EIA must not be regarded as complete as elements can be added or omitted depending on the local circumstances. In order to adapt an EIA format, it was further agreed that an inventory of relevant habitats in the individual countries and knowledge of the natural oceanographic and topographic conditions were prerequisites for drawing-up a detailed protocol and for understanding where to perform specific investigations.

23. The socio-economic aspects of an EIA were not discussed to the same extent as the impact on the natural environment, however it was recognized that specific procedures for stakeholder participation and screening already existed. The possible impact of aquaculture development on fishing community activities was emphasized by the group.

24. The workshop participants also recognized the need to adequately train techno-bureaucrats in dealing and properly interpreting the results of an EIA study.

25. The environmental impact assessment process is incorporated in the licensing procedures and, based on the information provided by the applicant, the decision-makers identify and predict the potential impact of the fish farm on the environment. The application process is intended and designed to facilitate proper site selection and preferably to identify a site that can be exploited over a long period. Following the issuance of a licence and allocation of a site, farmers must observe the regulations, standards and monitoring plans.

26. Monitoring immediately under the seabed and in proximity of a fish farm is mandatory in Norway, however monitoring of a larger area may also be required by the authorities. Monitoring is performed in accordance with the Norwegian Standard NS9410, which provides detailed procedures on how the environmental impacts of individual fish farm sites should be monitored. Environmental Quality Standards (EQS) for fish farm sites and surrounding are have been set-up such a way that farm sites may remain in use over a long

period of time. They also aim at ensuring that the farmed fish have favourable living conditions and prevent an unacceptable impact on the surrounding area. The EQS sets a limit for maximum permissible impact and makes it possible to distinguish between various impact levels. Apart from the monitoring of the seabed, the authorities may also require monitoring to be carried out before a farm is effectively established, during its operation and after the site has been abandoned.

27. The participants also indicated the need to obtain detailed information on how to monitor cage fish farms with regard to both their benthic and pelagic impacts. It was suggested that monitoring programmes from other cage culture farming countries be used however these need to be adapted to local conditions. A monitoring programme consists of a number of parameters to be measured, but also specifies how, where and how often samples should be taken and analysed. Furthermore, the importance of monitoring results against threshold impact limits (EQS) was emphasized.

28. Monitoring should be performed by trained personnel who should preferably possess some form of certification, and the authorities responsible for evaluating the monitoring, must themselves be given adequate training. An example of a monitoring programme for net cage fish farming is referred to in the Norwegian report attached as Appendix G.

29. In order to develop and establish a standard and specific fish cage culture monitoring protocol in the region it was recommended that one or more marine biology postgraduates from the RECOFI countries be responsible for the adaptation of an existing monitoring programme and EQS by establishing contacts with a research institute that holds expertise in cage farming impact and monitoring. In this regard, the experts invited the Secretariat to seek the possibility of organizing such know-how transfer through a dedicated training activity in Norway or an alternative country which has developed an adequate and functional fish cage aquaculture monitoring programme. The proposed activity would ensure the quick and easy transfer of expertise which would allow the selected biologists, in collaboration with the foreign partner, to adapt the monitoring programmes and EQS to local conditions. The trained staff would initially perform all monitoring in the region and subsequently train local technicians to take over as well as train officials from competent authorities to read and understand the scientific information contained in an EIA and the results of the monitoring process.

CAGE AQUACULTURE – LICENSING

30. The WGA Technical Secretary introduced the agenda item on cage aquaculture licensing based on a review document commissioned to Ms Rosa Chapela Pérez, an aquaculture legal expert with the Fisheries Socio-economics Department of the Technological Centre for the Sea (or Centro Tecnológico del Mar – CETMAR; www.cetmar.org/en/) of the Government of Galicia, Vigo, Spain. The paper on the "Review on cage aquaculture licensing procedures: a focus on Chile, Greece, Norway, Spain and the United States of America" is attached to this report as Appendix I.

31. The paper presents an overview of the policy and legal framework governing aquaculture in five countries which have an established cage aquaculture industry and focuses on licensing systems and permit procedures and requirements. The document outlines the number of different national agencies and local authorities typically involved in the management and regulation of the aquaculture sector including the granting of a farming

licence. The need to streamline and simplify the licensing process to encourage and facilitate investment is strongly highlighted. With specific regard to the farm licence, the rights and the duties of an aquaculture licence holder are discussed in details and are underlined as crucial elements in protecting the interest of the investor. Furthermore, the clear specification of the licence duties will ensure, among others, that the environmental obligations of the licence holder are met and maintained during the implementation and operation of a fish farm.

32. The review document indicates that aquaculture as a whole is frequently poorly regulated with many existing legislations not specifically issued for the industry. The often complex system for granting a farming permission, the excessive bureaucracy through the involvement of numerous and typically poorly coordinated competent authorities, and the general exclusion of aquaculture as an economic activity and potential resource user in coastal zone planning exercises are cited among the regulation constraints affecting the industry. The review clearly indicates that there is a general need and demand from the private sector to improve current aquaculture legislation also in those countries where the sector is flourishing.

33. Specific to aquaculture licence procedures the document lists the following as some of the main problems: i) lack of juridical safety, time-consuming and excessively long periods required to follow-up legal measures and hence the need for more transparent and faster license application procedures; ii) the need to establish specific procedures for different aquaculture operations (e.g. inland aquaculture, offshore); iii) call for clear environmental measures not subject to changes under different administrations; iv) simplification and harmonization of aquaculture legislation among the different agencies involved; and vi) the often unclear role played by different agencies involved in the licence process.

34. The experts acknowledged that the licence system is the most widely used technique for exercising legal and administrative control over aquaculture operations as it confers different rights and obligations, and allows public control with regard to environmental protection and the economic sustainability of the farming practices. Licence conditions are used as a regulatory tool to control the operation and ensure that aquaculture activities are developed in accordance with national laws and regulations and into a plan or specific site.

35. The workshop participants discussed the licence application process outlined in the review paper and those currently adopted in selected countries in the region. It was agreed that potential investors require access to different types of information in order to adequately complete and submit an application form as well as a clear understanding of the application procedures. Furthermore, it was agreed that the legislation involved and process in aquaculture licensing should be transparent, readily available and include information on processing time (preferably providing an indication on time limits), payable fees, if any, and whether there is a need for financial coverage in order to ensure that a site is cleared and cleaned in the event of bankruptcy. It was suggested that the countries in the region should prepare an instruction guide on how to complete a licence application. Such a guide should list all the documents to be presented to the competent authority along with the application. In this regard it was agreed that the Secretariat would make available to the WGA the guide used in Norway, once an English version of the document becomes available. This document would be used as an example to develop a regional guide that could in turn be adapted to national needs.

36. The experts attending the meeting also agreed that potential aquaculture investors in the region should be informed on what information is advisable to collect prior to applying for

a farm licence for a specific site. It was concurred that the advance availability of this pre-application data and information would certainly facilitate the issuance process of a licence and subsequent conduct of a follow-up EIA, if required by law. Furthermore, this simplified feasibility study would very likely reduce pre-investment expenses by ensuring that an investor targets a site that has a good basis for a successful application process. The experts also recognized that where coastal developmental plans or aquaculture zoning exist, individual licence applications could be considerably less complex as prospective developers would be able to access considerable information from these plans and would not have to seek the agreements and permissions from the concerned national and local authorities involved in the process. Appendix J lists the type of data and information needed and recommended by the workshop participants prior to the submission of a licence application.

37. A proposed cage aquaculture licence procedure was discussed and developed at the workshop based on the format developed and adopted by Oman. The proposed procedure is attached as Appendix K to this report.

OTHER MATTERS

Review on environmental impact assessment and monitoring in aquaculture

38. The WGA Technical Secretary informed the workshop participants on the FAO project on "Environmental Impact Assessment and Monitoring in Aquaculture" currently under implementation by the Aquaculture Management and Conservation Service (FIMA). He informed that this project aims to address key issues of environmental assessment and monitoring in aquaculture with a view to generate strategic advice and technical guidance information for use in policy making, capacity-building and training in the sector. Special attention is given to different aquaculture farming systems, different environments and different socio-economic contexts of development, with particular consideration of special circumstances and requirements of developing countries.

39. Through the project, case studies were prepared to cover the compilation and review of existing EIA and environmental monitoring procedures and practices in aquaculture in selected countries of the following regions Africa, Asia-Pacific, Europe and North America, and Latin America. A fifth special case study focused on EIA in marine cage aquaculture of salmon in Canada, Chile, Ireland, New Zealand, Norway, United Kingdom and the United States of America. A global review and synthesis report was also prepared based on these four regional case studies and the salmon aquaculture study.

40. In order to analyze and discuss the above regional reviews and global synthesis, an FAO Technical workshop on environmental impact assessment and monitoring in aquaculture was held in Rome from 15 to 17 September 2008. The workshop produced a range of conclusions, recommendations and elements for guidelines on EIA procedures, monitoring and environmental management frameworks relevant to aquaculture. The workshop report, as well as the thematic reviews, will be available as an FAO Fisheries and Aquaculture Technical Paper by April 2009. The draft table of contents of this paper was presented. It was further agreed that this document would be good reference material for the region.

Algal blooms and cage aquaculture

41. The damage resulting from algal blooms and more specifically from red tides to fish farming was raised by the experts attending the workshop. It was reported that the industry in the region had recently suffered a serious setback due to a major red tide event that killed the entire fish stocks in fish cages off the coast of Oman and the United Arab Emirates.

42. Algal blooms are natural phenomena that occur in the Gulf waters when the conditions are favourable. Factors that trigger such events include temperature levels and the nutrient content of the water. The question raised by the participants was how to tackle the problem and protect and prevent disasters in the mariculture industry. It was generally agreed that there is a need to develop the ability to anticipate such events, monitor water conditions, establish warning procedures and develop contingency plans.

43. The experts recommended that the WGA should consider organizing a technical workshop on the impact of hazardous algae on aquaculture with a focus on how the cage culture sector should handle the problem by developing suitable counter measures in the event of a hazardous bloom. Topics suggested for the workshop would include an introduction to algae biology, information on common blooms, species identification, conditions and mechanisms involved in triggering the blooms, effects of the blooms on caged fish, monitoring programmes, establishing warning systems and contingency plans, countermeasures and remedy actions, lessons learned, existing best management practice and the role of governmental agencies. In this regard the experts acknowledged the work carried out by Oman in the preparation of best management practices related to local cage aquaculture and invited the relevant authority to share and distribute the document when completed and available.

44. It was also recommended that the proposed workshop should be coordinated with the agenda of the Regional Organization for the Protection of the Marine Environment (ROPME; www.ropme.org) in view of the mandate of this regional organization. The red tide workshop organized by ROPME, held in the United Arab Emirates in November 2008, was referred to by the experts.

Fish cage demonstration farm

45. In view of the current developmental stage of fish cage farming in the region the workshop participants suggested that the establishment of a commercial demonstration cage farm would greatly enhance the opportunities to gain and share the much-needed experience not only in the operation of the farm, but would also provide an opportunity to the authorities to evaluate the suitability of their regulations and procedures.

46. The demonstration farm would allow the testing of environmental impact and monitoring procedures, performance and follow-up of monitoring programmes, adapting procedures to the individual cultured species, improving husbandry procedures (including disease treatment, handling of dead fish and waste), demonstrating the need for enforcement, and making indirect tests of the regulations. Observing the operations and scrutinizing the results of the ongoing tests would enable procedures to be streamlined and improve practical skills in carrying out farming and environmental monitoring operations.

47. It was also agreed that the farm could serve as a training centre for fish farmers, consultants and representatives of the authorities that deal with the processing of licences, environmental impact assessment and monitoring procedures and their enforcement. The option of using existing farming facilities was suggested and should be investigated. It was further recommended that the region should encourage information exchange between existing research facilities (including universities) and develop joint research cooperation programmes.

RECOFI-WGA legal aquaculture project proposal

48. The experts attending the workshop recognized the importance in implementing the legal and aquaculture project, prepared by the WGA and endorsed by the Commission at its fourth session (Jeddah, Kingdom of Saudi Arabia, 7–9 May 2007), as it would also cover issues related to aquaculture licensing and mandatory EIA and monitoring programmes. The participants invited the WGA to raise the issue at the next session of the Commission planned to take place from 12 to 14 May 2009 in Dubai, United Arab Emirates.

CLOSING REMARKS AND ADOPTION OF THE REPORT

49. The workshop participants acknowledged that the cage culture industry is still in an infancy stage and agreed that the governments in the region will play an important role in the future development and promotion of this faming practice as well as aquaculture as a whole. The development of adequate aquaculture frameworks, targeted rules and regulation including clear procedures on environmental requirements and farm licensing will certainly encourage investment in the region.

50. On behalf of the workshop participants, the Chairperson of the RECOFI-WGA, Mr Dawood Suleiman Al-Yahyai, expressed his appreciation to the Secretariat for organizing this technical workshop and invited all RECOFI-WGA focal points to circulate and discuss the workshop report and recommendations with the relevant national authorities in order to ensure a fruitful discussion during the next RECOFI session scheduled to take place in the United Arab Emirates in May 2009.

51. The report of the workshop was approved and adopted by the participants including the list of the workshop suggestions and recommendations attached as Appendix D.