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COMMITTEE ON FISHERIES

SUB-COMMITTEE ON AQUACULTURE

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PROSPECTIVE ANALYSIS OF FUTURE AQUACULTURE DEVELOPMENT AND THE ROLE OF COFI SUB-COMMITTEE ON AQUACULTURE

SUMMARY

The Second Session of the Committee on Fisheries Sub-Committee on Aquaculture requested that FAO provides a prospective analysis of future challenges in global aquaculture as a basis for a discussion of the longer term direction of the Sub-Committee's work. This document presents the results of the work which the Fisheries Department achieved in response to this request.

The review process concluded that, in all regions but Africa, market demand was critical to aquaculture development. In Africa, the main concern was the lack of suitable macro-policies and good governance. Here, however, experts thought that there would be improvements in the future with more emphasis for private sector investment in aquaculture. Also in Africa, market opportunities were seen from trading aquaculture products both within the region and internationally. In Asia, ensuring quality and safety of products was regarded as critical to gain market access. In the Americas and Europe, technology is seen as key to offset public opposition to aquaculture, obviate the use of limited coasts, or increase productivity and therefore competitiveness.

The Sub-Committee is requested to comment on the document and guide the Secretariat on the way forward.

1. Background

1. Global aquaculture production has grown substantially in the last three decades and this increasing trend is likely to continue, at least in the medium run.

2. If the current level of fish consumption is to be maintained, by 2030, aquaculture will have to produce 83 million tonnes of aquatic food, an increase of 37.5 million tonnes from the 2004 level. This production level would require pragmatic approaches which will result in increased social and economic contribution from aquaculture.

3. Recognizing the need to monitor the dynamics of the sector, the FAO Fisheries Department regularly conducts reviews on status and trends in aquaculture development^{1,2,3}.

4. Within the same framework, the Second Session of the Committee on Fisheries Sub-Committee on Aquaculture held in Trondheim, Norway in 2003 requested, among other things, that FAO provide a prospective analysis of future challenges in global aquaculture as basis for a discussion of the longer term direction of the Sub-Committee's work⁴. The purpose of this document is to present the results of the work which the Fisheries Department achieved in response to this request.

2. Process

5. The processes followed to compile the Prospective Analysis were complex, but can be briefly summarised as follows:

- National Aquaculture Sector Overviews – NASOs – were conducted in all major aquaculture producing countries in the world.
- Five Regional Workshops were then convened to discuss the status and trends in aquaculture development in Asia-Pacific, Central and Eastern Europe, Latin America and the Caribbean, North Africa and the Near East, and Sub-Saharan Africa.
- Next, seven Regional Aquaculture Development Status and Trends Reviews in Asia-Pacific, Central and Eastern Europe, Latin America and the Caribbean, North Africa and the Near East, Sub-Saharan Africa, Western Europe and the North America were carried out.
- Simultaneously with the above activities, a global expert survey on aquaculture development using the Delphi Technique⁵ was implemented.
- Then a global review of the status and trends in aquaculture development was prepared based on the outcome of all these efforts and other available documentation.
- Finally, an Expert Workshop was convened in Guangzhou, China P.R. with the objectives of (a) building consensus on the draft global aquaculture review (synthesis of regional aquaculture development status and trends reviews) and identifying any improvements required, (b) crafting the prospective analysis of future aquaculture development through discussion, brainstorming, and review of available literature, and (c) drafting the role of the COFI/AQ in assisting future aquaculture development in FAO member countries.

6. The outcome of the Expert Workshop, further informed by the results of the Delphi survey on the prospects and future of aquaculture, became the basis for the Secretariat to draft the "Prospective Analysis of Future Aquaculture Development" (see COFI/AQ/III/2006/Inf.7). This working document reflects the major observations on the future aquaculture development, opportunities and challenges. It offers some ideas for consideration by the Sub-Committee on the longer term direction of its work.

¹ FAO. 2003. *Review of the state of world aquaculture*. FAO Fisheries Circular. No. 886, Rev. 2. Rome, FAO. 95 pp.

² The last series of regional and global reviews were in 1999 and published following the Global Conference on Aquaculture in the Third Millennium held in Bangkok in the year 2000.

³ NACA/FAO. 2001. *Aquaculture in the Third Millennium*. Subasinghe, R.P., Bueno, P.B., Phillips, M.J., Hough, C., McGladdery, S.E. & Arthur, J.R. (Eds.) Technical proceedings of the conference on aquaculture in the third millennium, Bangkok, Thailand. 20-25 February 2000. NACA, Bangkok and FAO, Rome. 471 pp.

⁴ FAO. 2003. Committee on Fisheries. *Report of the second session of the Sub-Committee on Aquaculture*. Trondheim, Norway, 7-11 August 2003. FAO Fisheries Report. No. 716. Rome, FAO. 2003. 91p.

⁵ Gorden, T.J. 1994. The Delphi method. *Future Research Methodology*. AC/UNU Millennium Project. 30p.

3. Results

3.1. Recent trends in aquaculture development

7. The global aquaculture review shows six major development trends, which include:
 - a continuing intensification of aquaculture production resulting mainly from the increasing unavailability of aquaculture sites and the growing restrictions on using non-agricultural land for aquaculture;
 - a continuing diversification of species use, particularly high value marine species in regions and countries where aquaculture is well established;
 - a continuing diversification of production systems and practices, including integration of aquaculture into existing farming systems;
 - an increasing influence of markets, trade and consumers in prompting producers and processors to pay more attention to environmental concerns, food quality and safety and moving towards greater value adding and development of processed products for exports;
 - an enhanced regulation and improved governance of the sector, with strong emphasis on self-regulation, especially through farmer associations; and
 - an increasing attention on better management of the aquaculture sector through production efficiency, economic sustainability and overall competitiveness.
8. The review notes, however, that these trends do not necessarily apply equally to all the regions because of intra- and inter-regional differences in the development stage of aquaculture. The situation is particularly different for Sub-Saharan Africa.
9. In addition to providing a roadmap for the sector to achieve its goal of meeting the expected fish shortage in the years to come, the Prospective Analysis confirms these trends.

3.2. Main challenges

10. The main challenges for the future will be for policy makers and development agents to create an enabling environment for aquaculture to develop substantially enough to meet the demand for fish. The major enabling factors which were identified include:
 - national and international market developments and access to markets;
 - changing population and demography, seafood consumption habits and patterns, consumers preference, and increasing consumers' purchasing power;
 - technology development and improvement in management systems;
 - improving public sector enabling environment, governance and institutions;
 - access to services;
 - adoption of environmental management practices for protection and sustainable use of aquatic resources;
 - access to quality inputs in sufficient quantity;
 - access to land and water resources;
 - adequate physical infrastructure;
 - ensuring food safety;
 - skills development and capacity enhancement; and
 - efficient communication and knowledge transfer.
11. **National and international market developments and access to markets** – With respect to national and international market developments and access to markets, the study showed that, responding to market demand and gaining access to international markets are and will continue to be essential for aquaculture development. Market development is essential to expanding markets for aquaculture products. New markets will have to be developed and existing ones expanded. These enabling factors will be critical for industrial-, medium- and small-scale producers in all regions.

12. Over the last decades, international fish trade has been progressively liberalised and current import duties for exports to developed countries are very low for most species, although for some species such as shrimp, they may still be considerable. Further liberalization of fish trade through new multilateral and bilateral agreements and continued import tariff reduction will provide new opportunities for expansion of the aquaculture sector.

13. Developing countries frequently maintain high import tariffs on fish and fishery products, thereby impeding increased regional and South-South trade in aquaculture products. With the lowering of tariffs, non-tariff barriers have emerged as the main obstacle to increased trade and to market access. Non-tariff barriers, including technical and non-technical barriers to trade, have the potential to dramatically impact trade in aquatic products, especially as they relate to import requirements for quality and safety.

14. Increased trade will also influence the structure of the aquaculture industry. There is now real concern that many small-scale producers involved with export of products may find it increasingly difficult to compete in the future. Enabling small-scale producers to achieve market access should be a priority for policymakers.

15. It seems that access to diverse markets can be enabled through development of certification systems for food safety and quality. Development of niche markets will also allow aquaculture for both established and novel commodities and products. Production and marketing based on environmental criteria with relevant certification schemes and labels will play a larger part in the future (organic production, aquaculture eco-labels).

16. Growth in aquaculture production and exports has also led to an increasing number of accusations of dumping and illegal use of subsidies from domestic producers in the importing countries. On a number of occasions, these complaints have led the importing countries to implement concrete measures against such imports, including the introduction of minimum import prices and countervailing duties to compensate for the alleged dumping or subsidy margin. Such disputes are increasingly being brought to the WTO for resolution in the WTO Dispute Settlement Mechanism and have included farmed species such as shrimp and salmon. As the industry grows and more aquaculture products move into international trade, the competition for market shares will become stiffer. Thus, countries can be expected to use protective measures to shield domestic producers against foreign competition. Hence, many more such accusations and disputes can be anticipated in the future.

17. **Changing populations and demography, seafood consumption habits and patterns, increasing consumers' preference and purchasing power** - Changing populations and demographic effects have the potential to create substantial new markets. As experienced over the past decade, shifting eating habits are expected to have a significant influence on consumption of aquatic products. With improved living standards, rising purchasing power and disposable income, large, young populations in some countries in Asia, particularly in India, have the potential to influence eating and purchasing habits.

18. In the short-term, the demand will accrue especially for internationally-traded commodities such as shrimp, salmon, catfish, tilapia and marine finfish. In the long term, these population and demographic changes are expected to have an influence on the marketing of a wide range of aquaculture commodities and products.

19. Accessing these new and emerging market segments will require marketing and awareness campaigns as well as development of specialised products.

20. **Technology development and improvement in management systems** - Technology development has already contributed substantially to aquaculture progress, and further improvement of technology and management systems will be essential to enable its future advancement. New technologies will be required to make more efficient use of natural resources (e.g., water, land, energy, feed ingredients) and overall economic efficiency of aquaculture farms.

21. Improvements in aquatic animal health management and disease control are expected to enable aquaculture development in all regions and across all scales of enterprise from small- to industrial-scale. The example of the impact of vaccines for industrial scale salmon industry (Europe and Latin America) indicates that similar progress in other parts of the sector will positively increase the production of freshwater and marine fish globally; it is also likely to enable the development of marine and freshwater fish across all commercial scales.

22. Technology development will also make possible improvements in the environmental performance of aquaculture systems along with product quality and safety. Such improvements, combined with effective education and information, will lead to favourable public perceptions. In nutritional research, it will be an important enabling factor for higher quality and cost-effective feeds, utilisation of new protein and fat sources as feed ingredients, and eventually reduced reliance on marine protein sources. Technology development in feed management for efficient use of locally available feed ingredients in farm-made aquafeed will be an enabling factor for further expansion of small-scale aquaculture, particularly in Sub-Saharan Africa. Genetic improvement for selection against disease, improvement in growth and other desirable traits will further facilitate aquaculture development from industrial to small-scale level. Seed production of new marine species will also become a critical factor enabling aquaculture over the next decade.

23. Development of farming systems, particularly cages and possibly innovative enclosure systems for aquaculture in offshore, will be of a paramount importance. However, environmental impacts of such systems will have to be minimised, or even eliminated completely, in order for them to receive public acceptance.

24. Involvement of public and private sectors will be essential in technology development. Public-private partnership in planning, funding and implementing research will facilitate efficient R&D effort. R&D in the private sector should be enabled through incentives to encourage private R&D. Globalisation and increasingly free flow of technologies amongst countries will minimise differences between established and newly emerging industries.

25. Investment by the private sector will most likely be oriented towards the larger scale industrial aquaculture, or aquaculture commodities with significant value. Thus, the R&D basis for the small-scale sector may need more targeted government (public) interventions to ensure a proper balance between the industrial and other development scales. This R&D effort will only provide sustainable solutions to poverty and livelihood improvement if it leads to competitive small-scale aquaculture.

26. **Public sector enabling environment, governance and institutions** – Creating an enabling investment environment is a must for the development of the sector and essential at all levels for aquaculture development. Good governance, including political stability, has a major influence on aquaculture development at all scales, the costs of doing business, attracts investment in the sector and enhances the industry's competitiveness both at home and globally. Macro-economic policies, such as fiscal policies, access to manpower and skills, and technology play an equally important and similar role.

27. Improved participation of stakeholders in governance will be increasingly more important than before. Stronger emphasis also on strengthening farmers association and self-regulation by industry will ensure greater sustainability. Further, inter-sectoral (between different food producing sectors) communication is vital for better planning, policy, governance and efficient production.

28. Developing credible legal frameworks is necessary, but their enforcement is also essential. Equitable distribution of benefits will become a key to success and negative social impacts of aquaculture will have to be reduced.

29. Newly emerging aquaculture countries will require substantial investment in building institutions and governance arrangements for aquaculture, particularly industrial, export oriented aquaculture products.

30. **Ensuring access to services and finance** - Aquaculture enterprises of all scales require access to specialised services such as diagnostics, analytical services, disease testing, residue testing, technical information, extension and financial services. Governments will need to pay special attention to ensure access to these services for small- and medium-scale aquaculture enterprises, especially in newly emerging industries or aquaculture countries. Without the framework of supporting services, aquaculture development will not be sustained and farmers may be exposed to unacceptable risks.

31. There are opportunities for rationalization of small- and medium-scale enterprises, to enable them to perform to commercial- and export-oriented standards. This requires access to services which may be provided within the groups themselves, their associations or specific private sector service providers. The role of the state here is seen as supporting organizational aspects, rather than the direct provision of such services.

32. Food safety and certification assurance systems need substantial investment, and may pose a barrier to newly emerging aquaculture industries/states. Operational expenses also require ongoing investment and skilled people for their effective use and sustainability. Creating a sound environment which will attract investment and assistance from financial services is critical for long-term viability of industrial and/or commercial aquaculture.

33. **Adoption of environmental management practices for protection and sustainable use of aquatic resources** – Environmental issues are cross-cutting and a matter of increasing concern. They result from greater public awareness for the deteriorating state of the planet. The public image will be improved if the aquaculture industry addresses, and is very clearly seen to improve, environmental performance. Impacts of environmental changes generated by other sectors must also be considered, in order to reduce risks they impose on aquaculture operations.

34. Improving environmental management of aquaculture through development and adoption of better management practices at industry and government levels will be essential. This will apply to all levels of the industry, including well established and newly emerging aquaculture industries/countries.

35. Development and implementation of international standards for environmental management of aquaculture can definitely assist in enabling effective management of the sector, and provide some harmonisation among increasingly numerous and diverse aquaculture standards being produced by various stakeholder groups.

36. Improving communications on aquaculture and the environment will be essential in informing public opinion on the positive environmental aspects and benefits of aquaculture.

37. Appropriate conservation and management of biodiversity is an increasing priority. The sector needs to become more pro-active with respect to conservation of biodiversity and should assume greater responsibility for the negative impacts of irresponsible translocation of species.

38. Valuation of aquatic resources and industry payments for use of resources will drive more efficient use of resources. Resource values and environmental costs may become more significant factors when considering competitive advantage.

39. Ornamental fish movements need more attention to minimise disease risks.

40. International movements of aquatic animals may become more significant, but need to be backed by increased awareness and international agreement on protocols for risk analysis to minimise spread of disease and genetic/ecological impacts.

41. Newly emerging industries/states lacking critical inputs need to give careful consideration to any decisions concerning importing inputs, particularly with respect to disease and genetic issues. Africa may need special attention to this issue, given apparent freedom from some major aquatic animal diseases (e.g., Epizootic Ulcerative Syndrome - EUS, White Spot Syndrome Virus - WSSV).
42. **Access to quality inputs in sufficient quantity** - Access to quality inputs, including seed and feed are essential for undeveloped and newly emerging industries, regardless of scale.
43. Certification systems for seed and broodstock and their implementation are required.
44. Certification systems and standards for feed quality and other major inputs will be further developed, particularly in the light of appropriate sourcing of fish meals and fish oils, and the quality and safety of other feed ingredients.
45. **Adequate physical infrastructure** - Transportation infrastructure and connectivity is essential for access to markets and services. Energy is also an essential prerequisite for all scales of commercial aquaculture. Other infrastructure such as water supply, drainage systems are also necessary, although there are differences among practices and systems.
46. Aquaculture of all types will benefit from improvements in infrastructure within rural areas. Industrial-scale aquaculture can also create demand for energy and infrastructure that benefits rural communities. Industrial-scale aquaculture in rural areas also contributes to improvement of community services (e.g., potable water, schools).
47. Physical infrastructure is essential for all scales, but there are special concerns for small- and medium-scale enterprises. Cluster development, and public investment in common infrastructure will enable the small- and medium-scale sector to develop, be competitive and contribute effectively to rural development. Small- and medium-scale aquaculture clusters can be further enabled through provision of common marketing and processing facilities although there maybe commodity specific differences.
48. Whilst public investment in physical infrastructure can enable aquaculture development, a balance needs to be struck between the use of public goods and services for private enterprise and cost recovery systems from the aquaculture industry to pay for use of these services.
49. **Access to land and water resources** - Land and water are essential for aquaculture. Access to these resources will become increasingly competitive, and thus require careful consideration of how to allocate and make them available for aquaculture production.
50. A stable and clear policy and legal frameworks are required for equitable allocation and use of land and water resources, including integration of aquaculture within the context of coastal management planning and zoning.
51. Land and water legislation must be based on consideration of environmental impacts. In particular, it will be increasingly essential to balance aquaculture development with availability of water resources and distribution capacity, to avoid problems of exceeding carrying capacity.
52. Small-scale enterprises are especially vulnerable when resources are limited. Thus emphasising the importance of a legal framework that allows equitable use of resources will be essential. The importance of “clustering” and organisation of small-scale enterprises is emphasised.
53. Land prices are increasing in many coastal areas around the world, and becoming an increasing constraint to aquaculture and requiring significant improvements in efficiency of land use by aquaculture. Technological developments in offshore/ocean farming systems may overcome this constraint.

54. Increasing energy costs may require exploring for alternative energy sources.

55. **Ensuring food safety** - Implementation of trace-ability and food safety assurance systems is a necessity for many domestic as well as international markets. This is considered as an important enabling factor in all regions of the world. There is already considerable application with export oriented aquaculture production and increasingly some degree of application and implementation for domestic production (particularly where this is supplying domestic markets through supermarket chains).

56. Effective food safety and quality management systems require private and public sector coordination and partnership.

57. Certification of aquaculture products will enable market access and public acceptance of aquaculture products. Small-scale enterprises will require investment in improved services to access markets requiring certified markets, due to concerns that application of certification may adversely affect smaller producers.

58. The importance of the safe use of antibacterials and avoidance of banned substances in aquaculture production will be fully realised. The problems emerging as a result of such problems indicate the need to work more aggressively through Codex Alimentarius Commission (or other relevant international bodies) to facilitate setting of internationally acceptable standards for food safety and trading standards in aquaculture products. International resources need to be raised and directed towards setting the international standards for production and trade in aquaculture products. The sector has been sorely neglected in comparison with capture fisheries and agriculture, despite its economic importance, and increasing trade problems faced by many producing countries argue for urgent attention to this important issue.

59. The Codex Alimentarius Commission has approved the Code of Practice for fish and fishery products, including products from aquaculture. However, it is extremely difficult to apply the Code to aquaculture products, as aquaculture production systems and practices are highly diverse. Further work is required to improve the situation.

60. **Skills development and capacity enhancement within the aquaculture sector** - Skilled people are necessary for sustainable management of the aquaculture. Development of human capacity must be an integral part of overall development of aquaculture sector. Increasing intensity/complexity of aquaculture requires more skilled people to ensure sector sustainability.

61. Education and technical capacity building programmes can be made more effective through involvement of the users. A needs-based approach should be used to develop skills appropriate to the industry. Development of longer term formal and informal educational programs supporting all parts of the sector should be prioritised rather than short-term inputs such as study tours and training.

62. Building capacity of producer associations and policy makers deserve special attention. Capacity enhancement can be enabled through increased networking among educational providers and researchers to make efficient use of educational resources, including other disciplines (e.g., health, nutrition, and engineering fields). Involvement of private sector in development/implementation of educational programs is essential.

63. Capacity enhancement is very critical in new and emerging industries where networking with other countries and regions can also facilitate skills development. The development of indigenous capacity is essential to provide a basis for long-term development of the sector. Certification of trained people and accreditation scheme for aquaculture education providers would facilitate development of skills base for aquaculture.

64. **Efficient communication and knowledge transfer** – Effective and efficient communication is essential for transferring knowledge and learning from lessons of success and

failure. Increasingly efficient communication, including web-based knowledge transfer will bridge the South-South gap in knowledge on aquaculture and provide platform for dialogue between farmers and other stakeholders.

65. Effective communication will allow dialogue between stakeholders and should help in harmonization of policies, legislation, practices, etc., which governs the sector growth.

3.3. Special considerations for Sub-Saharan Africa

66. In Sub-Saharan Africa, some specific enabling factors have been identified. Overall and over-riding factors identified were political stability and good governance. Creating an enabling public sector environment is of high priority. Aggressive implementation of Poverty Reduction Strategy Papers (PRSPs), development of national aquaculture strategy plans which incorporate aquaculture into rural development policies and legislation are important. Development of incentives and risk reduction measures for Foreign Direct Investment is necessary which will also have a trickle-down effect to development of small-scale commercial aquaculture.

67. Enhanced capacity to support an integrated livelihoods approach, which includes aquaculture (appropriate extension, appropriate technology transfer (e.g., farm made feeds) at district (local) levels along with dynamic institutional linkages and networks with stakeholders will contribute to sector sustainability. Other important factors for encouraging effective sector development include:

- user-driven and appropriate R&D, with effective monitoring and evaluation to ensure credibility and sustainability;
- enabling environment including good governance and conducive policies;
- more involvement of the private sector;
- improved Government, private sector and civil society/NGO cooperation;
- identification of high priority areas for public sector support;
- appropriate goods and services that are linked to physical infrastructure; and
- south/south collaboration for technology transfer and human resources development.

68. Most countries in Sub-Saharan Africa cannot deliver public goods and services without donor support. There is thus a need for renewed, long-term, support to the aquaculture sector. This approach should favour private investment; it is imperative that we learn from mistakes of the past.

3.4. Unexplored opportunities

69. The aquaculture sector may benefit from tapping some unexplored opportunities.

70. Open water and offshore mariculture are seen as key unexplored opportunities for producing aquatic food for the future. This would need to be supported by appropriate policy and planning, including open water zoning, legal and management frameworks.

71. Development of genetically improved aquatic organisms (“designer fish”) with special characteristics (e.g., market requirements, environmental characteristics, disease control, and production efficiency) will take place as acceptability and public perception for such products are improving and/or changing.

72. More efficient feeds tailored for specific needs (“designer feeds”) will be developed to improve resource use efficiency in the aquafeed sector. Use of vegetable proteins to replace fishmeal and fish oil will be further considered and feeds to suit specific dietary requirements of fish and crustaceans, economical to use in semi-industrial or commercial farming will be developed. As fishmeal use is likely to increase for tropical omnivorous species (carp, tilapia and milkfish) and shrimp in Asia, thus the greatest opportunity and the challenge for aquaculture would be the reduction of fishmeal usage for omnivorous species.

73. Increased attention to recreational fisheries, eco-tourism, and ornamental fish production would widen the horizon of aquaculture's contribution to the society.

74. Non-food uses of aquaculture products, including development of innovative re-use technologies for by-products and waste material from aquaculture products (e.g., salmon skin, seaweed washings, etc.) show potential for future investment.

75. Marine bio-active compounds, nutraceuticals, natural products, etc., from marine organisms, algae in particular, appear to play a significant role in pharmaceutical industry.

76. Pet foods presently use a large amount of wild caught fish, and commitments have been made by the industry to eliminate use of such marine resources. Aquaculture could provide an alternative source, opening a significant new market.

4. Role of the COFI Sub-Committee on Aquaculture

77. The prospective review process also attempted to advise on the possible role of the COFI Sub-Committee on Aquaculture in shaping the future of global aquaculture. The general consensus was that the future of global aquaculture largely lies in the hands of the private sector in partnership with the national governments. The role of the government to create an enabling environment for the sustainable development of the sector remains undisputed.

78. The COFI Sub-Committee, as the only global inter-governmental body specifically responsible for dialogue and decision making on aquaculture, should seek to:

- serve as a forum for exchange of experiences and monitoring progress within the sector;
- review, discuss and agree on standards and guidelines;
- deliberate on emerging issues, and function as a forum for stakeholders to debate and agree on key issues and actions;
- develop priority programmes and actions for FAO and stakeholders to follow up (e.g., through regional/inter-regional projects), and identify avenues for raising funds for their implementation; and
- provide advice and guidance on the FAO work programme and budget.

79. In order for the Sub-Committee to be effective in accomplishing these tasks, it needs to ensure:

- an effective collaboration and contribution of all concerned of aquaculture;
- a good representation of all stakeholders (FAO Members, NGOs, IGOs, UN Agencies, etc.);
- good links with relevant ongoing regional programs and organizations;
- an effective communication system for projecting issues onto the agenda; and
- that intersessional work can be conducted by or under the coordination of the Secretariat.

5. Conclusions

80. The experts and the partners of the review process agreed that the aquaculture sector stands ready to meet the new challenges, but will need sustained commitment by government policy makers and international development partners involved in aquaculture development and support from "champions" and "change agents" within the sector.

81. There exists a wide range of perceptions towards aquaculture, marked by negative and positive extremes. The most negative view presents aquaculture as having little or no value. The most positive view regards aquaculture as the answer to many problems. The two extremes

provide benchmarks for various grades of perceptions on the shortcomings and/or benefits of the sector.

82. A balanced view recognises a mix of advantages and disadvantages and offers a scenario where the use of resources for social and economic development will lead to some environmental impact that could and should be mitigated.

83. Views on the sector in any event need to be based on solid evidence if they are to amount to anything more than mere opinion, however strongly or emotionally expressed. Responsible advocacy for particular directions in aquaculture development is one which is objectively guided by science (see Prospective Analysis of Future Aquaculture Development - COFI:AQ/III/2006/Inf.7).

84. Considering the above analysis, the Sub-Committee is requested to:

- comment on the draft Prospective Analysis;
- discuss aquaculture development needs at national, regional and global level to ensure sustainable development of the sector;
- advise FAO on appropriate work to be conducted through the Fisheries Department's Regular Programme and also using extra budgetary funding, as resources permit;
- discuss the role of COFI Sub-Committee on Aquaculture in global aquaculture development;
- reflect on its future role; and
- identify priority intersessional work and commit to the collaboration and support needed for its implementation.