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REGIONAL COMMISSION FOR FISHERIES

Report of the

REGIONAL TECHNICAL WORKSHOP ON AQUATIC ANIMAL HEALTH

Jeddah, Kingdom of Saudi Arabia, 6–10 April 2008

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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 Aquatic Animal Health held from 6 to 10 April 2008 in Jeddah, Kingdom of Saudi Arabia. The document contains the two major outputs arising from the workshop, i.e. (i) the "RECOFI regional aquatic animal health capacity and performance survey: summary of survey results and analysis", and (ii) the "Proposal for a regional programme for improving aquatic animal health in RECOFI member countries".

This report was prepared by the Workshop Secretariat, Alessandro Lovatelli and Melba B. Reantaso, Fishery Resources Officers of the Aquaculture Management and Conservation Service (FIMA), Fisheries and Aquaculture Management Division of the Department of Fisheries and Aquaculture of FAO, and J. Richard Arthur, FAO Consultant.

ACKNOWLEDGEMENTS

Many thanks are due to the Ministry of Agriculture, Kingdom of Saudi Arabia, particularly the Department of Aquaculture and the Fish Farming Center in Jeddah for the generous support and excellent hosting of the workshop. The officials and staff of the National Prawn Company are also gratefully acknowledged for the warm hospitality and kind assistance during the visit to the processing and farming facilities.

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ABSTRACT

The Regional Commission for Fisheries (RECOFI) Regional Technical Workshop on Aquatic Animal Health, held in Jeddah, Kingdom of Saudi Arabia, from 6 to 10 April 2008, was implemented in response to one of the recommendations of the fourth session of RECOFI (Jeddah, Kingdom of Saudi Arabia, 7–9 May 2007) and Technical Meeting of the RECOFI Regional Aquaculture Information System (Kuwait City, Kuwait, 6–8 November 2007).

Hosted by the Ministry of Agriculture of the Kingdom of Saudi Arabia, 19 delegates participated representing official participants and observers from five RECOFI member countries (Bahrain, Kingdom of Saudi Arabia, Oman, Qatar and the United Arab Emirates) and representatives from FAO (Cairo, Jeddah and Rome).

The significant outcomes of this regional technical workshop are:

- RECOFI Regional Aquatic Animal Health Capacity and Performance Survey Report – seven RECOFI member countries fully cooperated in the completion of the questionnaires which were presented and further discussed and finalized during the workshop and served as basis for the development of a regional programme.
- Proposal for a Regional Programme for Improving Aquatic Animal Health in RECOFI member countries – developed during the regional workshop based on the outcomes of the questionnaire survey and the working group discussion; outlines a long-term agreed-upon plan of activities to improve aquatic animal health capacity in the RECOFI member countries and identifies activities of regional interest and importance.
- Awareness and capacity building on aquatic animal health – a significant activity where workshop participants acquired knowledge on aquatic animal health concepts such as basic fish health management, development of aquatic animal health strategy, general principles of the risk analysis process and field experiences in dealing with important aquatic diseases such as Koi herpes virus and epizootic ulcerative syndrome.
- Interim activities identified with agency responsibilities prior to the next RECOFI session scheduled for May 2009.

CONTENTS

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 implementation of activities towards the preparation of a "regional strategy on aquatic animal health" as part of the work plan of the Working Group on Aquaculture (WGA). The activities include: (i) assessment of institutional and human resource capacities on aquatic animal health at the national level through a questionnaire survey, and (ii) organization of a regional workshop to present the results of the survey, brainstorm on the development of a regional aquatic animal health strategy and conduct a technical seminar as part of capacity building to raise awareness on various issues and concepts of aquatic animal health management.

2. The preparatory work for the strategy development was finalized in Kuwait in November 2007 during the Technical Meeting of the RECOFI Regional Aquaculture Information System (RAIS). It included: (i) finalization, implementation and analysis of the questionnaire survey (December 2007 to March 2008); (ii) implementation of a regional technical workshop in Jeddah, Kingdom of Saudi Arabia (April 2008); and (iii) preparation and finalization of a proposal for a regional aquatic animal health development programme.

3. This report documents the outputs of the RECOFI-WGA Regional Technical Workshop on Aquatic Animal Health (here after termed the "Technical Workshop"), which was held from 6 to 10 April 2008 at the Moevenpick Hotel, Jeddah, Kingdom of Saudi Arabia. The workshop prospectus is attached as Appendix C.

OPENING OF THE WORKSHOP

4. 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 a brief backgrounder to the workshop.

5. Mr Anwar Eissa Al-Sunaiher, Acting Director of the Aquaculture Department, Ministry of Agriculture, Kingdom of Saudi Arabia, also welcome the participants from the RECOFI member countries and resource experts and expressed their pleasure in hosting this technical workshop on aquatic animal health. He wished for the workshop to have a productive outcome that will provide guidance on future work of RECOFI-WGA in the area of aquatic animal health.

6. Mr Piero Mannini, Senior Fishery Officer, FAO Regional Office for the Near East (RNE), welcomed the participants to Jeddah and took the opportunity to introduce himself as the newly appointed Secretary of the Regional Commission for Fisheries. He acknowledged the importance of the Commission in managing shared fishery resources and in the promotion of a sustainable aquaculture industry.

PURPOSE OF THE WORKSHOP

7. The objectives of the workshop were to:

   a. present the outcomes of the RECOFI Regional Aquatic Animal Health Capacity and Performance Survey;

b. prepare and finalize a proposal and an initial action plan for a regional aquatic animal health development programme based on the outcomes of the regional survey, workshop brainstorming and deliberation; and

c. undertake a technical seminar on important and emerging issues concerning aquatic animal health.

8. The workshop agenda is attached as Appendix A. The Secretariat explained the workshop objectives, the process to be adopted, guidelines for the working group discussions and the expected outputs in details.

WORKSHOP PARTICIPATION

9. A total of 19 delegates, including selected WGA Focal Points and Alternate Focal Points from five RECOFI member countries (Bahrain, Oman, Kingdom of Saudi Arabia, Qatar, and the United Arab Emirates), members of the private sector (National Prawn Company, Al-Laith, Kingdom of Saudi Arabia), staff of the Fish Farming Center in Jeddah and Secretariat participated in the workshop. The list of participants appears in Appendix B.

WORKSHOP HIGHLIGHTS

Setting the scene for the regional strategy planning

10. The workshop technical sessions were conducted as per Agenda. Prior to the technical presentations, a brief self-introduction was made by all participants.

11. A number of presentations were delivered by the Secretariat in order to set the scene for the regional planning session. These were:

- Harmonization of international and regional planning and policy for aquatic animal health – experiences from Asia and elsewhere.
- RECOFI regional aquatic animal health capacity and performance survey – survey results and analysis.
- Regional strategy for improving aquatic animal health capacity in RECOFI member countries.
- Outline of possible contents of a regional strategy.

12. In presenting the paper on "*Harmonization of international and regional planning and policy for aquatic animal health – experiences from Asia and elsewhere*", the history of regional policy and planning initiatives undertaken by national governments in the West Balkans, southern Africa, the Pacific Islands and the Asia-Pacific Region with the assistance of the Food and Agriculture Organization of the United Nations (FAO) and other international, regional and national partners was reviewed. The presentation also briefly reviewed the process and components of developing a national strategy and examined the national aquatic animal health programme of a number of developed and developing countries.

13. In the second technical presentation, an overview of the questionnaire survey "*RECOFI Regional Aquatic Animal Health Capacity and Performance Survey – Survey Results and Analysis*" was presented. The purpose of the survey was to obtain information on

national capacity and the agencies mandated to implement aquatic animal health programmes for the eight RECOFI member countries (Bahrain, Islamic Republic of Iran, Iraq, Kuwait, Oman, Qatar, Kingdom of Saudi Arabia and the United Arab Emirates). The survey also collected information essential to support the development of the aquaculture sector through healthy aquatic production and sought opinions on the components and activities that might be included in a regional aquatic animal health programme. The results of the survey were used by the Secretariat to draft an outline for a regional programme and will help guide regional and national strategic planning for improving aquatic animal health and assuring adequate and rational support services to achieve sustainable aquaculture development.

14. The presentation noted that information was still incomplete for some countries in the Region. RECOFI-WGA focal points who had not yet responded to the request for clarifications were requested to see the Secretariat during the workshop to finalize their responses. There then followed a period for questions and discussion of the survey results. The draft summary and analysis of survey results are to be finalized by the Secretariat following the Technical Workshop and will be circulated by the Secretariat to focal points and other participants for comment (see The way forward).

15. The third and fourth presentations on "*Regional strategy for improving aquatic animal health capacity in RECOFI member countries*" and "*Outline of possible contents of a regional strategy*" provided the background material and basis for the subsequent working group deliberations that will further develop the regional strategy. The draft regional strategy consisted of a vision statement, general principles and five general themes containing a total of 17 proposed activities.

Working group discussions

16. The Secretariat presented the working group discussion guidelines. It was reiterated that since one of the goals of this Technical Workshop was to undertake a strategic planning, working groups were to "brainstorm" on the outline of the Regional Programme on Aquatic Animal Health presented by the Secretariat. A general presentation was made clarifying the terminologies (e.g. programme, components, elements; planning and the planning process; difference between a policy and strategy; difference between a plan and a master plan). Furthermore, information was presented on the use of SWOT Analysis (strengths, weaknesses, opportunities and threats) as a tool to assist in defining the current regional situation, creating understanding and assisting decision-making processes in a simple manner.

17. The working groups were tasked with:

- examining the overall Programme Components and essential elements that are covered, from both regional and national perspectives and from the overall goal; and
- for each of the elements, identifying the specific activities, timeframe, responsibility, indicators and potential problems.

18. The workshop participants were divided into two working groups (WGs), with WG-1 comprising mainly of participants with technical expertise, while WG-2 included mainly individuals with a broader experience in aquaculture, policy and planning.

SWOT exercise

19. To begin the programme planning exercise, the working groups were guided to perform a simple SWOT exercise, in which they brainstormed on these various categories as they relate to the development and success of a Regional Programme for Aquatic Animal Health. The results of this exercise are presented in Appendix D.

Review of the proposed content of the regional programme

20. The working groups were invited to consider the components of the draft Regional Programme, indicating for each activity the suggested timeframe (short, medium or long-term), the priority (high, medium or low) and the agency with primary responsibility. The results where then presented in plenary. A discussion followed in which the components, elements and activities of the draft Regional Programme were revised. The results of the working group discussions are summarized in Appendix E.

Approval of the framework for the regional programme

21. During the final day of the workshop, the Secretariat presented the revised framework for the Regional Programme, which now consisted of five programme components, 18 elements and 44 activities. Discussion then followed and the framework was unanimously accepted by the workshop participants. The Secretariat was charged with developing a final draft version for approval by the WGA Focal Points and other workshop participants.

Field trip

22. During the workshop, the participants had the opportunity to visit the facilities of the National Prawn Company (NPC), located at Al-Lith, south of Jeddah. The NPC is a one of the world's largest fully integrated desert coastal shrimp (*Peneaus indicus*) farm, resulting from research and development initiated in late 1990s. Phase-I had a water spread area (WSA) of 2 800 hectares and a planned Phase-II with an additional 3 400 hectares of WSA. The NPC's codes of conduct and production methods are based on FAO's definition of "sustainable development". NPC's product-line (antibiotic-free shrimp) is currently marketed locally and internationally under the brand name "Al-Watania" and other international brand names. The NPC, a USD 350 million project, has a 2 000 multinational task force with 25 nationalities.

Technical seminar

23. The Secretariat presented four technical presentations on current topics on aquatic animal health. The presentations were timed to provide participants from a break from the WG discussions and were developed to provide information that might assist in developing the Regional Programme. The presentations were on:

- Health management in aquaculture (M.B. Reantaso).
- Lesson learned in managing the Koi herpes virus (KHV) outbreak in Indonesia and epizootic ulcerative syndrome (EUS) in southern Africa (M.B. Reantaso).
- Role of risk analysis in aquatic animal health planning and management (J.R. Arthur).
- Some practical experience in risk analysis for aquatic animals (J.R. Arthur).

24. In the presentation on "*Health management in aquaculture*", the state of the world aquaculture, risks in aquaculture production, and aquatic animal diseases as a significant constraint to aquaculture production was briefly presented. The presentation further covered health and aquatic animals, the relationship between the host, the pathogen and the aquatic environment in disease development. Examples and impacts of transboundary aquatic animal diseases, interactions between aquaculture and wild fisheries, examples of different pathogen pathways, global and national strategies in dealing with aquatic animal diseases were also presented. The conclusion emphasized that improving health and biosecurity are major challenges facing sustainable aquaculture.

25. In the presentation on "*Lessons learned in managing the Koi herpes virus (KHV)*[1] *outbreak in Indonesia and the epizootic ulcerative syndrome (EUS)*[2] *in southern Africa*," the background on the outbreak of KHV in Indonesia, the outcomes of the work of the international disease investigation task force, actions taken at international/regional, national and farm levels, and the experiences in dealing with EUS in southern Africa were duly presented. Lessons learned in both outbreaks include the importance of regional and international cooperation, the value of having in place emergency preparedness capacity, the important role of epidemiologists, pathologists and risk analysts and importance of having good diagnostics and surveillance capacities at the national level.

26. In the presentation on the "*Role of risk analysis in aquatic animal health planning and management*", a brief review of risk analysis for aquatic animal pathogens was presented. It was noted that international movements of live aquatic animals often involve a high level of risk due to the wide variety of commodities being moved (species, life stages and forms), the high level of uncertainty that is often due to lack of critical information, and the aquatic environment itself, which makes disease detection and treatment more difficult than in terrestrial situations. The advantages of a shared regional approach to pathogen risk analysis for RECOFI member countries were stressed and the characteristics of risk analysis that contribute to improving governance were briefly reviewed.

27. During the presentation on "*Some practical experiences in risk analysis for aquatic animals*", the workshop participants were guided through the risk analysis process using experiences gained from two examples of risk analyses for pathogens, one involving a proposed international movement of giant river prawn from Fiji to Cook Islands, and the other involving importation of specific pathogen free (SPF) penaeid shrimp broodstock from the United States of America to Thailand. The presentation focused on the high level of uncertainty present in most risk analyses due to the lack of information on pathogen distribution and biology, and on the value of a precautionary approach that includes good risk management measures to reduce the risk of pathogen introduction in such situations.

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[1] Koi herpes virus is a serious disease affecting the high value ornamental Koi carp and the important food fish common carp; a classical example of a disease which originated from an ornamental to cultured fish and eventually affected wild fisheries.

[2] Epizootic ulcerative syndrome (EUS) is a significant finfish disease affecting both cultured and wild fish species; until 2006, the distribution of EUS was only in many Asian countries, Australia, Japan and the United States of America; confirmed in southern Africa (Botswana, Namibia and Zambia) in 2007 with outbreaks first occurring in this region in 2006.

THE WAY FORWARD

28. During the final workshop session, the Secretariat presented the interim work, i.e. proposed future activities that will need to be accomplished to complete the proposal for a Regional Programme and the agencies responsible for completing each task, along with a proposed timeframe (see Appendix F). The major outputs arising from the workshop will be (included in this report as appendixes as indicated below):[3]

1. RECOFI regional aquatic animal health capacity and performance survey: summary of survey results and analysis (Appendix G)[4]; and
2. Proposal for a regional programme for improving aquatic animal health in RECOFI member countries (Appendix H)[5].

CLOSING REMARKS

29. The workshop participants acknowledged the importance of planning and implementing national level activities, such as the identification of focal point/national coordinator/competent authority; national review of legislation, formation of national committee, general planning for national strategy development, collection of more detailed information, as a first step towards improving aquatic animal health issues in the region.

30. On behalf of the workshop participants, the Chairperson of the RECOFI-WGA, Mr Dawood Suleiman Al-Yahyai, thanked the efforts made by the Secretariat in organizing this technical workshop and invited all RECOFI-WGA focal points to circulate and discuss the draft "Proposal for a regional programme for improving aquatic animal health in RECOFI member countries" with all relevant national authorities in order to ensure a fruitful discussion during the next RECOFI session scheduled to take place in the United Arab Emirates next May 2009.

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[3] Final drafts of these documents prepared by the Secretariat were distributed in early June 2008 to RECOFI-WGA focal points and workshop participants for comment and approval.

[4] To be cited as: **Arthur, J.R., Reantaso, M.B. and Lovatelli, A.** 2008. RECOFI regional aquatic animal health capacity and performance survey: summary of survey results and analysis. In FAO/Regional Commission for Fisheries. Report of the Regional Technical Workshop on Aquatic Animal Health. Jeddah, Kingdom of Saudi Arabia, 6–10 April 2008. *FAO Fisheries and Aquaculture Report.* No. 876. Rome, FAO. pp. 21–99.

[5] To be cited as: **RECOFI.** 2008. Proposal for a regional programme for improving aquatic animal health in RECOFI Member countries. In FAO/Regional Commission for Fisheries. Report of the Regional Technical Workshop on Aquatic Animal Health. Jeddah, Kingdom of Saudi Arabia, 6–10 April 2008. *FAO Fisheries and Aquaculture Report.* No. 876. Rome, FAO. pp. 101–118.

APPENDIX A

Workshop agenda

Day	Activities
Saturday, 5 April	Arrival of participants to Jeddah, Kingdom of Saudi Arabia
Day 1 Sunday, 6 April	
09.00–17.00	Opening ceremony
	Background and objectives of the workshop
	Self-introduction of workshop participants
	Current status and future trends in aquaculture development in the RECOFI region
	Harmonization of international and regional planning and policy for aquatic animal health – experiences from Asia and elsewhere
	Working lunch
	Outcomes of the RECOFI Regional Aquatic Animal Health Capacity and Performance Survey
	Discussion
Day 2 Monday, 7 April	
09.00–17.00	Regional strategy planning
	Brief presentation on the outline of a regional strategy
	Brief backgrounder on the major elements of a regional strategy
	Working group mechanics and discussion
Day 3 Tuesday, 8 April	
09.00–17.00	Field trip to National Prawn Centre (NPC)
Day 4 Wednesday, 9 April	
09.00–12.00	Continue regional strategy planning/working group discussion
	Working group presentations
	Discussion
13.30–17.00	Technical seminar
	Global perspectives in managing aquatic animal health
	Role of risk analysis in aquatic animal health planning and management
	Lessons in managing the Koi herpes virus outbreak in Indonesia and epizootic ulcerative syndrome incursion in south Africa
	Some practical experiences in pathogen risk analysis
Day 5 Thursday, 10 April	
09.00–17.00	Presentation of regional strategy
	Discussion, adoption of strategy and way forward
	Closing ceremony
Friday, 11 April	Departure of participants

APPENDIX B

List of participants

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APPENDIX C

Workshop prospectus

Background

During the fourth session of the Regional Commission for Fisheries (RECOFI), held from 7 to 9 May 2007 in Jeddah, Kingdom of Saudi Arabia (KSA), the Commission endorsed the implementation of activities towards the preparation of a "regional strategy on aquatic animal health" as part of the work plan of the Working Group on Aquaculture (WGA). The activities include: (i) assessment of institutional and human resource capacities on aquatic animal health at national level through a questionnaire survey, and (ii) organization of a regional workshop to present the results of the survey, brainstorm on the development of a regional aquatic animal health strategy and conduct a technical seminar as part of capacity building to raise awareness on various issues and concepts of aquatic animal health management.

The preparatory work for the strategy development was finalized in Kuwait in November 2007 during the Technical Meeting of the RECOFI Regional Aquaculture Information System. These include: (i) finalization, implementation and analysis of the questionnaire survey (December 2007 to February 2008); (ii) implementation of a regional technical workshop in Jeddah, Kingdom of Saudi Arabia (April 2008) and (iii) preparation and finalization of a proposal for a regional aquatic animal health development programme.

Technical workshop on aquatic animal health

Purpose: The objectives of the workshop are to:

(i) present the outcomes of the RECOFI Regional Aquatic Animal Health Capacity and Performance Survey;
(ii) prepare and finalize a proposal and an initial action plan for a regional aquatic animal health development programme based on the outcomes of the regional survey, workshop brainstorming and deliberation;
(iii) undertake a technical seminar on important and emerging issues concerning aquatic animal health.

Participation: The regional workshop will be attended by representatives of the eight RECOFI member countries (Bahrain, Islamic Republic of Iran, Iraq, Kuwait, Oman, Qatar, Kingdom of Saudi Arabia and the United Arab Emirates), FAO staff and selected technical staff of the Fish Farming Center in Jeddah involved in aquatic animal health.

Process: Plenary presentations, working group discussions, field trip (refer to Provisional Programme).

Products:

- RECOFI Regional Aquatic Animal Health Capacity and Performance Survey Report.
- Draft proposal for a regional aquatic animal health development programme including activities at short-, medium- and long-term timeframe. This will provide possible national and regional recommendations for actions and targeted activities that will require funding, thus for consideration at the next RECOFI Session in 2009.
- Awareness and capacity building on aquatic animal health.
- Regional workshop report.

Further information (hotel venue, participant list, and other logistic arrangements) on the workshop will be circulated as soon as available; any specific inquiries can be done by writing to:

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APPENDIX D

Results of the SWOT analysis

STRENGTHS	
Early bird	• Time • Early actions in developing a strategy
Funding opportunities	• Funds
Institutional support	• Government support • Importance of aquaculture • Government committed to develop aquaculture and environmental protection
Human resources	• Available unskilled manpower • Manpower available for training • Establishment of RECOFI-WGA
Legal support	• Strong legislation • Enforcement taken seriously • General legislation on animal health
Shared resource	• Same water body (Gulf)
International relations	• Good international relations with relevant organizations (e.g. World Organisation for Animal Health)
Pristine environment	• Good regional health status • Pristine environment
Rich biodiversity	• High biodiversity

WEAKNESSES	
No targeted legislation	• Weak legislation relevant to aquatic animal health
Human resource deficiencies	• Lack of skilled manpower • Lack of experts • Lack of capacity to carry out risk analysis
Inadequate institutional support	• Lack on national plans • Too many governments involved • No strategy • No budget • Lack of facilities • Lack of extension services • Limited health awareness • Poor regional coordination, communication and networking • Lack of database • Lack of aquaculture society
Investment difficulties	–

OPPORTUNITIES	
Information and networking	• Available fish disease database for consultation and reference • Increased networking among the countries in the region • International linkages
Standards and protocols	• Developed aquatic health techniques and research • Application of bio-security standards and protocols to aquaculture projects
Diagnosis capacity	• Establishments of reference labs
Environmental sustainability	• Protection of marine resources and biodiversity • Environmental protection
Production	• Sustainable aquaculture production • Increased aquaculture production • Increase sustainable investments in the region • foreign and local investment opportunities
Trade	• Increase intra-regional trade (GCC) • Improve fish quality (fresh and processed) • Improved marketing • Increased export revenues

THREATS	
Government support	• Poor interest • Limited follow-up • No action continuity (change of responsible officials) • Lack of broader aquaculture development strategy • Lack of legal framework • Poor enforcement
Financial implications	• Increased costs (surveillance)

APPENDIX E

Outcomes of the working group deliberations on the timeframe, priority and agency with primary responsibilities for the different elements of the regional strategy programme components

PROGRAMME COMPONENT 1 – Improving capacity for governance

Element	Activities	Timeframe (S, M, L)[6]	Priority (H, M, L)[7]	Responsibility
Coordinating national policy and planning	Workshop on standardization of basic requirements for national policy and planning	S	H	RECOFI
Improving and harmonizing legislation and regulation	Review of national aquatic animal health legislation	M	H	RECOFI
	Workshop on harmonizing legislation and regulation	M	H	RECOFI

PROGRAMME COMPONENT 2 – Improving capacity for disease diagnostics

Element	Activity	Timeframe (S, M, L)	Priority (H, M, L)	Responsibility
Improving diagnostic capability	Training on recent laboratory techniques	L	H	RECOFI member
	Workshop on regional fish disease diagnosis	M	M	RECOFI member
	Postgraduate study in fish pathology	L	M	Government
	inviting fish disease experts	S	H	RECOFI member
Regional diagnostic laboratory	Establishing regional laboratory	M	H	RECOFI member
	Improving existing national laboratories	M	H	Government
	Updating laboratory equipment	S	M	Government
Pathogen database	Continuous updating of the Regional Aquaculture Information System (RAIS) Web site	S	H	RECOFI member
	Sharing information with other regions	S	H	Focal Point
	Establishing a pathogen list for each country	S	H	Focal Point

[6] **S** = Short; **M** = Medium; **L** = Long.
[7] **H** = High; **M** = Medium; **L** = Low.

PROGRAMME COMPONENT 3 – Improving capacity for aquatic biosecurity

Element	Activities	Timeframe (S, M, L)	Priority (H, M, L)	Responsibility
Regionally standardized guidelines/procedures for new aquaculture species	Review of guidelines and procedures for introduction of new species	S	H	Expert
	Workshop for formulation of guidelines	S	H	WGA and Expert
	Adoption of guidelines and procedures	M	M	Government
Improving risk analysis capacity	Review of capability available in the region	S	H	Expert
	Training workshop on risk assessment	S	H	WGA and Expert
Improving national/ regional disease surveillance, monitoring and reporting	Review of existing capabilities and protocols	M	M	Expert
	Workshop for developing the system	M	M	Expert and WGA
	Establishment of aquatic animal health reporting system, including local and regional focal points	L	H	WGA, Expert and Government
Improving regional emergency response planning	Workshop to help RECOFI member countries establish a contingency plan that should include but is not limited to: – Establishing emergency task force – Actions to be taken in the case of outbreak – Infrastructure and financial resources – Simulation exercise (mock drill) – Assessment – Awareness	M	M	Expert and WGA
Improving national pathogen lists and establishing a regional list	Preparation of national pathogen lists based on international standards	S	H	Government
	Workshop on regional pathogen lists	M	H	Expert and WGA
Improving health certification and regionally standardized health certificates for aquatic animals	Review of current practices for health certification for import and export	S	H	Expert
	Workshop for standardization of health certification	S	H	Expert and WGA
	Adoption of standard format	M	H	Government
Review of border inspection/quarantine procedures	Review of current practices for border inspection and quarantine procedures	M	M	Expert
	Workshop on regional guidelines and standards	M	M	Expert and WGA
	Adoption of procedures	L	M	Government
Zoning	Workshop for general principles for zoning	–	–	–

PROGRAMME COMPONENT 4 – Improving capacity to access information

Element	Activity	Timeframe (S, M, L)	Priority (H, M, L)	Responsibility
Import and export database	Health certificate requirements	L	H	Government
	Information on numbers of animal and species	S	H	Government
	Information about species available in each country	S	H	Government
Legislation database	Information on national legislation of RECOFI member countries relevant to aquatic animal health	L	H	Government
Expert database	Introducing aquatic animal health experts in each field	M	M	Government

PROGRAMME COMPONENT 5 – Improving regional links

Element	Activity	Timeframe (S, M, L)	Priority (H, M, L)	Responsibility
Import and export database	Health certificate requirements	L	H	Government
	Information on numbers of animal and species	S	H	Government
	Information about species available in each country	S	H	Government
Legislation database	Information on national legislation of RECOFI member countries relevant to aquatic animal health	L	H	Government
Expert database	Introducing aquatic animal health experts in each field	M	M	Government
Regional aquatic animal health Web site	Linkage with national and global aquatic animal health Web site	M	H	RECOFI member
Regional aquatic animal health meeting	Arranging regular meetings	S	H	RECOFI member
	Organizing a symposium on disease affecting farmed species in the Region	L	M	RECOFI member

APPENDIX F

Interim work and agency responsibilities

During the final workshop session a proposed list of future activities and actions required to complete the proposal for a Regional Programme on Aquatic Animal Health and the agencies responsible for completing each task was discussed and agreed along with a proposed timeframe.

Activities	**Responsibility**			**Timeframe**
	FAO	**WGA**	**Countries**	
Finalization of the regional survey	x		x	June 2008
Finalization of the workshop report	x			June 2008
Finalization of the regional programme concept paper	x			June 2008
First round – Circulation of the above three documents to workshop participants for final comments	x	x	x	July 2008
Printing and distribution of the documents	x			September 2008
Second round – Circulation to higher RECOFI member country officials		x	x	
Presentation to fifth RECOFI Session	x	x		May 2009
Intersessional activities at national and regional levels				
Planning and implementation of identified national level activities (e.g. identification of focal point/national coordinator/competent authority; national review of legislation, formation of national committee, general planning for national strategy development, collection of more detailed information)		x	x	Now to progress reporting during the next WGA meeting planned to take place in Oman in December 2008
Planning and implementation of identified regional activities (e.g. planning workshop for national strategy development)	x	x		Now to May 2009

APPENDIX G

RECOFI regional aquatic animal health capacity and performance survey: Summary of survey results and analysis

by

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Arthur, J.R., Reantaso, M.B. and Lovatelli, A. 2009. RECOFI regional aquatic animal health capacity and performance survey: Summary of survey results and analysis. In FAO/Regional Commission for Fisheries. Report of the Regional Technical Workshop on Aquatic Animal Health. Jeddah, Kingdom of Saudi Arabia, 6–10 April 2008. *FAO Fisheries and Aquaculture Report.* No. 876. Rome, FAO. pp. 21–99.

CONTENTS

BACKGROUND

The RECOFI Working Group on Aquaculture (WGA), during its third meeting in Jeddah, Kingdom of Saudi Arabia (KSA), in May 2007, endorsed the implementation of activities towards the preparation of a "regional strategy on aquatic animal health". The activities include: (i) assessment of institutional and human resource capacities on aquatic animal health at the national level through a questionnaire survey; and (ii) organization of a regional workshop to present the results of the survey, brainstorm on the development of a regional aquatic animal health strategy and conduct a technical seminar as part of capacity building to raise awareness on various issues and concepts of aquatic animal health management. The preparatory work for the strategy development was finalized in Kuwait in November 2007 during the Technical Meeting of the RECOFI Regional Aquaculture Information System. This includes: (i) finalization, implementation and analysis of the questionnaire survey (December 2007 to March 2008); (ii) implementation of a regional technical workshop in Jeddah, Kingdom of Saudi Arabia (6–10 April 2008); and (iii) preparation and finalization of a proposal for a regional aquatic animal health development programme.

PURPOSE

The purpose of this survey is to obtain information on national capacity and the agencies mandated to implement aquatic animal health programmes for the eight RECOFI member countries (Bahrain, Islamic Republic of Iran, Iraq, Kuwait, Oman, Qatar, Kingdom of Saudi Arabia and the United Arab Emirates). The survey also collects relevant information essential to support the development of the aquaculture sector through healthy aquatic production and seeks opinions on the components and activities that might be included in a regional aquatic animal health programme. The results of this survey will help guide regional and national strategic planning for improving aquatic animal health and assuring adequate and rational support services to achieve sustainable aquaculture development.

SURVEY STRUCTURE AND PROCESS

The scope of the survey and the associated survey form were jointly developed by the Food and Agriculture Organization of the United Nations (FAO), Fisheries and Aquaculture Department, Aquaculture Management and Conservation Service (FIMA) officers (R.P. Subasinghe, M.B. Reantaso and A. Lovatelli) and the FAO International Consultant (J.R. Arthur). The finalized survey questionnaire was sent by e-mail to the RECOFI Working Group on Aquaculture (WGA) National Focal and Alternate Points in late December 2007, with instructions that it should be completed by the national competent authority or other senior government officer with primary responsibility for national aquatic animal heath issues, with the assistance of national aquaculture experts and concerned laboratory personnel. The completed survey was to be returned to FAO by the first week of February 2008. Using the completed survey returns, FAO's International Consultant was to prepare a document summarizing the results of the survey returns and an analysis of the complete results. The summary and analysis of survey returns, as well as an outline for a regional programme based on the survey and other relevant sources of information, were then presented during the RECOFI Regional Workshop on Aquatic Animal Health, held in Jeddah, Kingdom of Saudi Arabia, from 6 to 10 April 2008. The initial draft document served as a basis for discussion and further elaboration of a regional aquatic animal health development programme, including recommendations for implementation, during a brainstorming exercise that was undertaken during the regional workshop.

The survey questionnaire contains 18 sections pertaining to: (1) international trade in live aquatic animals and national border controls; (2) control of domestic movement of live aquatic animals and other domestic activities that may spread pathogens; (3) policy and planning; (4) legislation; (5) disease surveillance/monitoring; (6) disease diagnostics; (7) emergency preparedness and contingency planning; (8) extension services; (9) compliance/enforcement; (10) research; (11) training; (12) expertise; (13) infrastructure; (14) linkages and cooperation; (15) funding support;

(16) current challenges; (17) constraints; and (18) additional information (a blank Survey Questionnaire is appended as Annex I).

PREPARATION OF THE SURVEY SUMMARY AND ANALYSIS

Survey forms were returned by the focal points of all eight RECOFI member countries. A list of people completing the survey questionnaire is given as Annex II. Checking of forms for completeness and collation of data were carried out by the international consultant. During compilation of the survey results, missing or incomplete data for some questions were encountered and responses occasionally required further clarification. Lists of these issues were prepared for each country and all respondents were again contacted by e-mail and requested to provide further specific information, as needed. Responses to requests for clarification were returned by all countries completing the survey except Kuwait.

The results of the survey are presented in this document in tabular form, the sequence of presentation of information following the sequence of Sections and Questions used in the RECOFI Regional Aquatic Animal Health Capacity and Performance Survey form (see Annex I). During preparation of this summary, responses have been edited for English language and to reduce length; however, all significant information provided in the original survey forms has been retained. For each of the 18 sections of the survey questionnaire, a written Summary of results detailing important features of the results is presented, which is followed by an Analysis of the significance of the results with regard to current and future development of aquatic animal health capacity in the RECOFI region. Original survey forms and clarification sheets as completed by the respondents for each country are retained by FAO.

Results of the survey questionnaire have been summarized in tabular form and are cross-referenced to the original survey questionnaires, with each table caption providing a reference to the sections of the questionnaire covered by that table. Additionally, where relevant, individual table column headings are accompanied by numbers (given in parentheses) indicating the precise question for which results are summarized.

The following abbreviations are used throughout the summary tables:

- AAH = Aquatic animal health
- HC = Health certificate
- NA = Not applicable (question or portion of question was not applicable to the country situation)
- NI = Not indicated (specific information not provided by respondent)
- NR = No response (respondent did not reply to question)

Additionally, quotation marks appearing in table entries indicate instances where the response was left as originally answered.

SECTION 1. INTERNATIONAL TRADE IN LIVE AQUATIC ANIMALS AND NATIONAL BORDER CONTROLS

A. Relevant international memberships

Summary of results

Table 1A summarizes the status of RECOFI member countries with regard to membership in the World Organisation for Animal Health (OIE) (www.oie.int) and the World Trade Organization (WTO) (Survey Questionnaire Parts 1.1–1.3). All eight RECOFI member countries are also members of the OIE, while six of the eight countries are members of the WTO (the exceptions being the Islamic Republic of Iran and Iraq, both of which have observer country status).

Analysis

Membership of countries in international bodies such as the OIE and WTO requires that countries abide with the conditions of membership, thus placing obligations upon the Competent Authorities in terms of implementation and compliance with the provisions embodied in those agreements and memberships.

The World Organisation for Animal Health, created in 1924 as the Office international des épizooties (OIE), is the intergovernmental organization responsible for improving animal health worldwide. As of July 2008, the OIE had a total of 172 member countries and territories. The OIE maintains permanent relations with 35 other international and regional organizations and has regional and subregional offices on every continent. Worldwide aquatic animal health is protected and maintained through its *Aquatic Animal Health Code* (the "Code"), and *Manual of Diagnostic Tests for Aquatic Animals* (the "Manual", available at: www.oie.int/eng/normes/fmanual/A_summry.htm?e1d11). The OIE Aquatic Animal Health Standards Commission prepares these standards with assistance of internationally renowned experts and also oversees OIE's activities on aquatic animal health (www.oie.int/aac/eng/en_fdc.htm).

One of the main objectives of the OIE, within its mandate under the World Trade Organization's *Agreement on the Application of Sanitary and Phytosanitary Measures* (SPS Agreement) is to safeguard the world trade by publishing health standards for international trade in animals and animal products. OIE's main normative work on aquatic animals is articulated through the Code and Manual, which provide a range of tools that assist OIE member countries in preventing and controlling aquatic animal diseases. OIE's programme is based on a broad combination of activities, including listing of serious diseases of international importance; disease surveillance, monitoring, and reporting; contingency planning; disease zoning; standardized diagnostics testing; use of international health certificates; risk analysis; designation and evaluation of competent authorities; etc.

As OIE members, all RECOFI member countries, are obligated to apply the various standards and procedures as outlined in the Code and Manual. In addition to other monthly and annual reporting responsibilities to the OIE, the National Veterinary Services of OIE member countries are obligated to immediately report (within 24 hours):

- for OIE-listed diseases, (i) the first occurrence or re-occurrence of a disease in a country or zone or compartment of the country, if the country or zone or compartment of the country was previously considered to be free of that particular disease; or (ii) if the disease has occurred in a new host species; or (iii) if the disease has occurred with a new pathogen strain or in a new disease manifestation; or (iv) if the disease has a newly recognized zoonotic potential; and
- for diseases not listed by the OIE, if there is a case of an emerging disease or pathogenic agent, should there be findings that are of epidemiological significance to other countries.

The World Trade Organization (WTO) (www.wto.org/) is an international organization with headquarters in Geneva, Switzerland, designed to supervise and liberalize international trade. The

WTO was established on 1 January 1995 and is the successor to the General Agreement of Tariffs and Trade (GATT). The WTO deals with the rules of trade between nations at a near-global level. It is responsible for negotiating and implementing new trade agreements and is in charge of policing member countries' adherence to all WTO agreements.

The WTO is concerned with aquatic animal health to the extent that the occurrence of aquatic animal diseases may be used to restrict trade in aquatic animals and their products between WTO member countries. Rules for the application of sanitary measures to protect member countries from serious diseases that may be spread via international trade are outlined under the *Agreement on Sanitary and Phytosanitary Measures* (the SPS Agreement, see www.wto.org/english/docs_e/legal_e/15-sps.pdf). The WTO has recognized the OIE as the reference organization for aquatic animal health issues. In general, sanitary measures above those specified in the OIE Code must be justified by risk analysis.

The membership of all RECOFI member countries in the OIE and of six of eight countries in the WTO provides RECOFI member countries with a common, agreed-upon formal methodology and structure (as outlined in the OIE Code and Manual) for conducting trade in live aquatic animals and which can be used in developing national and regional aquatic animal health programmes.

The possible existence of regional agreements and other cooperation bodies that may have relevance to promoting and supporting aquatic animal health in the RECOFI region should be explored.

Table 1A. Relevant international memberships (Questionnaire Parts 1.1–1.3)

Country	(1.1) OIE member	(1.2) OIE official delegate[1]	(1.3) WTO member	Notes
Bahrain	Yes	Dr Salman Abdul Nabi Director of Animal Wealth Directorate Ministry of Municipality Affairs and Agriculture PO Box 251, Manama	Yes	Dr Fajer Al-Salloom (OIE focal point and Chief of Veterinary Diagnosis Laboratory) Ministry of Municipality Affairs and Agriculture Animal Wealth Directorate Veterinary Services Section
Iran (Islamic Republic of)*	Yes	Dr Mojtaba Noorouzi Head of Iran Veterinary Organization Ministry of Jihad-e-Sazandegi Vali, Asr Avenue Seyd Jamaledin Asad Abadi St. PO Box 14155, 6349 Tehran	No (Observer)	The Iran Veterinary Organization (IVO) is the legally competent authority for purposes of reporting health status of all kinds of animal, including aquatic animals.
Iraq	Yes	Dr Dawood M. Sharief Director General Iraqi Veterinary Services Ministry of Agriculture Wazeryia, Baghdad	No (Observer)	–
Kuwait	Yes	Dr Nabeela Al Khaleel Deputy Director General for Animal Resources The Public Authority for Agriculture Affairs and Fish Resources PO Box 21422, 13075 Safat	Yes	–

Oman	Yes	Dr Ali Abdullah Al Sahami Assistant Director General General Directorate of Animal Wealth Ministry of Agriculture PO Box 467, PC 113 Muscat	Yes	In 2006, the Ministry of Agriculture and Fisheries, which was the agency responsible for procedures for import and export of live fish, was separated into the Ministry of Agriculture and the Ministry of Fisheries. Procedures remain the same but now two ministries share responsibilities.
Qatar	Yes	Dr Kassem Nasser Al-Qahtani Director of Animal Resources Department Ministry of Municipal Affairs and Agriculture Department for Agriculture Research and Development PO Box 23211, Doha	Yes	–
Saudi Arabia (Kingdom of)*	Yes	Dr Abdulghani Y. M. Al Fadhl Director General Ministry of Agriculture Animal and Plant Quarantine Department 11195 Riyadh	Yes	Dr Anwar Essa Al-Sunaihe, Chief of Aquatic Animal Health, is the Fisheries Representative of the Ministry of Agriculture and is responsible for coordination with the OIE Delegate for the Kingdom of Saudi Arabia with regard to aquatic animal diseases.
United Arab Emirates*	Yes	Dr Mohamed Mousa Abdullah Director General Animal Wealth Department Ministry of Environment and Water PO Box 1509, Dubai	Yes	–

[1] As information supplied by the respondents was often incomplete, this data was obtained from the Web site of the World Organisation for Animal Health (http://www.oie.int/eng/OIE/PM/en_PM.htm?e1d1).

* **Note**: For convenience the names of the following countries have been abbreviated as follows: Kingdom of Saudi Arabia = KSA; Islamic Republic or Iran = Iran IR; and United Arab Emirates = UAE.

B. Legislation relevant to aquatic animal health

Summary of results

Results of the portion of the survey questionnaire dealing with national legislation relevant to aquatic animal health (Parts 1.4–1.5) are summarized in Table 1B. Seven of the eight RECOFI member countries (the exception being Qatar) indicated the existence of some legislation relevant to aquatic animal health for their country.

Analysis

Among RECOFI member countries, relevant legislation varies from nonexistent (Qatar), through to numerous laws and regulations scattered in various legal documents (Bahrain, Oman, Kingdom of Saudi Arabia), some which are specific to veterinary or aquaculture law (Islamic Republic of Iran, Oman, Kingdom of Saudi Arabia, United Arab Emirates). It is clear from the information provided in Table 1B and from assessment of Current challenges (Section 16) and Constraints (Section 17), that a more in-depth review of the relevant national legislation is needed. This review and revision of national legislation should be done in conjunction with development of national aquatic animal health strategies and plans, which should be harmonized, as far as possible, with national biosecurity, veterinary, aquaculture, conservation and marine resource law, and support standardized aquatic animal health procedures, as far as possible, across all RECOFI member countries.

Table 1B. Existence of national legislation relevant to aquatic animal health for RECOFI member countries (Questionnaire Parts 1.4–1.5)

Country	(1.4) Relevant legislation exists?	(1.5) If "Yes", brief description of legislation containing sections relevant to aquatic animal health
Bahrain	Yes	• **Royal Decree on Exploitation and Utilization of the Marine Resources: i**ssued in 2002, has provisions for controlling the culture of organisms used in aquaculture, such as licensing and quality issues. According to the law, a company may not undertake any aquaculture activity without permission from the authorized government body (Directorate of Marine Resources). It also controls the collection of seed from the wild. The export of live aquatic animals is licensed by the General Directorate for Protection of Marine Resources. The import is under supervision of the Ministry of Health, which requires a health certificate and may apply quarantine measures.
Iran IR	Yes	• **Act of Iran Veterinary Organization**: ratified by the senate on 14 June 1974, provides for the health of animals and relevant products and the prevention and control of animal diseases. The Iran Veterinary Organization, under the Ministry of Agriculture, is the national competent authority and is administered by a General Director appointed by the Minister of Agriculture from holders of the DVM degree.
Iraq	Yes	• The law includes many issues related to animal diseases, and one of them relates to fish diseases: **Act No. 38 for 1936 (Septic Disease Law)**.
Kuwait	Yes	• "This legislation deals with all kind of animals of having an import and export paper confirming the health of the imported and exported animals."

Oman	Yes	• **Law of Fishing and Protection of Living Aquatic Resources (RD 53/1981, revised RD 59/1993):** contains many bylaws, including those dealing with import/export of fish. These are the **By-law for Aquaculture and Quality Control of Cultured Organisms** and the **By-law for Quality Control of Exported Fish**. Currently, this law is under revision to cope with the development of the fisheries sector. • **By-law for Aquaculture and Quality Control of Cultured Organisms (MD 36/2004):** includes some general rules for quarantine procedures and fish importation requirements; culture of exotic species is prohibited without permission; states all requirements for quality of aquaculture organisms and hygienic issues of farms. • **Quality Control Regulation for Omani Fishery Exports (MD 136/1998):** deals with aspects of quality control for exported fish, including specifications for frozen fish, chilled fish, and chilled and frozen crustaceans. • **Veterinary System in Gulf Council Countries (RD 93/2000) and the By-law of Veterinary System (MD 8/2001**): requires that export and import of all animals and their products (including fish) be first approved by the Ministry of Agriculture and Fisheries; prohibits import of animals from infected countries; requires accompanying documents for imported shipments of animals (including live fish) to include an international health certificate issued by the government of the exporting country; provides for quarantine and checking of violating shipments; shipment not to be released without required documents; quarantine authority can conduct necessary procedures, including testing of specimens and vaccination to ensure freedom from disease and fitness for human consumption. For live fish, shipments should be in good condition and free of OIE-listed diseases and of any pollutants harmful to humans, animals or the environment. See Annex III for details
Qatar	No	–
KSA	Yes	• Quality control legislation for imported aquatic animals. • Good laboratory Practice Manual: Export of Cultured Shrimps and Cultured Shrimp Products to the European Union. • Legislative measures of the Department of Aquaculture.
UAE	Yes	• **Federal Law Number (6) of the Year 1979 Concerning Veterinary Quarantine:** specifies the general requirements for quarantine and inspection of live animals and their products. Does not specifically mention fish or other aquatic animals or include aquatic animal diseases in the schedule of epidemic and contagious diseases. Consignments of animals to be accompanied by an official veterinary health certificate issued by the exporting country showing that they have been checked directly before shipment and found free of contagious diseases. • **Veterinary System in Gulf Council Countries (RD93/2000):** living animals imported from non-infected areas and accompanied by official health certificates stating freedom from contagious diseases are only subject to examination upon arrival.

C. Trade in live aquatic animals and use of health certification

C.1 Exports

Summary of results

Survey results relating to the export of live aquatic animals by RECOFI member countries are presented in Tables 1C and 1D (Survey Questionnaire Parts 1.6–1.7). To provide a clearer picture of the nature of exportations, data have been subdivided into exports of live food fishes (includes crustaceans) (Table 1C) and exports of ornamental aquatic animals (Table 1D). Based on available data, there is only a very limited export of live food fishes. Bahrain exports some three million juvenile hatchery-produced Gilthead seabream (*Sparus aurata*) and Sobaity seabream (*Sparidentax hasta*) to other RECOFI member countries for grow out in marine culture systems. The Islamic Republic of Iran exports some 46 500 kg of freshwater crayfish to the European Union. The Kingdom of Saudi Arabia also exports a small quantity of live food fishes to Egypt, Taiwan Province of China and China, Hong Kong Special Administrative Region. Ornamental fishes are also exported by Bahrain, Kingdom of Saudi Arabia and the United Arab Emirates in limited quantities. Combined estimated total value of exportations by the eight RECOFI member countries is approximately USD 1.58 million.

Table 1E provides a summary of survey results relating to use and type of health certificates that are provided by RECOFI member countries to their trading partners. Bahrain, Islamic Republic of Iran, Kingdom of Saudi Arabia and the United Arab Emirates provide health certificates for exported live aquatic animals at the request of importing countries. For Bahrain, the General Directorate of Marine Resources provides health certificates to "Other standards (visual or other)". The Iran Veterinary Organization (IVO) provides health certificates for crayfish exported to the European Union (EU) to the standards specified by EU Directives and Regulations, while the Department of Aquaculture, Ministry of Agriculture, Kingdom of Saudi Arabia provides certificates that meet OIE standards (where possible) or to other standards as specified by the importing country. The United Arab Emirates also provides health certificates for re-exports of ornamental fishes to "Other standards (visual or other)".

Analysis

Exportation of both food fishes and ornamentals by RECOFI member countries is presently quite limited, indicating the potential for significant growth through increased aquaculture production. More detailed information on exportations and on future projections for aquaculture development is needed to fully understand trading patterns and the demands placed on competent authorities for issuance of health certificates. More accurate and complete data on live exports, including information on species compositions, life history stages, numbers of animals by species, origins, health status, destinations, etc. should be systematically collected and stored in a national database in a format that is easily retrievable for use by policy planners.

Further information is required to clearly understand the nature of the health certificates provided by Bahrain and Kingdom of Saudi Arabia. Examples of completed health certificates as provided to importing countries should be examined. It appears that health certificates issued by Bahrain and the United Arab Emirates are of a general nature (indicating absence of clinical disease based on general appearance of health), while the ability of the Kingdom of Saudi Arabia to issue international health certificates may be limited by the ability of its diagnostic laboratories to test for OIE-listed diseases.

To fully access international markets, RECOFI member countries will need to be able to provide health certificates based on testing for pathogens as specified by importing countries to the standards given in the OIE *Aquatic Animal Health Code* and *Manual of Diagnostic Tests for Aquatic Animals*. Issuance of such international health certificates requires a high level of diagnostic capability. A more detailed review of current health certification practices is thus needed.

Table 1C. Summary of exportations of live food fishes by RECOFI member countries (Questionnaire Parts 1.6–1.7, In Part)

Country	(1.6) Exports aquatic animals?	(1.7) If "Yes", principal species exported, volumes, estimated values, destinations				
		Year	Species/life stage	Quantity (units)	Value (USD)	Destination
Bahrain	Yes	2007	*Sparus aurata* juv *Sparidentex hasta* juv	2 675 739 pcs 347 652 pcs 3 023 391 pcs	744 627 96 966 841 593	UAE, KSA, Oman UAE, KSA
Iran IR	Yes	–	Freshwater crayfish (*Astacus leptodactylus*)	46 500	116 250	European Union
Iraq	No	–	–	–	–	–
Kuwait	No	–	–	–	–	–
Oman	No	–	–	–	–	–
Qatar	No	–	–	–	–	–
KSA	Yes	2005	Other live fish	25 tonnes[1]	7 734[2]	Egypt, Taiwan PC, China, Hong Kong SAR
UAE	No	–	–	–	–	–

[1] Volume for the Kingdom of Saudi Arabia is for total gross weight of shipment.
[2] Converted from Saudi Riyals using an average historical rate for 2005 of SAR 1 = USD 0.26668.

Table 1D. Summary of exportations of live ornamental fishes by RECOFI member countries (Questionnaire Parts 1.6–1.7, In Part)

Country	(1.6) Exports aquatic animals?	(1.7) If "Yes", principal species exported, volumes, estimated values, destinations				
		Year	Species	Quantity (units)	Value (USD)	Destination
Bahrain	Yes	2005	NI	95 000	540 000	Gulf Cooperation Council (GCC)[1], Middle East
Iran IR	No	–	–	–	–	–
Iraq	No	–	–	–	–	–
Kuwait	No	–	–	–	–	–
Oman	No	–	–	–	–	–
Qatar	No	–	–	–	–	–
KSA	Yes	2005	NI	162 MT[2]	75 550[3]	>31 countries/territories in Middle East, Asia, Europe, North America, Africa
UAE	Yes[4]	2007	NI	156 138 pcs	NI	NI

[1] Authors' note: the Gulf Cooperation Council seeks to strengthen cooperation in areas such as agriculture, industry, investment, security, and trade among its six members – Bahrain, Kuwait, Qatar, Oman, Kingdom of Saudi Arabia and United Arab Emirates.
[2] Volumes for the Kingdom of Saudi Arabia are for total gross weight of shipment.
[3] Converted from Saudi Riyals using an average historical rate for 2005 of SAR 1 = USD 0.26668.
[4] Noted to be re-exportation.

Table 1E. Summary of health certification (HC) provided for exported aquatic animals (Questionnaire Parts 1.8–1.9)

Country	(1.8) Health certificate issued?	(1.9) If "Yes", is health certificate (HC) issued?			Notes
		An international HC to OIE standards?	As required by importing country (Non-OIE standard)?	To other standards (Visual or other)?	
Bahrain	Yes	No	No	Yes	• HC and export permit issued by General Directorate of Marine Resources, Kingdom of Bahrain, PO Box 20071 Manama, Bahrain Fax: +973 1772 8459 • Importing countries emphasized to follow OIE standards.
Iran IR	Yes	No	Yes	Yes	• HC issued by IVO according to EU Directives and Regulations
Iraq	NA	–	–	–	• Does not export live aquatic animals
Kuwait	NA	–	–	–	• Does not export live aquatic animals
Oman	NA	–	–	–	• Does not export live aquatic animals
Qatar	NA	–	–	–	• Does not export live aquatic animals
KSA	Yes	Yes (as possible)	Yes	Yes	–
UAE	Yes	No	No	Yes	• Only re-exports ornamental fishes

C.2 Importations

Summary of results

Survey results relating to the import of live aquatic animals by RECOFI member countries are presented in Tables 1F (live food fishes) and 1G (ornamentals) (Survey Questionnaire Parts 1.10–1.11). All RECOFI member countries except Qatar import some live aquatic animals. In 2007, Bahrain imported some 36 million gilthead seabream larvae from France and Greece and a small quantity of "live trout" from Sri Lanka. Oman reported importing 360 000 live gilthead seabream fingerlings from Bahrain, while the United Arab Emirates also reported importing some 8–10 million fingerlings of gilthead and Sobaity seabream from Bahrain. The Islamic Republic of Iran reported having imported eyed eggs and gametes of rainbow trout from Norway and France, white shrimp from the United States of America and cyprinids (carps) from India. The Kingdom of Saudi Arabia imports small quantities of tilapia and other live fishes, primarily from other middle eastern countries. Other countries that reported importations (Iraq, Kuwait) did not provide further information.

Most RECOFI member countries import small quantities of marine and/or freshwater ornamental fishes that are obtained from a wide range of countries. Information on species composition is not readily available and in some cases is not required of importers. Volume data for at least one country (Kingdom of Saudi Arabia) is collected in the form of gross tonnage and as is often seen in the ornamental trade, likely represents the total weight of shipments, including packing water and shipping materials.

Information on the nature of any health certificates demanded by RECOFI member countries from their trading partners is summarized in Table 1H (Summary Questionnaire Part [1.11]). All countries that import live aquatic animals indicated that some form of health certification is required from exporters; however, only the respondents for the Islamic Republic of Iran, Oman and the United Arab Emirates were able to provide a clear statement of the exact nature of the health certificate required. The Islamic Republic of Iran indicated that import health certificates are demanded to the standards of the OIE and the European Union. It is probable that the health certificates demanded by most RECOFI member countries are of a general nature, as for example is the case with Oman and the United Arab Emirates, where the competent authority of the exporting country must only certify that the animals are healthy and free from clinical signs of disease at the time of examination.

Table 1I summarizes information on any other risk management measures used by RECOFI member countries during importation of live aquatic animals (Summary Questionnaire Part 1.12). Three countries (Islamic Republic of Iran, Iraq, and the Kingdom of Saudi Arabia) require some form of quarantine of imported shipments, while additional examination and/or testing are performed by five countries (Islamic Republic of Iran, Kuwait, Oman, Kingdom of Saudi Arabia, and the United Arab Emirates). The United Arab Emirates also requires routine inspection of aquaculture facilities and noted that all facilities are assigned a licensed veterinarian by the Ministry of Environment and Water. Islamic Republic of Iran indicates that it conducts monitoring and an active disease surveillance programme.

Analysis

As is the case with exportations of live aquatic animals, more detailed information on importations is needed to fully understand trading patterns and identify “risky” practices. It appears that for most RECOFI member countries, a review of the information that the state requires from importers is needed so that procedures for more accurate and complete data on species compositions, life history stages, numbers of animals by species, origins, health status, destinations, etc., are available. This information should be systematically collected and stored in a national database in a format that is easily retrievable for use by risk analysts.

In general, it appears that procedures for health certification and other risk mitigation measures that are currently applied by RECOFI member countries can be improved so as to be more effective in preventing the entry of serious diseases and pathogens. However a more detailed review of the health certification requirements and border quarantine and testing requirements and procedures is needed before firm conclusions can be drawn. Use of risk analysis can assist in identifying practices in need of detailed examination and help target application of risk management measures to those species/practices considered to pose a high or unacceptable risk.

Table 1F. Summary of importations of live food fishes by RECOFI member countries (Questionnaire Part 1.10–1.11, In Part)

Country	(1.10) Imports aquatic animals?	(1.11) If "Yes", principal species imported, volumes, estimated values, sources				
		Year	Species/stage	Quantity	Value (USD)	Source
Bahrain	Yes	2007	*Sparus aurata* larvae	36 000 000 pcs	$256 508	France, Greece
			"Live trout"	150 pcs	2 685	Sri Lanka
				36 000 150 pcs	$259 193[1]	
Iran IR	Yes	2007	Rainbow trout (*Oncorhynchus mykiss*) eyed eggs and gametes	23 746 000 pcs	Unknown	Norway, France
			White shrimp (*Litopenaeus vannamei*) postlarvae and broodstock	6 000 pcs		Hawaii, United States of America
			Broodstock of carps (Cyprinidae)	60 000 pcs		India
Iraq	Yes	NI	NI	NI	NI	NI
Kuwait	Yes	NI	"All kind of marine and fresh water fish that are not endangered."	NI	NI	NI
Oman	Yes	2007	*S. aurata* fingerlings	360 000 pcs	NI	Bahrain
Qatar	No					
KSA	Yes	2005	Tilapia	57 MT	48 269	Bahrain, Pakistan, Egypt
			Other live fish	20 MT	9 600	Egypt, Yemen, Spain, Russian
				Total 77 MT[2]	$57 869[3]	Federation
UAE	Yes	2007	*Sparidentex hasta* fingerlings	appx. 4–5 million pcs	NI	Bahrain
			S. aurata fingerlings	appx. 4–5 million pcs		
				Total appx. 8–10 million pcs		

[1] Converted from Bahrain Dinars using an average historical rate for 2007 of BHD 1 = USD 2.67196.
[2] Volumes for the Kingdom of Saudi Arabia are for total gross weight of shipment.
[3] Converted from Saudi Riyals using an average historical rate for 2005 of SAR 1 = USD 0.26668.

Table 1G. Summary of importations of live ornamental fishes by RECOFI member countries (Questionnaire Part 1.10–1.11, In Part)

Country	(1.10) Imports aquatic animals?	(1.11) If "Yes", principal species imported, volumes, estimated values, sources				
		Year	Species	Quantity	Value (USD)	Source
Bahrain	Yes	2005	NI	174 423 pcs	180 028	Canada, India, Indonesia, Malaysia, Maldives, Pakistan, Philippines, Kingdom of Saudi Arabia, Singapore, Sri Lanka, Thailand, Switzerland
Iran IR	Yes	2007	Guppy (*Poecilia reticulata*) Sailfin molly (*P. latipinna*) Goldfish (*Carassius auratus auratus*) Glass fish (*Chanda*) Rainbow fish (*Melanotaenia*)	5 000 000 pcs	250 000	India, Malaysia, Indonesia
Iraq	Yes	NI	NI	NI	NI	NI
Kuwait	Yes	NI	"All kind of marine and fresh water fish that are not endangered."	NI	NI	NI
Oman[1]	Yes	2006	License to import does not require specific name	240 302 pcs	NI	Major sources: United Arab Emirates, Malaysia, Singapore, Thailand, India
Qatar	No					
KSA	Yes	2005	NI	55 MT[2]	141 340[3]	Bahrain, Sri Lanka, Thailand, Malaysia, Singapore, Indonesia, Nigeria, other countries
UAE	Yes	2007	NI	295 651 pcs		Includes Indonesia, Malaysia, Singapore

[1] Additional data submitted for Oman – 2001: 404 500 pcs, 2002: 400 317 pcs, 2003: 103 268 pcs, 2004: 627 803 pcs; 2005: 56 994 pcs.
[2] Volumes for the Kingdom of Saudi Arabia are for total gross weight of shipment.
[3] Converted from Saudi Riyals using an average historical rate for 2005 of SAR 1 = USD 0.26668.

Table 1H. Summary of health certification required from exporting countries for aquatic animals entering RECOFI member countries (Questionnaire Part 1.11, In Part)

Country	Health certificate required?	Type of health certificate (HC) required			Notes
		International HC to OIE Standards	As required by RECOFI country (may be non-OIE standard)	As provided by exporting country	
Bahrain	Yes	–	–	Yes	HC from Veterinary Department in country of origin. Bahrain does not specify requirements.
Iran IR	Yes	Yes	–	Yes	HC to comply with OIE and EU directives and certification
Iraq	Yes	–	–	–	"International Health Certificate, that indicate fish is free of diseases. Origin certification"
Kuwait	Yes	NI	NI	NI	"The animals are not endangered and tested to be in good health by a governmental agency."
Oman	Yes	–	Yes	–	HC must be issued by competent authority of exporting country, should contain specific name and state that shipment is healthy and free from clinical signs of disease at time of examination
Qatar	NA	–	–	–	Does not import aquatic animals
KSA	Yes	Yes	–	–	–
UAE	Yes	No	Yes	Yes	Statement of examination before shipment and freedom from contagious diseases

Table 1I. Summary of other controls or risk management measures applied to imported aquatic animals by RECOFI member countries (Questionnaire Part 1.12)

Country	(1.11) Other controls or risk management measures applied to imported aquatic animals
Bahrain	None
Iran IR	• Inspection of primary documents • Quarantine period with sampling • Monitoring • Active surveillance
Iraq	• Checking of documents • Putting shipment at quarantine pond for 21 days before release
Kuwait	• Animals are also tested in Kuwait by before released inside Kuwait
Oman	• Veterinary inspector at port of entry • General inspection at port of entry but currently no facilities for quarantine • Release of live aquatic animals into the wild is prohibited by regulations
Qatar	• Not applicable as no aquatic animals are imported
KSA	• Imported live aquatic animals should be subjected to quarantine measures and examination before being allowed entrance • Ecological studies to ensure that the imported live aquatic animals have no dangerous effect on native species
UAE	• Veterinary inspection at port of entry and quarantine • Routine inspection of local aquaculture establishments by Ministry of Environment and Water (MEW) and municipalities/veterinary department section • According to Ministerial Decree No. (170) of the Year 2003 concerning issuance of the executive by-law of the Federal Law No. (10) of the Year 2002 regarding the practicing of veterinary profession, all local aquaculture establishments have a licensed veterinarian from the MEW.

D. Risk analysis capacity

Summary of results

The current capacity of RECOFI member countries to undertake pathogen risk analysis is summarized in Table 1J (Summary Questionnaire Parts 1.13–1.16). Only three of the eight countries (Islamic Republic of Iran, Kuwait, Kingdom of Saudi Arabia) indicated the existence of some risk analysis capacity for proposed movements of live aquatic animals, while only two countries (Islamic Republic of Iran, Kingdom of Saudi Arabia) responded that there is some linkage of pathogen risk analysis with evaluation of other risks associated with the movement of live aquatic animals.

Analysis

Governments must often make decisions having far-reaching social, environmental and economic consequences based on incomplete knowledge and a high degree of uncertainty. Risk analysis is a structured process that provides a flexible framework within which the risks of adverse consequences resulting from a course of action can be evaluated in a systematic, science-based manner. The risk analysis approach permits a defendable decision to be reached on whether the risk posed by a particular action is acceptable or not, and provides the means to evaluate possible ways to reduce an unacceptable risk to one that is acceptable.

A pathogen risk analysis (termed import risk analysis [or IRA] when applied to international trade) analyses the risks of introducing and/or spreading exotic pathogens or strains into new geographic areas along with the international or domestic movement of aquatic animal commodities. With the adoption of the *Agreement on the Application of Sanitary and Phytosanitary Measures* (the SPS Agreement) in 1994, WTO member countries are required to use risk analysis as a means to justify any restrictions on international trade in live aquatic animals or their products based on risk to human, animal or plant health, including the application of sanitary measures beyond those outlined in the OIE Code. As a result, risk analysis is now an internationally accepted method for deciding whether trade in a particular commodity poses a significant risk to human, animal or plant health and, if so, what measures could be applied to reduce that risk to an acceptable level.

A key problem with conducting pathogen risk analysis is the large amount of uncertainty that is often encountered due to a general lack of basic knowledge on pathogens of aquatic animals, including their identities, life cycles, ecology, host specificity, pathogenicity, etc. Thus along with the development of risk analysis expertise, countries also need to establish the appropriate supporting activities such as disease information databases, targeted research, diagnostics capability, surveillance and monitoring, etc.

There appears to be little capability or experience with pathogen risk analysis in RECOFI member countries. While three countries (Islamic Republic of Iran, Kuwait, and Kingdom of Saudi Arabia) indicated that expertise related to conducting risk analysis is present, only the Islamic Republic of Iran cited an example of a commodity-based pathogen risk analysis that has been conducted. There is thus a need to increase capacity through regional and national training programmes in pathogen risk analysis, to develop appropriate regional or national structures for conducting risk analyses for key aquatic species and, as part of regional and national strategies, to develop capacity in other areas of aquatic animal health to support risk analysis. There is also a need to coordinate pathogen risk analyses with ecological and genetic risk analyses where proposals to introduce new species for aquaculture development are received.

As a priority activity, risk analyses should be commissioned for the most frequently traded aquatic animal commodities (e.g. cultured marine fish, penaeid shrimps), as this will allow a preliminary determination of the “riskiness” involved in the movements of these species. Such risk analyses will also assist with regional and national planning exercises for the allocation of resources and the development of associated aquatic animal health capacity.

Table 1J. Summary of capacity to conduct risk analyses for proposed movements of live aquatic animals in RECOFI member countries (Questionnaire Parts 1.13–1.16)

Country	(1.13) Is there expertise to conduct import risk analysis (IRA) for aquatic animal pathogens?	(1.14) If "Yes", details of agency(ies) having expertise and examples of IRAs undertaken	(1.15) Is pathogen RA linked with evaluation of other risks (e.g. ecological, pest, invasive alien species, and genetic risks)?	(1.16) If "Yes", how is this accomplished?
Bahrain	No	–	No	–
Iran IR	Yes	• Iran Veterinary Organization • For example, risk analysis for importation of eyed eggs of rainbow trout has been done	Yes	Via a risk analysis committee comprised of experts from IVO, veterinary faculties, fisheries research centre
Iraq	No	–	No	–
Kuwait	Yes	• Public Authority of Agriculture and Fish Resources	No	–
Oman	No	–	No	–
Qatar	No	–	No	–
KSA	Yes	• Department of Aquaculture (Riyadh) • Fish Farming Center • Fisheries Research Center (Qatif) "These agencies provide quarantine measures and laboratory examination for live aquatic animal pathogens (bacteria, parasites, etc)." Risk analyses have been done for some bacteria and viruses.	Yes	Via cooperation between the Department of Aquaculture and the Animal and Plant Quarantine Department
UAE	No	–	No	–

SECTION 2. CONTROL OF DOMESTIC MOVEMENTS OF LIVE AQUATIC ANIMALS AND OTHER DOMESTIC ACTIVITIES THAT MAY SPREAD PATHOGENS

Summary of results

A summary of the status of regulations present in RECOFI member countries pertaining to activities that may prevent the domestic spread of aquatic animal pathogens is given as Table 2 (Questionnaire Parts 2.1–2.4). Four of the eight countries (Islamic Republic of Iran, Kuwait, Oman, and the Kingdom of Saudi Arabia) indicated the presence of capacity to regulate the domestic movement of live aquatic animals. Four countries (Islamic Republic of Iran, Oman, Kingdom of Saudi Arabia, and the United Arab Emirates) indicated capacity to regulate the disposal of waste products from processing plants.

Analysis

The ability to regulate the domestic movement of live aquatic animals can be an important tool for risk management and can be used, for example, to limit the use and distribution of new and exotic aquaculture species until their health status and the absence of any unpredicted ecological impacts are confirmed. It is also an essential component of contingency planning to restrict pathogen spread during a major disease outbreak, and is required for zoning to help countries maintain the disease-free status of uninfected zones.

The question of whether or not to develop capacity to regulate domestic movements of live aquatic animals used in aquaculture must be considered individually by each RECOFI country. In some instances, the current absence of any importations may make such capacity unnecessary (e.g. Qatar) or the small size of the country and/or lack of provincial or state units (e.g. Bahrain) may allow informal methods to provide adequate safeguards against the domestic spread of pathogens. However, in larger countries, particularly those having significant freshwater aquatic systems (e.g. Islamic Republic of Iran, Iraq) or long marine coastlines (Kingdom of Saudi Arabia), disease zoning and control may be possible and measures for domestic control of movements may be desirable. On a regional basis, it is possible that disease zoning could be applied to shared marine ecosystems – the entire Gulf and Gulf of Oman.

The unsafe disposal of aquatic animal wastes (including processing water) from seafood processing plants represents a potential source for transmission of viruses and other aquatic animal pathogens. In countries where commercial processing takes place, the governmental agencies charged with regulating processing plants should be identified and current regulations and procedures (e.g. Hazard Analysis and Critical Control Points [HACCP], Best Management Practices [BMPs]) should be reviewed to confirm that there are adequate safeguards to ensure that wastes and waste waters are properly treated or disposed of in a manner that will prevent the release of any viable pathogens into the environment.

Table 2. Summary of status of regulations pertaining to activities that may prevent domestic spread aquatic animal pathogens by RECOFI member countries (Questionnaire Parts 2.1–2.4)

Country	(2.1) Regulations on in-country movement of aquatic organisms?	(2.2) If "Yes", brief description of controls, contact details of responsible agencies, legislation providing authority for control	(2.3) Regulations on waste disposal from seafood processing plants?	(2.4) If "Yes", Brief description of controls, contact details of responsible agencies, legislation providing authority for control
Bahrain	No	–	No	–
Iran IR	Yes	Transporting of all kinds of animals and their products between provinces requires official permission from provincial veterinary authorities (30 offices in 30 provinces). The legal basis for controlling in-country movements is the Act of Iran Veterinary Organization, ratified 14 June 1971	Yes	• All seafood processing establishments in the Islamic Republic of Iran work under HACCP and most have gained EC code for exporting seafood to EU • The legal basis is the Act of Iran Veterinary Organization, ratified 14 June 1971
Iraq	No		No	–
Kuwait	Yes	"Public Authority of Agriculture and Fish Resources, Kuwait science institution, environmental public authority."	No	–
Oman	Yes	No comprehensive set of rules for in-country movement, but a provision in the by-law on aquaculture and quality control of aquaculture products states clearly that any in-country movement of live aquatic animals is prohibited without prior approval from the competent authority (the Directorate General of Fisheries Research and Extension, Ministry of Fisheries, PO Box 427, PC 100 Muscat, Tel/Fax: +968-24-097229)	Yes	• By-law Quality Control Regulation for Omani Fishery Exports (MD 136/1998) contains many articles dealing with this issue. Article 57 states the facilities that should be provided in the establishment, such as that the area and size should be enough to work under adequate hygienic conditions. Other facilities that all relate to the hygienic status of processing plants are also stated. Article 86 deals with the conditions concerning parasites in fishery products, stating that fishery products should be subjected to visual examination to detect and remove any visible parasites. Infected fish must not be placed on the market for human consumption even if parasites are removed • Fish Quality Control Centre, Directorate General of Fisheries Research and Extension, Ministry of Fisheries, PO Box 427, PC 100 Muscat, Tel/Fax: +968-24-097229

Qatar	No	–	No[1]	–
KSA	Yes	Department of Aquaculture (DA); based on quarantine measures, accurate disease diagnosis, hygienic disposal of diseased stock, sanitation and sound management of infected farms, and periodic examination. Permission must be obtained from the DA for movement of live aquatic animals from one area to another	Yes	• Based on legislative measures of the DA: sanitation and sound management, restricted laboratory examination of processed products, hygienic disposal of waste products • Saudi Fisheries Company., National Prawn Company; Gazdco Company
UAE	No	–	Yes	• Municipalities oversee hygienic disposal of waste products.

[1] There are currently no processing plants in Qatar; fish market wastes are used as agricultural fertilizer.

SECTION 3. POLICY AND PLANNING

Summary of results

A summary of the current status of policy and planning for aquatic animal health in RECOFI member countries is presented in Table 3A (Survey Questionnaire Parts 3.1–3.2) and Table 3B (Survey Questionnaire Parts 3.3–3.7). Six of the eight respondents (Islamic Republic of Iran, Iraq, Kuwait, Oman, Kingdom of Saudi Arabia, and the United Arab Emirates) indicated that a specific agency(ies) or department(s) was identified as responsible for national aquatic animal health matters. Only four countries (Islamic Republic of Iran, Iraq, Kuwait, and the Kingdom of Saudi Arabia) have aquatic animal health policy officially expressed in the form of a national aquatic animal health plan, strategy, legislation or other document. With regard to the involvement of subnational entities in setting national aquatic animal health policy, only the Islamic Republic of Iran and Iraq indicated that this occurred. However, in the case of Iraq, the activities undertaken were related to disease monitoring rather than to providing input to broader issues of national policy.

Table 3C presents summary information on estimates of the effectiveness of current policy (Survey Questionnaire Part 3.8 (a-c)). Respondents for five of the eight RECOFI member countries (Islamic Republic of Iran, Iraq, Kuwait, Kingdom of Saudi Arabia and Oman) indicated that current policy and planning was thought to be adequate in preventing the entry and spread of pathogens, adequate for the domestic control of serious diseases, and effectively implemented. The United Arab Emirates indicated that current policy and planning was adequate in preventing the entry and spread of pathogens and was effectively implemented, but that it was inadequate for the domestic control of serious diseases. Respondents for the other countries were either uncertain, indicated “Don’t know” or felt that current policy was inadequate.

Table 3D summarizes for each country, the specific areas addressed by national policy (Survey Questionnaire Part 3.9). Bahrain, Oman and Qatar indicated that this question was not applicable due to the absence of national policy. The Islamic Republic of Iran, Kuwait and the Kingdom of Saudi Arabia indicated that all areas were addressed by policy. Iraq indicated that the technical areas were adequately addressed, while the non-technical areas (financial requirements and planning; international treaties, memberships and linkages; and communication (interagency, stakeholder)) were not. The United Arab Emirates indicated that farm-level treatment/prevention and international treaties, memberships and linkages were adequately addressed, but that other areas were not covered by national policy.

Table 3E summarizes responses concerning the current priorities for national aquatic animal health policy in RECOFI member countries (Survey Questionnaire Part 3.10). For the Islamic Republic of Iran, priority is given to conducting a survey programme, monitoring for disease, conducting periodic inspections and implementing a quarantine programme. For Iraq, emphasis is on developing technical capacity (including infrastructure) for diagnosis of aquatic animal diseases and developing treatments for the most important diseases. Oman’s priorities include higher level planning for aquatic animal health management (developing a national aquatic animal health plan, establishing risk analysis procedures, defining the roles of governmental authorities, contingency planning), developing human capacity, establishing diagnostic laboratories, conducting targeted research, and establishing a disease monitoring programme. For Qatar, the priority is to initiate policy development. Priorities for the Kingdom of Saudi Arabia include improving quality control, establishing an effective management plan and improving disease prevention and control. Those for the United Arab Emirates include developing legislation relevant to aquaculture animal health, establishing national diagnostic services, obtaining adequate manpower, establishing emergency preparedness and disease control, and addressing financial and planning issues.

Analysis

In RECOFI member countries, the agencies responsible for ensuring aquatic animal health are generally those involved in the management of fisheries resources, aquaculture development or agriculture. In only one case (Islamic Republic of Iran) is the national veterinary services indicated to

be the responsible agency. The information provided on the responsibilities of the concerned agencies/departments generally relate to specific aquatic animal health activities rather than to broader policy development (the exception being Oman's Directorate of Animal Health, which has clearly stated responsibilities for development of plans, programmes, legislation and coordination of activities related to aquatic animal health).

With regard to the effectiveness of current policy, it is possible that some respondents are overly optimistic as to how effectively their competent authorities would respond should a major epidemic occur. As noted for the Kingdom of Saudi Arabia, most RECOFI member countries have not yet experienced a serious aquatic animal disease outbreak, and thus the ability of existing policy and capacity to prevent disease spread has not been tested. The general absence of contingency planning for aquatic animal disease outbreaks in RECOFI member countries (see Section 7) indicates that responses would probably be inadequate to prevent disease spread.

Development of a national strategy on aquatic animal health within the broader framework of biosecurity policies or aquaculture development plans is being promoted by FAO. A national strategy contains a comprehensive framework that will allow countries to protect aquatic animal health, ensure healthy aquatic production, comply with international obligations, etc. A national strategy contains many of the essential elements for a successful aquatic animal health protection programme. These include national coordination and priority setting, legislation and policy, pathogen list, institutional resources, diagnostics, disease zoning, surveillance and reporting, health certification and quarantine, contingency planning, pathogen risk analysis, capacity building, communication, farmer/private sector engagement, financial resources, surveillance and monitoring, and evaluation and regional and international cooperation.

The development of formal strategies, policies and plans for aquatic animal health in RECOFI member countries should be a priority. In no instance did any of the survey responses cite the existence of national policy expressed in a single coherent national plan or strategy setting out a national programme and vision for development of aquatic animal health. For most countries, formulation of a clear national policy that states a vision for national aquatic animal health and outlines the means of achieving it would be desirable. The development of national strategies and plans can be accomplished either as a separate activity or as part of national plans for biosecurity or aquaculture development. The incorporation of aquatic animal health issues related to international and domestic disease control and prevention into broader programmes of national biosecurity that include components for terrestrial animals and plants has many advantages, including development of standardized procedures and methods across all commodities and cost effectiveness with regard to shared expertise and facilities.

The current priorities for national aquatic animal health as identified by the Islamic Republic of Iran, Iraq, Oman, Qatar, Kingdom of Saudi Arabia and the United Arab Emirates indicate a shared need to develop effective planning and associated technical capacity. The inability of other RECOFI member countries to identify national aquatic animal health priorities at a time when increasing aquaculture development, more stringent requirements by trading partners, increased trade in live aquatic animals and the increased occurrence of epizootic diseases probably indicates a need for senior governmental authorities to undertake long-term planning exercises and develop strategies to maintain good national aquatic animal health status.

Table 3A. Summary of status of policy and planning for aquatic animal health (AAH) in RECOFI member countries (Survey Questions 3.1–3.2)

Country	(3.1) National responsible agency designated?	(3.2) If "Yes", indicate:	
		Name of responsible agency/department	Responsibilities
Bahrain	No	–	–
Iran IR	Yes	Iran Veterinary Organization	• To study aquatic animal diseases and identify infected areas and the sources and methods of their transmission and dissemination • To provide AAH through execution of prevention, quarantine and campaign measures against contagious diseases • To establish quarantine stations at border entry points and throughout the country for prevention of aquatic animal diseases, health control and the supervision of the import and export of aquatic animals, raw products and their transport, and to issue health certificates for aquatic animal commodities that are to be exported • To participate in international veterinary conferences and dispatch representatives to such conferences within the limit of ratified credits and after confirmation of Minister of Agriculture and to exchange scientific information with veterinary scientific associations and authorities • Health supervision of aquatic animal premises and feedstuff production facilities. • Health supervision of manufacturing and processing facilities using products of aquatic animal origin • To determine and supervise the manufacture, import, export and supplying of drugs, vaccines, sera and biological materials related to aquatic animals
Iraq	Yes	General Board for Developing Fisheries	Developing and following up fisheries in rivers, streams and lakes
Kuwait	Yes	Public Authority of Agriculture and Fish Resources, Kuwait science institution, environmental public authority	NI

Oman	Yes	Directorate General of Fisheries Research and Extension, Ministry of Fisheries, PO Box 467, PC 100 Muscat, Tel: +968-24-603451, Fax: +968-24-697229	Responsibilities concerning AAH: • Approves any shipment of live aquatic animal • Responsible for Aquaculture Centre, which contains special laboratory for aquatic animal disease
		Directorate General for Animal Wealth, Ministry of Agriculture, PO Box 427, PC 100 Muscat	Responsibilities concerning AAH: • Gives veterinary permit to import animal products, including live aquatic animals. • Prepares the national contingency plan and annual programmes for animal production and veterinary health. • Responsible for the Directorate of Animal Health, which has the following responsibilities: ▪ Prepares plans and programmes to protect the animal wealth from diseases ▪ Prepares laws and regulations concerning animal health and veterinary medicines ▪ Coordinates with different authorities concerning prevention of common zoonotic diseases
		Directorate General of Fisheries Development, Ministry of Fisheries, PO Box 427, PC100 Muscat, Tel: +968-24-696369	Responsibilities concerning AAH: • Gives license to import or export fish and fish products after approval of other related fisheries department • Coordinates with veterinary department regarding live aquatic animal export/import
Qatar	No[1]	–	–
KSA	Yes	Department of Aquaculture	Based on the legislative measures of the DA: restricted examination of imported/exported aquatic animal species; periodic screening of local fish farms and processing plants for pathogens; training programmes for persons responsible for AAH inspection
UAE	Yes	Animal Wealth Department, Animal Health Section, with cooperation of the Fisheries Department, Ministry of Environment and Water	• Restricted examination of imported/exported aquatic animal species. • Routine inspection of local aquaculture establishments. • Licensing of veterinarians.

[1] The Fisheries Department would be the responsible agency, but has not been officially designated as such.

Table 3B. Summary of status of policy and planning for aquatic animal health (AAH) in RECOFI member countries (Survey Questions 3.3–3.7)

Country	(3.3) Official policy expressed by national AAH plan, strategy, legislation or other document?	(3.4) If "Yes", citation for relevant document	(3.5) If No, how are issues impacting national AAH currently handled?	3.6) Subnational entities play role in setting national AAH policy?	(3.7) If "Yes", description of roles
Bahrain	No	–	Very few issues due to small industry. Issues are handled on as needed basis by Ministry of Health and General Directorate for Protection of Marine Resources	No	–
Iran IR	Yes	National aquatic animal health executive regulations (a collection of regulations and circulars released by IVO according to the ACT of IVO.)	–	Yes	Experts from all subnational entities are members of policy-making committees
Iraq	Yes	Regulations and rules released by the Ministry of Agriculture	–	Yes	Through follow-up of health status of fish ponds, besides the main rivers, lakes and marshes
Kuwait	Yes	"N/K"	–	No	–

Oman	No	–	For import/export of fish and fish products including live aquatic animals, applicant contacts Department of Fisheries monitoring and licensing to get the forms. Depending on application type, applicant should get the approval of other fisheries departments before proceeding with the application. For live aquatic animals, if ornamental fish, this department gives the applicant the approval, then the application goes to the veterinary department for final permit. In case of import for aquaculture purposes, the application should be approved by Aquaculture Centre before it can be proceed. Shipment should be accompanied by a health certificate, which is checked in the airport by the Veterinary Department, which also checks the shipment. This department doesn't have any specialist in fish diseases.	No	–
Qatar	No	–	There is no aquaculture development and thus issues related to AAH have not yet arisen.	No	–
KSA	Yes	Legislative measures of Department of Aquaculture declared in 1409H	–	No	–
UAE	No	–	Veterinary inspection at port of entry. Routine inspection of local aquaculture establishments by Ministry of Environment and Water (MEW) and municipalities/veterinary department section. According to Ministerial Decree No. (170) of the Year 2003 concerning issuance of the executive by-law of the Federal Law No. (10) of the Year 2002 regarding the practicing of veterinary profession, all local aquaculture establishments have a licensed veterinarian from the MEW. Based on information from the OIE, the ministry bans importation of cultured fishes from some countries to prevent the entrance of contagious fish diseases.	No	–

Table 3C. Effectiveness of current policy and planning for aquatic animal health (AAH) in RECOFI member countries (Survey Questions 3.8a-c)

Country	Adequate for preventing entry and spread of pathogens?	Adequate for domestic control of serious diseases?	Effectively Implemented?
Bahrain	No	No	Don't Know
Iran IR	Yes	Yes	Yes
Iraq	Yes	Yes	Yes
Kuwait	Yes	Yes	Yes
Oman[1]	Yes	Yes	Yes
Qatar[2]	NA	NA	NA
KSA	Yes	"No serious disease has been encountered in KSA"	Yes
UAE	Yes	No	Yes

[1] Oman currently does not have a documented policy or national aquatic animal health plan; however, there are specific actions taken with regard to aquatic animal health, including license to import, health certificate with shipment, and general inspections at port of entry, preventing entry of any exotic species.

[2] Qatar has no aquaculture and thus has not yet developed policy or planning for aquatic animal health.

Table 3D. Areas addressed in national policy by RECOFI member countries (Survey Questions 3.9) (**+** = addressed; **–** = not addressed; **NA** = not applicable due to absence of policy)

Area addressed in policy	Bahrain	Iran IR	Iraq	Kuwait	Oman	Qatar	KSA	UAE
National diagnostic services	NA	+	+	+	NA	NA	+	–
Risk analysis	NA	+	+	+	NA	NA	+	–
Farm-level treatment/prevention	NA	+	+	+	NA	NA	+	+
Emergency preparedness and disease control	NA	+	+	+	NA	NA	+	–
Manpower requirements	NA	+	+	+	NA	NA	+	–
Infrastructural requirements	NA	+	+	+	NA	NA	+	–
Financial requirements and planning	NA	+	–	+	NA	NA	+	–
Intern. treaties, memberships and linkages	NA	+	–	+	NA	NA	+	+
Communication (interagency, stakeholder)	NA	+	–	+	NA	NA	+	–

Table 3E. Current priorities with regard to national aquatic animal health policy in RECOFI member countries (Questionnaire Part 3.10)

Country	Current national priorities	
Bahrain	Not aware of any	
Iran IR	(i)	Survey programme
	(ii)	Disease monitoring
	(iii)	Periodic inspection
	(iv)	Quarantine programme
Iraq	(i)	Creating a special centre related to aquatic disease and control
	(ii)	Building laboratory capacity; diagnosis of bacterial, viral and parasitic diseases
	(iii)	Preparing drugs related to the most important diseases in Iraq
Kuwait	NR	
Oman	(i)	Prepare the plan for aquatic animal health
	(ii)	Risk analysis procedures or precautionary approach in introducing exotic species
	(iii)	Define exactly the role of each government authority in regard to aquatic animal health
	(iv)	Plan for contingency and emergency
	(v)	Enhance human capacity
	(vi)	Establish laboratories for tests for fish diseases
	(vii)	Research on fish diseases
	(viii)	Monitoring programme for aquatic animal diseases
Qatar	(i)	Initiate policy development
KSA	(i)	Quality control
	(ii)	Effective management plan
	(iii)	Disease prevention and control
UAE	(i)	Legislation relevant to aquaculture animal health
	(ii)	Establish national diagnostics services
	(iii)	Obtain required manpower
	(iv)	Establish emergency preparedness and disease control
	(v)	Address issues related to financial requirements and planning

SECTION 4. LEGISLATION

Summary of results

Development of essential enabling legislation is a key component of a national aquatic animal health strategy. Table 4 summarizes the status of national legislation dealing with aquatic animal health policy for RECOFI member countries (Survey Questionnaire Parts 4.1–4.3). Only three countries (Islamic Republic of Iran, Oman, and the Kingdom of Saudi Arabia) indicated that specific legislation supporting policy exists. In the Islamic Republic of Iran and Oman, this legislation is part of broader legislation, while in the Kingdom of Saudi Arabia it is contained both in separate act or regulation and as a part of more general legislation. All three countries indicated that their current legislation is in need of major review or revision.

Analysis

For most RECOFI member countries, once a review of the effectiveness of existing legislation has been accomplished and long-term policy and planning exercises have been undertaken, national legislation should be reviewed to ensure that the legal mechanisms are in place to support aquatic animal health activities. The FAO Legal Department may provide FAO member countries with assistance in the review and revision of national fisheries and aquaculture legislation, including laws and regulations supporting national aquatic animal health.

Table 4. Status of legislation dealing with aquatic animal health policy in RECOFI member countries (Questionnaire Parts 4.1–4.3)

Country	(4.1) Specific legislation exists?	4.2) If "Yes"		(4.3) If "Yes", existing legislation needs major review or revision?
		by separate act or regulation?	as part of broader legislation or regulation?	
Bahrain	No	–	–	–
Iran IR	Yes	No	Yes	Yes
Iraq	No	–	–	–
Kuwait	No	–	–	–
Oman	Yes	No	Yes	Yes
Qatar	No	–	–	–
KSA	Yes	Yes	Yes	Yes
UAE	No	–	–	–

SECTION 5. DISEASE SURVEILLANCE/MONITORING

Summary of results

The current status of surveillance and monitoring programmes for plant and animal diseases in RECOFI member countries is summarized in Table 5 (Survey Questionnaire Parts 5.1–5.3). All countries indicate that some form of official surveillance or monitoring programme exists. Most common are official programmes for surveillance and monitoring of diseases of terrestrial animals (present in seven of eight countries) and for diseases of plants (four countries). Official surveillance and monitoring programmes for aquatic animal diseases are indicated to be present in four countries: Islamic Republic of Iran, Iraq, Kuwait and the Kingdom of Saudi Arabia.

Analysis

Disease surveillance is a fundamental component of any official aquatic animal health protection programme. Surveillance and monitoring programmes for aquatic animal diseases are essential to detection and rapid emergency response to serious disease outbreaks and form the basis for early warning of emerging disease outbreaks. They are also increasingly demanded by trading partners to support statements of national disease status and are the basis for disease zonation. Surveillance also provides the building blocks of information necessary to have an accurate picture of the distribution and occurrence of diseases relevant to disease control and international movement of aquatic animals and their products.

There appears to be a need to establish surveillance and monitoring programmes for countries where these are lacking, and to review and improve these programmes where they are already established. Surveillance can be passive (reactive and general in nature) or active (proactive and targeted). In both cases there must be adequate reporting mechanisms so that suspected cases of serious pathogens are quickly brought to the attention of the lead agency. Surveillance and monitoring efforts must be supported by adequate diagnostics capability (including appropriately trained expertise, suitably equipped laboratory and rapid-response field diagnostics, and standardized field and laboratory methods), information system management (i.e. a system to record, collate and analyze data and to report findings), legal support structures, transport and communication networks and linked to national and international (OIE) disease reporting systems (e.g. pathogen list or list of diseases of concern, disease notification and reporting procedures).

Table 5. Current Status of surveillance and monitoring programmes for plant and animal diseases in RECOFI member countries (Questionnaire Parts 5.1–5.3)

Country	(5.1) Official surveillance or monitoring programme exists?	(5.2) Areas in which programmes exist			(5.3) Brief description of programmes for aquatic animal diseases and name and contact details for responsible agency(ies)
		Plants	Terrestrial animals	Aquatic animals	
Bahrain	Yes	Yes	Yes	No	• Yet to be developed
Iran IR	Yes	Yes	Yes	Yes	• All programmes for active and passive surveillance and monitoring of aquatic animal disease are conducted by the Iran Veterinary Organization. These include: for shrimp – TSV, IHHNV, YHD, IMNV; for coldwater fish – IPN, IHN, VHS; for warm water fish – SVC, KHV, GCRV; for marine fish – IPN, VNN
Iraq	Yes	NI	NI	Yes	• There is a small unit in each veterinary hospital in all 15 governorates whose duty is to check and follow up AAH in main streams, rivers, lakes marshes and private ponds • All these units are included under the umbrella of veterinary state Co. belonging to MOA with corporation with General Board of Fish Resource and Development • Monthly and occasional emergency reporting when there is abnormal mortality of fish or other aquatic life
Kuwait	Yes	No	Yes	Yes	• "Public Authority of Agriculture and Fish Resources, Kuwait science institution, environmental public authority"
Oman	Yes	Yes	Yes	No	–
Qatar	Yes	No	Yes	No	–
KSA	Yes	Yes	Yes	Yes	• Quality control, effective management plan, disease prevention and control • Department of Aquaculture in cooperation with Department of Animal and Plant Quarantine
UAE	Yes	No	Yes	No	–

SECTION 6. DISEASE DIAGNOSTICS

Summary of results

A summary of disease diagnostics capability in RECOFI member countries is presented in Tables 6A–6B. Table 6A indicates the ability to diagnosis those diseases listed by the World Organisation for Animal Health (OIE) (Survey Questionnaire Parts 6.1–6.2). According to the survey responses, no country has the capability to diagnosis all OIE-listed diseases, Kuwait and Oman are able to diagnosis some diseases in all categories (molluscan, crustacean and finfish diseases), the Kingdom of Saudi Arabia can diagnose all crustacean and all finfish diseases, Iraq can diagnose all finfish diseases, the Islamic Republic of Iran can diagnose some crustacean and some finfish diseases, and the United Arab Emirates can diagnose some finfish diseases. Bahrain and Qatar indicated no capability at present.

Table 6B summarizes the status of diagnostic laboratories in RECOFI member countries, indicating whether they are officially designed national laboratories, laboratories accredited as international or national reference centres, or other public or private-sector laboratories (Summary Questionnaire Parts 6.2–6.8). Four countries (Islamic Republic of Iran, Iraq, Kuwait, and Kingdom of Saudi Arabia) indicated that national laboratories have been designated. Only one country (Kingdom of Saudi Arabia) indicated the presence of accredited laboratories (nationally accredited by the Saudi Arabian Standards Organization [SASO]) and only two countries (Islamic Republic of Iran, Kingdom of Saudi Arabia) indicated the existence of some diagnostic capability in other public or private-sector laboratories.

Table 6C summarizes the status of national pathogen lists for RECOFI member countries (Survey Questionnaire Parts 6.9–6.10). Four of eight countries (Islamic Republic of Iran, Iraq, Kuwait, and the Kingdom of Saudi Arabia) indicate the existence of a national pathogen list.

Analysis

Disease diagnostics plays two significant roles in health management and disease control. The first role of diagnostics is to ensure that stocks of aquatic animals that are intended to be moved from one area or country to another are not carrying infection by specific pathogens at subclinical levels and is accomplished through screening of healthy animals. The second equally important role of diagnostics is to determine the cause of unfavourable health or other abnormalities in order to recommend measures appropriate to a particular situation. Disease diagnostics is also an important supporting component of surveillance and monitoring programmes, contingency planning and emergency response.

The capacity to provide rapid, accurate diagnosis of aquatic animal diseases is an important part of a national aquatic animal health plan. Issuance of international health certificates based on the demonstrated ability to diagnose diseases using the standards and diagnostics tests specified by the OIE Code and Manual for OIE-listed molluscan, crustacean and finfish diseases is increasingly required by importing countries.

There are few aquatic animal disease diagnostic laboratories present in RECOFI member countries, and only one or two of these appear to have capability to diagnose most OIE-listed diseases to OIE standards. There is no regional aquatic animal health laboratory and none of the existing national laboratories is an OIE reference centre for aquatic animal disease diagnosis.

National pathogen lists should include only those diseases that meet a stringent set of criteria (see FAO/NACA, 2000).[8]

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[8] FAO/NACA. 2000. Asia regional technical guidelines on health management for the responsible movement of live aquatic animals and the Beijing consensus and implementation strategy. *FAO Fisheries Technical Paper*. No. 402. Rome, FAO. 53 pp.

These are:

(i) Presence or absence of the disease or pathogen in the importing country – The disease or pathogen should be:
- exotic to the entire country, or
- occurring in parts of the country, but there are zones that are officially recognized as free and that need to be protected, or
- occurring in parts of the country, and the country is running a control programme to minimize spread of the disease and/or to eradicate it.

(ii) Pathogenicity – The disease or pathogen has a significant adverse affect on host health.

(iii) Infectious etiology – The disease is caused by an infectious agent that is transmissible horizontally and/or vertically, as well as directly or indirectly (via carriers or intermediate hosts existing in the receiving waters).

(iv) Adverse socio-economic, public health or ecological impacts – The disease or pathogen is known or likely to cause significant adverse socio-economic, public health or ecological impacts.

Importantly, a pathogen should not be listed if it:

- occurs widely within the region with no infectious mortality or
- has no socio-economic impact, or
- is controlled through improved husbandry handling (non-chemotherapeutic intervention).

Application of these criteria to the information provided by respondents in Table 6C (6.10) indicates that only the Islamic Republic of Iran and the Kingdom of Saudi Arabia have a national pathogen list that appears to meet these criteria.

The results of the survey show that there is a clear need to increase national disease diagnostics capability in most RECOFI member countries. This can be accomplished in several ways, depending on (i) the demand for international health certificates by exporters, (ii) the need to confirm health status of imported live aquatic animals during quarantine, (iii) the need for diagnostics support to disease surveillance and monitoring programmes, and (iv) the need for diagnostics services to support aquatic animal health in aquaculture facilities. In some cases these needs might be met by use of foreign or private-sector laboratories, while routine diagnostic service to the private sector can often be adequately delivered by private-sector laboratories. In general, some national diagnostics capacity is desirable, and each RECOFI country should consider its need for diagnostics capacity based on current needs and future plans for aquaculture development and increased trade in live aquatic animals.

Each country should also consider establishing a national pathogen list that can be used when demanding health certificates from exporting countries. OIE-listed diseases that are relevant to national conditions (including consideration of trading patterns) form a good starting point; however, national disease lists need to be founded on a thorough knowledge of national disease status, which can only be obtained through passive and active disease surveillance programmes, generalized disease/pathogen surveys, adequate disease record keeping and reporting, and a national disease database. The possibility of establishing a regional pathogen list should also be considered. In the same manner, designating a regional aquatic animal disease reference centre should also be considered. The role and specific tasks of this reference centre can be defined based on an assessment of the needs for such a centre at the regional level.

Table 6A. Summary of ability to diagnose OIE-listed diseases in RECOFI member countries (Questionnaire Parts 6.1–6.2)

Country	(6.1) Adequate capacity to diagnose OIE-listed diseases?	(6.2) If "Yes", capacity to diagnosis OIE-listed		
		Molluscan diseases	Crustacean diseases	Finfish diseases
Bahrain	No	–	–	–
Iran IR	Yes	No	Yes (some)	Yes (some)
Iraq	Yes	NI	NI	Yes (all)
Kuwait	Yes	Yes (some)	Yes (some)	Yes (some)
Oman	Yes	Yes (some)	Yes (some)	Yes (some)
Qatar	No	–	–	–
KSA	Yes	No	Yes (all)	Yes (all)
UAE	Yes	No	No	Yes (some)

Table 6B. Summary of diagnostic capacity for aquatic animal diseases in RECOFI member countries (Questionnaire Parts 6.2–6.8)

Country	(6.3) National laboratory officially designated?	(6.4) If "Yes", contact information	(6.5) Laboratories accredited as international or national reference centres?	(6.6) If "Yes", laboratory, accrediting body and type of accreditation	(6.7) Other public or private-sector laboratories exist?	(6.8) If "Yes", brief description of services and contact information
Bahrain	No	–	No	–	No	–
Iran IR	Yes	Central Veterinary Laboratory of the Iran Veterinary Organization; Reference shrimp laboratories in Hormozgan, Boushehr and Sistan and Balouchestan provinces	No	–	Yes	• The Veterinary Faculty of Tehran University and the Iranian Research Centre for Aquatic Animals have qualified laboratories for aquatic animal diseases. • The Directorate for Health and Campaign Against Aquatic Disease of IVO is responsible for supervision. Both laboratories offer services in parasitology, histopathology, general bacteriology/mycology, general virology, electron microscopy, tissue culture, molecular diagnostics, immunoassay and water quality analysis.
Iraq	Yes	Aquatic laboratory in central hatchery of Sewera	No	–	No	–
Kuwait	Yes	Public Authority of Agriculture and Fish Resources, Kuwait science institution, environmental public authority	No	–	No	–
Oman	No	–	–No	–	No	–
Qatar	No	–	No	–	No	–

KSA	Yes	Fish Farm Center (Jeddah) Fisheries Research Center (Qatif) Fish Health and Safety Laboratories (Jeddah and Qatif)	Yes	Saudi Arabian Standards Organization (SASO)	Yes	National Prawn Co. (parasitology, general bacteriology/mycology, general virology, molecular diagnostics (e.g. PCR), immunoassay (e.g. ELISA), water quality analysis)
UAE	No	–	No	–	No	–

Table 6C. Summary of status of national pathogen lists for RECOFI member countries (Questionnaire Parts 6.9– 6.10)

Country	(6.9) National pathogen list exists?	(6.10) If "Yes", pathogens/diseases listed
Bahrain	No	–
Iran IR	Yes	• Viral haemorrhagic septicaemia, infectious pancreatic necrosis, spring viraemia of carp, infectious haematopoietic necrosis, Koi herpes virus disease, Taura syndrome, white spot disease, yellow head disease, spherical baculovirosis (*Penaeus monodon*), tetrahedral baculovirosis (*Baculovirus penaei*), infectious hypodermal and haematopoietic necrosis, crayfish plague (*Aphanomyces astaci*) • Listing/delisting of a disease is the responsibility of IVO according to the following criteria: included in the OIE list of notifiable diseases, international spread, zoonotic potential, significant spread within country, emerging diseases.
Iraq	Yes	• Spring viremia of carp, bacterial gill necrosis, *Saprolegnia*, fin rot, *Lernaea*, *Argulus*, *Trichodina*, *Gyrodactylus*
Kuwait	Yes	NI
Oman	No	–
Qatar	No	–
KSA	Yes	• White spot disease, yellowhead disease, baculoviral midgut gland necrosis, infectious hypodermal and haematopoietic necrosis, crayfish plague • Listing determined by the Department of Aquaculture through the Director General
UAE	No	–

SECTION 7. EMERGENCY PREPAREDNESS/CONTINGENCY PLANNING

Summary of results

A summary of the current status of emergency preparedness and contingency planning for outbreaks of aquatic animal disease in RECOFI member countries is presented in Table 7 (Survey Questionnaire Parts 7.1–7.3). Only two countries, the Islamic Republic of Iran and the Kingdom of Saudi Arabia, indicated that contingency planning exists for aquatic animal disease outbreaks, while three countries (Oman, Qatar and the United Arab Emirates) indicated that an emergency response plan for a terrestrial animal disease (avian influenza) or a plant pest has been prepared.

Analysis

Emergency preparedness is the ability to respond effectively (via early detection) and in a timely fashion (rapid response) to disease emergencies (e.g. disease outbreaks, mass mortalities). The capability to deal with emergency diseases requires a great deal of planning and coordination (including establishing operational, financial and legislative mechanisms) and making available required resources (i.e. skilled personnel and essential equipment).

As long as there is importation of live aquatic animals, there exists the possibility of a serious disease outbreak due to an exotic pathogen or strain. Risk analysis and risk mitigation measures help to reduce the likelihood of a serious disease event occurring, but even under the best circumstances, pathogens will occasionally escape detection, breach national barriers, become established, spread and cause major losses. The extent to which losses occur often depends on the quickness of detection (which depends on the effectiveness of disease surveillance, diagnostics and reporting programmes) and the rapidity and effectiveness with which governments recognize and react to the first reports of serious disease. As quick and effective reaction is largely dependent upon contingency planning, RECOFI member countries need to develop such plans for key cultured species and diseases.

Table 7. Current status of emergency preparedness/contingency planning for outbreaks of aquatic animal disease in RECOFI member countries (Questionnaire Parts 7.1–7.3)

Country	(7.1) Contingency or emergency response plans exist?	(7.2) If "Yes", details of plan(s)	(7.3) If "No", similar plans for control of terrestrial animal and/or plant diseases exist?
Bahrain	No	–	Not aware of any
Iran IR	Yes	Contingency plan that is disease specific for several aquatic animal diseases provided by Iran Veterinary Organization	–
Iraq	No	–	NR
Kuwait	"Don't Know"	–	NR
Oman	No	–	Yes (see Annex IV)
Qatar	No	–	Yes, for avian flu and possibly others
KSA	Yes	Department of Aquaculture (AD); quarantine measures, accurate disease diagnosis, hygienic disposal of diseased stock, sanitation and sound management of infected farms, periodic examination.	–
UAE	No	–	Yes, emergency response plans for avian influenza. Ministry of Environment and Water, PO Box 1509, Dubai

SECTION 8. EXTENSION SERVICES

Summary of results

A summary of the current status of extension services that support the prevention of aquatic animal diseases in aquaculture facilities in RECOFI member countries is presented in Table 8 (Survey Questionnaire Parts 8.1–8.3). According to respondents, extension services exist only in the Islamic Republic of Iran, Oman and the Kingdom of Saudi Arabia.

Analysis

Individual countries should consider the need for extension services to the aquaculture industry and the best methods of delivering these services. Often the aquaculture sector can deliver its own extension services; however, in some cases, government extension services, either by training of fisheries or veterinary extension officers in the basics of aquatic animal health, or through specific health-related extension and diagnostic services can be considered. Extension officers can also serve to monitor basic health conditions in aquaculture facilities and provide a basis for passive disease surveillance by serving as a liaison with aquaculturists.

Table 8. Summary of current status of extension services that support the prevention of aquatic animal diseases in aquaculture in RECOFI member countries (Questionnaire Parts 8.1–8.3)

Country	(8.1) Extension services exist?	8.2) If "Yes", description of services, name and contact details of responsible agency(ies), number of staff and their specific areas	(8.3) If "No", agency mandated to fulfil this function and contact details
Bahrain	No	–	Yet to be developed
Iran IR	Yes	Faculty of Veterinary Medicine University of Tehran, Qareeb Street, Azadi Avenue PO Box 14155-6453 Tehran Postal Code: 1419963111 Tel.: +98-21-61117000 Fax: +98-21-66933222 E-mail: info@vetmed.ut.ac.ir vetadmin@vetmed.ut.ac.ir Iranian Research Center for Aquatic Animals	–
Iraq	No	–	General Board of Fish Resource and Development
Kuwait	No	–	Public Authority of Agriculture and Fish Resources, Kuwait science institution, environmental public authority
Oman	Yes	The Directorate General of Animal Wealth, Ministry of Agriculture (PO Box 467, PC 100 Muscat) includes a veterinary extension department that is responsible for increasing public awareness on animal health and diseases. It is also responsible for conducting extension sessions and seminars on animal diseases for owners of animals. This department's major work is with terrestrial animals and nothing is currently done regarding aquatic animals, primarily due to lack of expertise in AAH.	–
Qatar	No	–	Not yet determined
KSA	Yes	The Department of Aquaculture is involved with all kingdom areas having aqua-farms. Activities include periodic examination visits, accurate diagnosis, disease prevention and control programmes. Seven staff are involved.	–
UAE	No	–	Not yet designated

SECTION 9. COMPLIANCE/ENFORCEMENT

Summary of results

A summary of the current status of capacity for compliance/enforcement of regulations on aquatic animal health in RECOFI member countries is presented in Table 9 (Questionnaire Parts 9.1–9.6). Five countries (Islamic Republic of Iran, Kuwait, Oman, Kingdom of Saudi Arabia, and the United Arab Emirates) have compliance services that monitor and enforce international trade in live aquatic animals, including aquatic animal health regulations; two countries (Islamic Republic of Iran, Oman) have compliance services that monitor and enforce domestic trade in live aquatic animals, including aquatic animal health regulations; and five countries (Islamic Republic of Iran, Kuwait, Oman, Kingdom of Saudi Arabia, and the United Arab Emirates) have regulations related to disease prevention and control in aquaculture facilities.

Analysis

Capacity to enforce aquatic animal health regulations is an essential component of a national aquatic animal health plan. This includes ensuring border compliance with regard to import and export of live aquatic animals (usually done by quarantine officers and customs officials located at points of entry) and enforcement of regulations pertaining to an array of domestic concerns, including use of drugs and chemicals for disease treatment, control of domestic movements, enforcement of zoning regulations, inspection of aquaculture premises, etc. Such activities are usually conducted by fisheries, aquatic animal health or veterinary officers who may have special training and powers of enforcement.

RECOFI member countries should review the effectiveness of current compliance and enforcement capacity and where warranted, incorporate planning for staffing, training and regulatory support to ensure adequate compliance. Self-enforcement by aquaculture producers groups through use of best management practices (BMPs) and HACCP can be effective in improving compliance with regulations, as are communication programmes targeting risky practices by aquaculturists and the general public.

Table 9. Current status of capacity for compliance/enforcement of regulations on aquatic animal health (AAH) in RECOFI member countries (Questionnaire Parts 9.1–9.6).

Country	Does country have compliance services that monitor and enforce:					
	(9.1) International trade in live aquatic animals, including AAH regulations?	**(9.2) If "Yes", brief description of service, name and contact details of responsible agency(ies), number of staff involved and supporting legislation**	**(9.3) Domestic movements of live aquatic animals, including AAH regulations?**	**9.4) If "Yes", brief description of service, name and contact details of responsible agency(ies), number of staff involved and supporting legislation**	**(9.5) Regulations related to disease prevention, management and control in aquaculture facilities?**	**(9.6) If "Yes", brief description of service, name and contact details of responsible agency(ies), number of staff involved and supporting legislation**
Bahrain	No	–	No	–	No	–
Iran IR	Yes	31 provincial veterinary offices located in 31 provinces act as Veterinary Authority and are directly responsible for the application of animal health measures in a province under the authority of the Iranian Veterinary Administration (IVO)	Yes	31 provincial veterinary offices located in 31 provinces act as Veterinary Authority and are directly responsible for the application of animal health measures in a province under the authority of the Iranian Veterinary Administration (IVO)	Yes	31 provincial veterinary offices located in 31 provinces act as Veterinary Authority and are directly responsible for the application of animal health measures in a province under the authority of the Iranian Veterinary Administration (IVO)
Iraq	Don't Know	–	No	–	No	–
Kuwait	Yes	Public Authority of Agriculture and Fish Resources, Kuwait science institution	"Don't Know"	–	Yes	Yearly check up for the animals or any mortality that occurred during the year.

Oman	Yes	Directorate General for Animal Wealth, Ministry of Agriculture, PO Box 467, PC 100, Muscat Within this directorate, the Department of Veterinary Health is responsible for monitoring animal health including fish (although most of its work is on terrestrial animals.) It is responsible for issuing permits for import / export of live aquatic animals and also inspects shipments at port of entry. With establishment of a new Ministry of Fisheries, procedures for live aquatic trade issues will be re-evaluated	Yes	Directorate General of Fisheries Research and Extension, Ministry of Fisheries, PO Box 437, PC 100, Muscat, Tel.: +968-24-603451; Fax: +968-24-697229 Approves any local movement of live aquatic animals. Current services include only giving of permission; there is no quarantine for fish	Yes	Aquaculture Centre, Directorate General of Fisheries Research and Extension, Ministry of Fisheries, PO Box 427, PC 100, Muscat, Tel: +968-24-736618; Fax: +968-24-737782 This centre includes a section for environmental monitoring of aquaculture projects that is also responsible for AAH. The centre was established in September 2006 and capacity is being built via a master plan for aquaculture and contracting with fish disease experts
Qatar	No	–	No	–	No	–
KSA	Yes	Department of Aquaculture, according to the legislative measure of the DA Number of staff: 7	No	–	Yes	Department of Aquaculture; according to the legislative measures of the DA; Number of staff: 7; quarantine measures, accurate disease diagnosis, hygienic disposal of diseased stock, periodic examination
UAE	Yes	Animal Wealth Department Quarantine Section, Ministry of Environment and Water	No	–	Yes	All fish farms are subject to UAE State Sovereignty according to Ministry of Agriculture and Fisheries Ministerial Resolution No. 277/2001 (not currently available in English)

SECTION 10. RESEARCH

Summary of results

Survey Results detailing the status of current research activity for aquatic animal health in aquaculture in RECOFI member countries are summarized in Table 10 (Questionnaire Parts 10.1–10.2). Respondents for only three countries, the Islamic Republic of Iran, Iraq and the Kingdom of Saudi Arabia, indicated the existence of related research.

Analysis

Research capacity in aquatic animal health is necessary to the successful expansion of aquaculture development. Targeted and basic research can lead to better disease management, better understanding of national aquatic animal health status, support to risk analysis, improved diagnostic methods, etc.

The general lack of specific research capacity in RECOFI member countries means that countries must rely, to a large extent, on research conducted by scientists in other nations. Often, such "borrowed" research may not be directly applicable to local situations and experimental testing must be undertaken to adapt these findings. In other cases, little or no relevant information on the specific problem may be available.

There are many mechanisms to improve access to research capacity. These include development of national aquatic animal health research laboratories, supporting linkages and research programmes within universities and the private sector, contracting of targeted research with foreign institutions, and development of a regional aquatic animal health centre. Countries should develop their individual strategies to ensure adequate access to research to support national priorities in aquatic animal health. As some countries may not be able to justify substantial support to research, joint support to a regional research institute to develop specific aquatic animal health research capacity may be worth exploring.

Table 10. Summary of current research activity in aquatic animal health in aquaculture in RECOFI member countries (Questionnaire Parts 10.1–10.2)

Country	(10.1) Existence of research activity including AAH in its scope?	(10.2) If "Yes", brief description of research, institute, number of staff and students involved and specific areas of involvement
Bahrain	No	–
Iran IR	Yes	• Research is conducted by staff at the Iran Veterinary Organization, the Veterinary Faculty of Tehran University and the Iranian Research Center for Aquatic Animals • Detailed information about researchers and institutes is currently unavailable
Iraq	Yes	• AAH research is done mainly by colleges, veterinary schools and the Environment Center for Research, Ministry of Agriculture
Kuwait	No	–
Oman	No	–
Qatar	No	–
KSA	Yes	• On-going research includes aquaculture and diseases • Number of staff: Department of Aquaculture (7), Fish Farming Center (20), Fisheries Research Center (5) and Fish Health and Safety Laboratories in Jeddah and Qatif
UAE	No	–

SECTION 11. TRAINING

Summary of results

Survey results summarizing existence of formal training programmes in aquatic animal health in RECOFI member countries are presented in Table 11 (Questionnaire Parts 11.1–11.4). The results indicate that postgraduate-level training (M.Sc./Ph.D) is available only in the Islamic Republic of Iran and the Kingdom of Saudi Arabia. Formal non-degree training in aquatic animal health is also available only in the Islamic Republic of Iran and the Kingdom of Saudi Arabia.

Analysis

There is presently little opportunity for aquatic animal health training within the RECOFI region. Consideration of training needs is a key component of a national aquatic animal health strategy. Postgraduate training is probably best accomplished by programmes for national staff in universities having internationally recognized programmes and expertise in aquatic animal health (examples include University of Stirling in Scotland and the University of Arizona in the United States).

There is much potential for targeted short-term training. Recognized courses are given outside the region (such as those given by the Southeast Asian Fisheries Development Centre (SEAFDEC) in Iloilo, Philippines (on-line course) and the Aquatic Animal Health Research Institute (AAHRI) in Bangkok, Thailand (customized training course, research attachments). Short-term regional training exercises can be easily organized and held in the RECOFI region on such topics as national strategy development, risk analysis, biosecurity, diagnostics, shrimp health management, aquatic epidemiology, disease surveillance, histopathology, etc., through the offices of FAO, OIE, the Network of Aquaculture Centres in Asia-Pacific (NACA) or other regional or international bodies.

Table 11. Summary of current status of training that supports aquatic animal health in RECOFI member countries (Questionnaire Parts 11.1–11.4)

Country	(11.1) Post-graduate training programmes (MSc/PhD)	(11.2) If "Yes", description of programmes, contact details, number of staff and students involved, and areas of involvement	(11.3) Formal non-degree training programmes	(11.4) If "Yes", description of programmes, contact details, number of staff and students involved, and areas of involvement
Bahrain	No	–	No	–
Iran IR	Yes	Fishery and aquatic animal health department in veterinary faculty in Tehran University Faculty of Veterinary Medicine University of Tehran, Qareeb Street, Azadi Avenue PO Box 14155-6453 Tehran Postal Code: 1419963111 Tel.: +98-21-61117000 Fax: +98-21-66933222 E-mail: info@vetmed.ut.ac.ir vetadmin@vetmed.ut.ac.ir	Yes	Biotechnology Institute in Shahid Beheshti University and the Veterinary Faculty of Tehran University Faculty of Veterinary Medicine University of Tehran, Qareeb Street, Azadi Avenue PO Box 14155-6453 Tehran Postal Code: 1419963111 Tel.: +98-21-61117000 Fax: +98-21-66933222 E-mail: info@vetmed.ut.ac.ir vetadmin@vetmed.ut.ac.ir
Iraq	No	–	No	Training of veterinary staff is mainly via cooperation with the veterinary school, especially in control and management of pond farms
Kuwait	No	–	No	–
Oman	No	–	No	–
Qatar	No	–	No	–
KSA	Yes	King Saud University (Riyadh) King Faisal University (Al-Hssa) No. of staff: 1 Ph.D., 2 M.Sc.	Yes	Extension and training programmes conducted by the Department of Aquaculture, Fish Farming Center
UAE	No	–	No	–

SECTION 12. EXPERTISE

Summary of results

A summary of results obtained by the Survey Questionnaire (Section 12) with regard to the numbers of individuals actively employed in areas of direct relevance to aquatic animal health in RECOFI member countries is presented in Table 12. Seven of the eight responding countries have advanced degree (Ph.D. or M.Sc.) holders as follows – Bahrain: total of 6 staff with Ph.D., Iraq: 1 staff with M.Sc., Kuwait: 1 staff with Ph.D., Oman: 2 staff with Ph.D., Kingdom of Saudi Arabia: 10 staff with Ph.D. and 2 staff with M.Sc., and United Arab Emirates: 2 staff with Ph.D. and 2 staff with M.Sc. The Islamic Republic of Iran indicated the presence of Ph.D. and M.Sc. holders in 7 and 3 disciplines, respectively, but did not give the number of staff for each category. Only the Islamic Republic of Iran indicated the presence of staff having relevant veterinary and other degrees (number of staff not indicated).

Analysis

There appears to be sufficient aquatic animal health expertise only in the Islamic Republic of Iran and the Kingdom of Saudi Arabia. An important consideration is assessing “available” expertise (i.e. the number of experts who are actually spending a significant amount of their time in conducting research, laboratory diagnostics or field studies related to aquatic animal health; for example, Bahrain, has only one technical staff currently assigned to aquatic animal health). Expertise that is primarily occupied with administration and management, while valuable for policy setting and planning, often does not contribute significantly to implementation of aquatic animal health programmes. Countries will need to access existing expertise to determine if it is adequate and appropriately utilized.

Table 12. Summary of estimated number of individuals with tertiary qualifications in fields related to aquatic animal health in RECOFI member countries (only individuals actively employed in a capacity with direct relevance to the field of expertise are listed) (Questionnaire Section 12)

Country	Doctorate degree (by area of expertise)		Masters degree (by area of expertise)		Veterinary degree, bachelors degree, other degree
Bahrain	Parasitology (exptl)	2	–		–
	Virology	1			
	Bacteriology	2			
	Toxicology/Water Quality	1			
	Subtotal	6			
Iran IR[1]	Parasitology (exptl)		Epidemiology		*Veterinary Degree*
	Bacteriology		Toxicology/Water Quality		Parasitology(taxonomy/ systematics)
	Mycology		Other (physiology)		Electron Microscopy
	Epidemiology				Other (Physiology)
	Histopathology				*Other Degree*
	Toxicology/Water Quality				Electron Microscopy
	Molecular Diagnostics				Risk Analysis
Iraq	–			1	–
Kuwait	Bacteriology	1	–		–
Oman	Parasitology (exptl)	1			–
	Virology	1			
	Subtotal	2			
Qatar			No expertise		
KSA	Parasitology (exptl)	2	Bacteriology	1	–
	Virology	1	Toxicology/		
	Bacteriology	4	Water Quality	1	
	Epidemiology	1	*Subtotal*	2	
	Histopathology	1			
	Other (physiology)	1			
	Subtotal	10			
UAE	Virology (gen.)	1	Bacteriology (gen.)	1	–
	Bacteriology	1	Parasitology (gen.)	1	
	Subtotal	2	*Subtotal*	2	

[1] Current numbers of individuals in each category cannot be estimated by respondent.

SECTION 13. INFRASTRUCTURE

Summary of results

Survey results on current infrastructure (laboratories, office space, and other) dedicated solely to aquatic animal health activities or shared with other groups are summarized in Table 13 (Survey Questionnaire Parts 13.1–13.2). Only four survey respondents indicated the existence of infrastructure. The Islamic Republic of Iran has the dedicated laboratories of the Veterinary Faculty of Tehran University and the Iranian Research Center for Aquatic Animal Health, as well as the shared Central Veterinary Laboratory of the Iran Veterinary Organization. Iraq noted the presence of a unit for fish disease that shares facilities with a central veterinary laboratory, while the Kingdom of Saudi Arabia was indicated to possess laboratories at the Fish Farming Center, the Fisheries Research Center and the Fish Health and Safety Laboratories that are dedicated to aquatic animal health. The United Arab Emirates indicated only the existence of shared resources such as aquaculture ponds and tank rooms. Research centres in the Kingdom of Saudi Arabia were noted to be well equipped with aquaculture ponds, related infrastructure and facilities needed to carry out all activities required in the fields of aquaculture. Although Kuwait is known to possess some infrastructure related to aquatic animal health, no information was provided.

Analysis

Based on the available information, it appears that only the Islamic Republic of Iran and the Kingdom of Saudi Arabia are likely to have sufficient infrastructure to address national aquatic animal health needs. Countries should consider current and future infrastructure needs when developing aquatic animal health strategies. For smaller countries, the possibility of shared facilities with national veterinary services, aquaculture centres, universities or the private sector should be considered.

Table 13. Summary of Infrastructure Dedicated to aquatic animal health in RECOFI member countries (Questionnaire Parts 13.1–13.2)

Country	(13.1) Infrastructure dedicated solely to aquatic animal health			(13.2) Infrastructure available for aquatic animal health activities but shared with other groups		
	(a) Laboratories (Type)	(b) Office space	(c) Other	(a) Laboratories (Type)	(b) Office space	(c) Other
Bahrain	None	None	None	None	None	None
Iran IR	Laboratories of the Veterinary Faculty, Tehran Univ. Laboratories of the Iranian Research Center for Aquatic Animals	Iranian Research Center for Aquatic Animals	None	Central Veterinary Laboratory of Iran Veterinary Organization	Directorate of Aquatic Animal Health of IVO and related offices in 31 provinces	None
Iraq	Yes	NI	NI	Yes, fish disease unit shared with central veterinary lab.	NI	NI
Kuwait	"N/K"	"N/K"	"N/K"	"N/K"	"N/K"	"N/K"
Oman	None	None	None	None	None	None
Qatar	None	None	None	None	None	None
KSA	Fish Farming Center, Fisheries Research Center, Fish Health and Safety Laboratories	NI	Research centres are well equipped with aquaculture ponds and related infrastructure and facilities to carry out all activities required in the fields of aquaculture	None	None	None
UAE	None	None	None	None	None	Aquaculture ponds, tank rooms, etc.

SECTION 14. LINKAGES

Summary of results

A summary of current international and domestic linkages and cooperation related to aquatic animal health in RECOFI member countries is given in Table 14 (Questionnaire Parts 14.1–14.2). No specific international, regional or bilateral linkages (other than OIE and WTO memberships, see Section 1), cooperation or joint projects were identified. Similarly, most respondents were unable to identify any domestic linkages, projects or cooperation between government, universities and/or the private sector. Three countries (Iraq, Oman, and the Kingdom of Saudi Arabia) noted some form of informal cooperation among government agencies or between government and university or private sector.

Analysis

Developing international regional and domestic linkages and cooperation is clearly an area that offers great potential to increase aquatic animal health capacity among RECOFI member countries.

Cooperation in research and training is possible via international agencies such as the FAO, OIE and NACA and with foreign universities and experts.

There is a great potential for regional cooperation and networking in almost all areas of aquatic animal health. Examples include the development of standardized procedures for import and export of live aquatic animals, harmonization of legislation, shared communication structures (Web sites, newsletters), development of a regional aquatic animal health information system (pathogen database, regional disease diagnostic and extension manuals), linkage of experts, cooperative research programmes, development of regional strategy and policy, regional disease reporting, a regional emergency response system, regional reference laboratory, regional risk analysis case studies for specific commodities, coordinated training efforts, etc. Mutual areas of concern need to be identified and prioritized on a regional basis and mechanisms for funding identified.

Domestically, linkages between agencies, particularly those agencies responsible for fisheries and aquaculture, veterinary services, biosecurity and environmental/conservation issues, should be promoted to develop standardized procedures. Cooperation between government, universities and the private sector should also be explored.

Table 14. Summary of current international and domestic linkages and cooperation related to aquatic animal health in RECOFI member countries (Questionnaire Parts 14.1–14.2)

Country	(14.1) International, regional and bilateral linkages, cooperation and joint projects		(14.2) Domestic linkages, projects and cooperation between government, universities and/or private sector	
	Nature of activity	Participating agencies	Nature of activity	Participating agencies
Bahrain	None	–	None	–
Iran IR	None	–	None	–
Iraq		–	Problem solving (as needed)[1]	Government/Universities
Kuwait	"N/K"	–	"N/K"	–
Oman	None[2]	–	Informal cooperation	No formal projects in AAH due to the infancy of aquaculture, with only two commercial projects. However, there is: • Cooperation between the Marine Science and Fisheries Centre (MSFC) and Sultan Qaboos University (SQU) in the case fish mortality due to algal bloom • Cooperation with the Fishermen Training Institute, Ministry of Manpower, which has one expert on fish quality and diseases Previously, cooperation occurred between the Fish Quality Control Centre from our Ministry and the Fishermen Training Institute
Qatar	None	–	None	–
KSA	None[3]	–	Aquaculture; application of disease prevention and control programmes	Department of Agriculture and local fish farms (cooperation in aquaculture activities and disease prevention and control programmes)
UAE	None	–	None	–

[1] Currently no formal project linkages with universities; when certain problems occur, the government tries to contact experts in universities and other institutes.

[2] A study on the state of aquatic animal health in Oman was completed by people from the Aquaculture Centre and Fish Quality Control Centre as part of major study conducted by the Arab Organization for Agricultural Development (AOAD) belonging to the Arab League. The study produced a written report having a structure prespecified by the organization; all the reports from the participating countries being presented in a single volume.

[3] The Fish Farming Center (FFC) in Jeddah was established in 1982 through cooperation between the Ministry of Agriculture and FAO. The main activity of the FFC is the transfer of aquaculture technology, especially for marine culture systems. This is achieved through projects in such areas as marine finfish farming, marine tilapia farming, live fish food, shrimp farming, disease control, and training and extension activities.

SECTION 15. FUNDING SUPPORT

Summary of results

Few countries were able to provide clear cut answers with regard to national levels of funding. Respondents for Bahrain and Qatar indicated that there are currently no funds specifically allotted to support aquatic animal health activities, while survey respondents for Oman, the Kingdom of Saudi Arabia and the United Arab Emirates were unable to provide estimates due to funding for aquatic animal health being integrated into broader budgets.

Analysis

Due to lack of information, no analysis can be made on the dedication of funds by RECOFI member countries to support aquatic animal health capacity. However, this is clearly an important issue, as without adequate budget, little improvement in capacity can be achieved. Each RECOFI country will have to address its specific funding needs.

Table 15. Estimated total annual budget dedicated specifically to aquatic animal health activities in RECOFI member countries (Questionnaire Parts 15.1–15.3)

Country	(15.1) Estimated total annual budget dedicated specifically to AAH activities				(15.2) Is funding adequate for current and future needs?	(15.3) If "No", % increase required over next 5-years
	(a) Regular programme support	(b) Special funding/ project support	(c) Foreign assisted project support	(d) Total support		
Bahrain	None	None	None	None	NI	NA[1]
Iran IR	NI	NI	None	NI	No	50%
Iraq	Not Estimated	NI	NI	NI	Don't Know	Not Estimated[2]
Kuwait	"N/K"	"N/K"	"N/K"	"Not Fixed"	Don't Know	–
Oman	NA	None	None	NA	NA	NA[3]
Qatar	None	None	None	None	No	NI
KSA	NA	None	None	NA[4]	NI	NI
UAE	NA	None	None	NA[5]	No	40%

[1] Bahrain is currently trying to locate funding for a fish pathology laboratory, which will require an estimated budget of USD 150 000.

[2] Iraq plans to develop marshes in the south, so must allot a certain budget for AAH for the next five years for building capacity, manpower development, research, drugs, vaccines, etc.

[3] Oman does not have a special budget or special programmes dedicated to AAH activities, either nationally or through foreign-assisted projects.

[4] The Kingdom of Saudi Arabia does not have a specified national budget for aquatic animal health; rather, these activities are included within funding to established aquatic animal laboratories through the programmes of the Ministry of Agriculture.

[5] The United Arab Emirates does not have a specified national budget for aquatic animal health.

SECTION 16. CURRENT CHALLENGES

Summary of results

Respondents for five countries (Bahrain, Oman, Qatar, Kingdom of Saudi Arabia, and the United Arab Emirates) provided detailed information of the current challenges that their countries are facing in their efforts to improve aquatic animal health capacity (Table 16; Questionnaire Part 16.1).

For challenges related to preventing the entry and spread of exotic pathogens, Iraq and Qatar indicated that this was a general challenge, while the Islamic Republic of Iran indicated that white spot disease was of specific concern; Bahrain indicated a lack of capacity for monitoring and control; Oman listed the absence of a national aquatic animal health plan, lack of risk analysis procedures or a precautionary approach, lack of quarantine facilities, and lack of fish disease specialists; Kingdom of Saudi Arabia indicated the need for well trained staff and for continuous development and improvement of diagnostics techniques for fish pathogens; and the United Arab Emirates listed the need to develop quarantine activities.

For challenges related to preventing domestic spread of serious pathogens, Iraq and Qatar indicated that this was a general challenge; Bahrain indicated a lack of monitoring and control; the Islamic Republic of Iran indicated that white spot disease was of specific concern; Oman listed a lack of detailed regulations and of expertise in fish health; Kingdom of Saudi Arabia indicated that there was a need for well-trained staff, for large-scale extension programmes and for an updating of diagnostic techniques; the United Arab Emirates indicated the need to develop quarantine activities; and the United Arab Emirates listed the need to increase control and inspection of local aquaculture establishments.

For challenges related to meeting international and trading-partner standards for health certification, Qatar indicated that this is an area of general concern; Bahrain indicated the absence of a diagnostic laboratory; the Islamic Republic of Iran indicated that white spot disease was of specific concern; Oman listed a lack of expertise and of quarantine capacity; Kingdom of Saudi Arabia noted the need to achieve high-quality control programmes; and the United Arab Emirates noted the need for improved health certificates.

For challenges related to controlling mortalities and losses due to pathogens in aquaculture facilities, Bahrain indicated the absence of capacity for monitoring and control and lack of appropriate measures; the Islamic Republic of Iran indicated that white spot disease was of specific concern; Oman listed a lack of a national plan and of specialists and specialized laboratories; the Kingdom of Saudi Arabia noted the need for rapid and accurate diagnostic techniques; and the United Arab Emirates listed the need for to apply sanitary requirements and biosecurity in aquaculture facilities.

For other serious challenges likely to arise in the next five years, Bahrain indicated an absence of studies and data to support aquatic animal health; the Islamic Republic of Iran indicated that white spot disease was of specific concern; Oman listed possible problems related to the establishment of separate ministries for agriculture and fisheries and the challenge of dealing with invasive species transported via ship’s ballast waters; Qatar indicated the need to formulate policy and strategy, and KSA indicated the need to apply modern techniques for disease diagnosis and control programmes.

Analysis

The current challenges to improving aquatic animal health capacity in RECOFI member countries touch on almost all major areas of a national aquatic animal health strategy. These include the need for improved policy and planning, improved specialist expertise, the need for specialized infrastructure for diagnostics and quarantine, better monitoring and control, improved diagnostics techniques, improved legislation and better extension programmes. These are all areas that should be given high priority in preparing a regional approach to improving aquatic animal health capacity.

Although funding is noted in Section 17 as a current constraint, this was not mentioned as a future challenge, indicating that respondents consider policy and planning and technical issues (expertise, infrastructure, etc.) as the major issues and perhaps, that with proper planning obtaining the required financial support will not be a major problem.

Table 16. Summary of current challenges related to improving aquatic animal health capacity in RECOFI member countries (Questionnaire Part 16.1)

Country	(16.1) Type of Challenge				
	(a) Preventing entry and spread of exotic pathogens	**(b) Preventing domestic spread of serious pathogens**	**(c) Meeting intl/ trading partner standards for health certification**	**(d) Controlling mortalities/ losses due to pathogens in aquaculture**	**(e) Other serious challenges likely in next 5-years**
Bahrain	No monitoring and control	No monitoring and control	No diagnostic laboratory	No monitoring and control; Lack of measures	No study or data to support
Iran IR	Yes (white spot disease)	Yes (white spot disease)	Yes (white spot disease)	Yes (white spot disease)	Yes (white spot disease)
Iraq	Yes	Yes	NI	NI	NI
Kuwait	None	None	None	None	None
Oman	Absence of national plan for AAH Absence of risk analysis procedures or precautionary approach Lack of quarantine facilities Lack of fish disease specialists	Lack of detailed regulations Lack of expertise in fish health and diseases	Lack of expertise Lack of quarantine	Lack of national plan Lack of specialists Lack of specialized laboratories	Different government authorities now responsible for AAH issues, as the Ministry of Agriculture and Fisheries was separated into the Ministry for Agriculture (MA) and the Ministry for Fisheries (MF). According to law, the MA is responsible for quarantine issues for all kinds of animals and is also the OIE focal point Problem of invasive species from ballast water that can carry diseases and parasites
Qatar	Yes	Yes	Yes	NA[1]	Formulation of policy and strategy

KSA	Need for enough well trained staff Need for continuous development and improvement of diagnostic techniques for fish pathogens	Need for large-scale extension programmes Updating diagnostic techniques Need for enough well-trained staff	Achieving high-quality control programmes	Need for rapid and accurate diagnostic techniques	Application of modern techniques for disease diagnosis and control programmes.
UAE	Need to develop quarantine activities	Need to increase control and inspection of local aquaculture establishments	Need for approved health certificates using OIE standards from competent authorities in country of origin	Need to apply sanitary requirements and biosecurity in aquaculture facilities	–

[1] Qatar has no aquaculture at present.

SECTION 17. CONSTRAINTS

Summary of results
Seven survey respondents listed constraints to implementing an effective aquatic animal health programme (Table 17, Survey Questionnaire Part 17.1).

Analysis
The constraints identified by the survey respondents generally mirrored the "current challenges", as summarized in Section 16. The following are the major constraints faced by most countries:

- Lack of a national plan for aquatic animal health (including lack of awareness and initiatives)
- Lack of specialized expertise/qualified staff
- Lack of training opportunities
- Lack of infrastructure (dedicated laboratories, quarantine facilities)
- Lack of budget/funding
- Other constraints (security situation, lack of regulations, lack of extension planning)

These are all serious constraints that need to be addressed if aquatic animal health capacity is to develop to the level needed in the RECOFI region.

Table 17. Summary of the major constraints to implementing an effective aquatic animal health programme, in order of importance, as identified by the respondents (Questionnaire Part 17.1)

Country	(17.1) Major constraints	
Bahrain	(i)	Lack of awareness
	(ii)	No initiative
	(iii)	Budget constraints
	(iv)	Lack of qualified local staff
Iran IR	(i)	Lack of laboratory equipment
	(ii)	Lack of human resources (including expert staff)
	(iii)	Lack of funding support
Iraq	(i)	Lack of security
	(ii)	Lack of experts
	(iii)	Lack of training outside country
	(iv)	Lack of specific aquaculture laboratory
Kuwait	None	
Oman	(i)	Lack of national plan for aquatic animal health
	(ii)	Lack of quarantine facilities
	(iii)	Lack of specialized human resources in aquatic animal health
	(iv)	Lack of specialized laboratories for aquatic animal health
Qatar	(i)	Lack of national policy, planning and programme
KSA	(i)	Funding
	(ii)	Insufficient training programmes
	(iii)	Need for some specific qualifications and expertise
	(iv)	Need to apply a master plan for extension activities to cover all fish farms
	(v)	Need to improve molecular techniques for disease diagnosis
UAE	(i)	Lack of aquatic animal health programme (an effective programme is required)
	(ii)	Lack of adequate regulations
	(iii)	Lack of specialists in aquatic animal health
	(iv)	Lack of funds to develop and operate an aquatic animal health programme

SECTION 18. ADDITIONAL INFORMATION

Respondents were asked to provide any additional information about their country's capacities or capabilities with respect to managing aquatic biosecurity that is not mentioned in the responses to the survey questions. In particular the general recommendations to RECOFI made by the respondent for Oman should be considered during the discussions on a regional strategy to be held in Jeddah.

Table 18. Additional information as provided by the respondents (Questionnaire Part 18.1)

Country	(18.1) Additional information provided
Bahrain	None
Iran IR	None
Iraq	• Pollution of streams by pesticide used for fishing • Lack of water quality • No specific medicines to treat fish disease; medicines used for poultry are used.
Kuwait	None
Oman	We have a special fish kill committee headed by the Ministry of Fisheries that has members from governmental authorities such as the Ministry of Health, Sultan Qaboos University, Ministry of Environment and Climate Affairs, Royal Oman. This committee studies any fish kills, identifies the cause(s), and also coordinates the work of different authorities in case of fish kills. General recommendations for RECOFI area in relation to aquatic animal health: • Focus on the training of human resources. • Formulate a system to enhance the exchange of information on this issue. This can be established through a network of regional fish disease experts. • List all aquatic animal health experts available in the region. • Formulate one or two accredited laboratories in the region to conduct the necessary tests required for aquatic animal health. • Establish a database of fish diseases in the region. • Conduct a detailed survey of the fish diseases in the region. • Harmonize regulations concerning the introduction of exotic species. In this regard, several international guidelines and codes of conduct can be of great use, such as: OIE Aquatic Animal Health Code, International Council for the Exploration of the Seas (ICES) Code of Practice on the Introduction and Transfer of Marine Organisms, FAO Code of Conduct for Responsible Fisheries. • Encourage and increase cooperation with international and regional organizations in the field of aquatic animal health such as FAO, NACA and OIE.
Qatar	None
KSA	None
UAE	Environmental Research and Wildlife Development Agency (ERWDA) has a few projects for protecting some marine animals such as dugong and green turtle that are under threat of extinction and also pollution control of the marine environment that supports aquatic biosecurity, to a certain extent.

Annex I

Questionnaire Survey Form

RECOFI Regional Aquatic Animal Health Capacity and Performance Survey

Background: The RECOFI Working Group on Aquaculture (WGA), during its third meeting in Jeddah, Kingdom of Saudi Arabia (KSA), in May 2007, endorsed the implementation of activities towards the preparation of a "regional strategy on aquatic animal health". The activities include: (i) assessment of institutional and human resource capacities on aquatic animal health at national level through a questionnaire survey, and (ii) organization of a regional workshop to present the results of the survey, brainstorm on the development of a regional aquatic animal health strategy and conduct a technical seminar as part of capacity building to raise awareness on various issues and concepts of aquatic animal health management. The preparatory work for the strategy development was finalised in Kuwait in November 2007 during the Technical Meeting of the RECOFI Regional Aquaculture Information System. These include: (i) finalization, implementation and analysis of the questionnaire survey (December 2007 to February 2008); (ii) implementation of a regional technical workshop in Jeddah, Kingdom of Saudi Arabia (April 2008) and (iii) preparation and finalization of a proposal for a regional aquatic animal health development programme.

Purpose: The purpose of this survey is to obtain information on national capacity and the agencies mandated to implement aquatic animal health programmes for the eight RECOFI member Countries. The survey will also collect relevant information essential to support the development of the aquaculture sector through healthy aquatic production and seeks opinions on the components and activities that might be included in a regional aquatic animal health strategy. The results of this survey will help guide regional and national strategic planning for improving aquatic animal health and assuring adequate and rational support services to achieve sustainable aquaculture development. The survey questionnaires contain 18 sections pertaining to: (1) international trade in live aquatic animals and national border controls, (2) control of domestic movement of live aquatic animals and other domestic activities that may spread pathogens, (3) policy and planning, (4) legislation, (5) disease surveillance/monitoring, (6) disease diagnostics, (7) emergency preparedness and contingency planning, (8) extension services, (9) compliance/enforcement, (10) research, (11) training, (12) expertise, (13) infrastructure, (14) linkages and cooperation, (15) funding support, (16) current challenges, (17) constraints and (18) additional information.

Participation: Eight RECOFI member countries (Bahrain, Islamic Republic of Iran, Iraq, Kuwait, Oman, Qatar, Kingdom of Saudi Arabia and the United Arab Emirates) will participate in the survey.

Process: The survey questionnaires, jointly developed by FAO and an international consultant (J.R. Arthur) will be undertaken between the end of December 2007 to end of January 2008. The survey returns are expected by first week of February 2008. Through the RECOFI Working Group on Aquaculture (WGA) National Focal and Alternate Points, this survey should be completed by the national competent authority or other senior government officer with primary responsibility for national aquatic animal heath issues, with the assistance of national aquaculture experts and concerned laboratory personnel. FAO will analyse the survey returns, results will be presented during the planned regional workshop on aquatic animal health in Jeddah, Kingdom of Saudi Arabia in April 2008.

Product: Analysis of survey results will form the basis for the development of a regional strategy after a brainstorming exercise that will be undertaken during the regional workshop.

Details of person completing the survey questionnaires

Country:
Contact information for person completing this survey:
Name:
Title:
Institution:
Mailing address:
Telephone:
Facsimile:
E-mail:
Signature of completing official:
Date:

SECTION 1. International trade in live aquatic animals and national border controls

1.1 Is your country a member of the **World Organisation for Animal Health** (OIE, Office International des Epizooties)?

( ) Yes ( ) No

1.2 If **yes**, please indicate the government agency/person that is recognized by the OIE as your country's Competent Authority for purposes of reporting aquatic animal health s status? (If the Chief Veterinary Officer, please indicate):

1.3 Is your country a member of the **World Trade Organization** (WTO)?

( ) Yes ( ) No

1.4 Does your country have **legislation** that supports or strengthens government control of imports and exports with respect to aquatic animal health?

( ) Yes ( ) No

1.5 If **yes**, name and briefly describe this legislation:

( ) Yes ( ) No

1.6 Does your country export live **aquatic animals** to other countries?

( ) Yes ( ) No

1.7 If **yes**, please briefly list the principal species exported, the destination countries, volumes, and estimated values. You can use a table like the one below:

Species	Country of destination	Volume	Value

1.8. If **yes**, please describe any associated aquatic animal health certification that you provide to the importing country, including the name and contact details of the government agency/ies that provides this certification:

1.9. If **yes**, is certification done:

(a) for **freedom from specified pathogens** using the methods outlined in the OIE aquatic animal disease diagnostics manual (http://www.oie.int/eng/normes/en_amanual.htm?e1d10):

( ) Yes ( ) No

(b) to whatever **standards the importing country requires**:

( ) Yes ( ) No

(c) to other standards based on general appearance of health (e.g. by visual inspection) or using testing protocols devised by agencies within your country

( ) Yes ( ) No

1.10. Are live aquatic animals **imported** to your country from other countries?

( ) Yes ( ) No

1.11 If **yes**, please briefly list the principal species imported, countries of origin, volumes, and estimated values. You can use a table like the one below:

Species	Country of destination	Volume	Value

1.11 If **yes**, describe any associated aquatic animal health certification that you require to be provided by the exporting country.

1. 12. If **yes**, describe any other official controls or risk management measures to which imported aquatic animals or aquatic animal products are subject (e.g. veterinary inspection at the port of entry, quarantine, or end-use controls such as prohibitions on the release of live aquatic animals into natural waters):

1.13. Is there expertise in your country for **Import Risk Analysis** (IRA) for aquatic animal pathogens?

( ) Yes ( ) No

1.14. If **yes**, provide contact details of the agency/ies with this expertise and provide examples of the import risk analyses that have been undertaken:

1.15. Is evaluation of risks for aquatic animal **pathogens linked with evaluation of other risks** (e.g. ecological, pest, invasive alien species, genetic risks)?

( ) Yes ( ) No

1.16 If **yes**, briefly describe how is this accomplished (e.g. by interagency committee).

SECTION 2. Control of domestic movements of live aquatic animals and other domestic activities that may spread pathogens

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2.1 Does your country have any **regulations controlling the in-country movement** of live aquatic organisms?

( ) Yes ( ) No

2.2 If **yes**, briefly describe these controls, including the name and contact details of the responsible agency/ies and the legislation that provides authority for this control:

2.3 Does your country have any regulations **pertaining waste disposal from seafood processing** plants in relation to preventing the spread of aquatic animal pathogens?

( ) Yes ( ) No

2.4 If **yes**, briefly describe these controls, including the name and contact details of the responsible agency/ies and the legislation that provides authority for this control:

SECTION 3. Policy and planning

3.1 Has an agency or agencies been designated as responsible for national aquatic animal health policy and planning for your country?

( ) Yes ( ) No

3.2. If **yes**, indicate agency(ies) or department(s) and please indicate their responsibilities.

( ) Yes ( ) No

3.3 Has official policy been expressed in a **National Aquatic Animal Health Plan**, strategy, legislation or other document?

( ) Yes ( ) No

3.4 If **yes**, provide citation for document:

3.5 If **no**, briefly describe how issues impacting national aquatic animal health currently are being handled:

3.6 Do **subnational entities** (state, provincial, local government, private sector) play a role in setting national aquatic animal health policy?

( ) Yes ( ) No

3.7. If **yes**, briefly describe their role(s):

3.8 Is current policy for aquatic animal health:

(a) **adequate for preventing the entry and spread** of exotic aquatic animal pathogens?

( ) Yes ( ) No ( ) Don't know

(b) **adequate for controlling serious diseases** within country?

( ) Yes ( ) No ( ) Don't know

(c) **effectively implemented**?

( ) Yes ( ) No ( ) Don't know

3.9 Which of the following areas are **addressed in national policy**?

national diagnostics services:	( ) Yes	( ) No
risk analysis:	( ) Yes	( ) No
farm-level treatment and prevention:	( ) Yes	( ) No
emergency preparedness and disease control:	( ) Yes	( ) No
manpower requirements:	( ) Yes	( ) No
training requirements:	( ) Yes	( ) No
infrastructural requirements:	( ) Yes	( ) No
financial requirements and planning:	( ) Yes	( ) No
international treaties, memberships and linkages:	( ) Yes	( ) No
communication (interagency, stakeholder):	( ) Yes	( ) No

3.10 What are the **current priorities for your country** with regard to national aquatic animal health policy (list in order of importance)?

SECTION 4. Legislation

4.1 Is there **specific legislation** in place dealing with aquatic animal health?

( ) Yes ( ) No

4.2 If **yes**, indicate if aquatic animal health legislation is:

By separate act or regulation:	( ) Yes	( ) No
As part of broader veterinary, aquaculture, environmental protection or conservation legislation or regulation:	( ) Yes	( ) No

4.3. If **yes**, is existing legislation/regulations in need of major review and/or revision?

( ) Yes ( ) No

SECTION 5. Disease surveillance/monitoring

5.1 Are there any **official surveillance or monitoring programmes** for plant or animal diseases in your country?

( ) Yes ( ) No

5.2 If **yes**, do these programmes deal with:

Plants:	( ) Yes	( ) No
Terrestrial animals:	( ) Yes	( ) No
Aquatic animals:	( ) Yes	( ) No

5.3 Briefly describe any **programmes for surveillance or monitoring of aquatic animal diseases**, including the name and contact details of the responsible agency/ies:

SECTION 6. Disease diagnostics

6.1 Is there adequate national capacity to **diagnose those diseases listed by the World Organisation for Animal Health** to the specifications listed in the OIE manual?

( ) Yes ( ) No ( ) Don't know

6.2 If yes, indicate **capacity to diagnosis disease to OIE standards** for the following groups:

(a) OIE-listed **molluscan** diseases:	( ) Yes (all)	( ) Yes (some)	( ) No
(b) OIE-listed **crustacean** diseases:	( ) Yes (all)	( ) Yes (some)	( ) No
(c) OIE-listed **finfish** diseases	( ) Yes (all)	( ) Yes (some)	( ) No

6.3 Does your country have an **officially designated national laboratory**(ies) for aquatic animal health diagnostics?

( ) Yes ( ) No

6.4 If **yes**, please provide contact information:

6.5 Are any laboratories in your country accredited as **international or national reference centres** for aquatic animal disease diagnosis?

( ) Yes ( ) No

6.6 If **yes**, please indicate laboratory(ies), accrediting body and type of accreditation:

6.7 Does your country's government and private aquaculture sector have access to other public or private-sector laboratory-based disease diagnostic services?

( ) Yes ( ) No

6.8 If **yes**, briefly describe this service/s, including the name and contact details of the responsible institutes/companies and the range of services available, including:

Parasitology
Histopathology
General bacteriology/mycology
General virology
Electron microscopy
Tissue culture
Molecular diagnostics (e.g. PCR)
Immunoassay (e.g. ELISA)
Water quality analysis

6.9 Is there a **national pathogen list** for aquatic animal diseases?

( ) Yes ( ) No ( ) Don't know

6.10 If **yes**, list the criteria for inclusion of a pathogen in the national list and give those aquatic animal diseases/pathogens that are listed:

SECTION 7. Emergency preparedness/Contingency planning

7.1 Does your country have any **contingency or emergency response plans** for containment or eradication of serious aquatic animal diseases?

( ) Yes ( ) No ( ) Don't know

7.2 If **yes**, briefly describe these plans, including the name and contact details of the responsible agency/ies and any legislation that supports emergency response activity:

7.3 If **no**, briefly describe any emergency response plans for terrestrial animal diseases or terrestrial plant pests or invasive pest species in your country, including the name and contact details of the responsible agency/ies and any legislation that supports emergency response activity:

SECTION 8. Extension services

8.1 Does your country have any **extension services** that support the prevention of aquatic animal diseases in aquaculture?

( ) Yes ( ) No

8.2 If **yes**, briefly describe this service, including the name and contact details of the responsible agency/ies, the number of staff involved and specific areas of involvement:

8.3. If **no**, indicate what agency, if any, is mandated to fulfil this function and provide contact details:

SECTION 9. Compliance/Enforcement

9.1 Does your country have any compliance services that monitors and enforces:

(a) **international trade in live aquatic animals** (importations and exports), including aquatic animal health regulations?

( ) Yes ( ) No ( ) Don't know

9.2 If **yes,** briefly describe this service, including the name and contact details of the responsible agency/ies, the number of staff involved and the legislation that supports compliance activity:

9.3 Does your country have any compliance services that monitors and enforces:

(b) **domestic movements** of live aquatic animals, including aquatic animal health regulations?

( ) Yes ( ) No ( ) Don't know

9.4 If **yes,** briefly describe this service, including the name and contact details of the responsible agency/ies, the number of staff involved and the legislation that supports compliance activity:

9.5 Does your country have any compliance services that monitors and enforces:

(c) **regulations related to disease prevention**, management and control in aquaculture facilities?

( ) Yes ( ) No ( ) Don't know

9.6 If **yes,** briefly describe this service, including the name and contact details of the responsible agency/ies, the number of staff involved and the legislation that supports compliance activity:

SECTION 10. Research

10.1 Does your country have **any research activity** that includes aquatic animal health in its scope?

( ) Yes ( ) No

10.2 If **yes**, briefly describe this research, including the name and contact details of the responsible institute/s, the number of staff and students involved and specific areas of involvement:

SECTION 11. Training

11.1 Does your country have any formal **post-graduate training** programmes (M.Sc. or Ph.D.) in areas related to aquatic animal health?

( ) Yes ( ) No

11.2 If **yes**, briefly describe these programmes, including the name and contact details of the responsible institute/s, the number of staff and students involved and specific areas of involvement:

11.3 Does your country have any **formal non-degree training** programmes (short courses, work-study programmes etc.) in areas related to aquatic animal health?

( ) Yes ( ) No

11.4 If **yes**, briefly describe these programmes, including the name and contact details of the responsible institute/s, the number of staff and students involved and specific areas of involvement:

( ) Yes ( ) No

SECTION 12. Expertise

Summarize the estimated total numbers of individuals in the country with particular levels of tertiary qualifications in each of the stated fields related to aquatic animal health – only those actively employed in a capacity with direct relevance to the field of expertise should be included:

	Level of qualification				
Field of expertise in aquatic animal health	**Doctorate**	**Masters degree**	**Veterinary degree**	**Bachelors degree**	**Other (specify)**
Parasitology (experimental)					
Parasitology (taxonomy/systematics)					
Virology					
Bacteriology					
Mycology					
Epidemiology					
Histopathology					
Toxicology/water quality					
Molecular diagnostics (e.g. PCR, ELISA)					
Electron microscopy					
Aquatic biosecurity (e.g. risk analysis)					
Other (specify)					

SECTION 13. Infrastructure

13.1 Summarize the available **infrastructure dedicated solely to aquatic animal health**:

(a) Laboratories (type):
(b) Office space:
(c) Other (e.g. aquaculture ponds, tank rooms):

13.2 Summarize the available infrastructure available for aquatic animal health activities but **shared with other groups**:

(a) Laboratories (type):
(b) Office space:
(c) Other (e.g. aquaculture ponds, tank rooms, electron microscope):

SECTION 14. Linkages and cooperation

14.1 List any **international, regional or bilateral linkages, cooperation or joint projects** related to aquatic animal health that your country has, indicating their nature and the participating agencies:

14.2 List any **domestic linkages, projects or cooperation** between government agencies, universities and/or private sector, indicating their nature and the participating parties:

SECTION 15. Funding support

15.1 Indicate the **estimated total annual budget** dedicated specifically to aquatic animal health activities for your country:

(a) Amount from regular programmes:
(b) Amount from special funding/projects:
(c) Amount from foreign assisted projects:
(d) Total:

15.2 Is this amount considered **adequate** to meet current and future needs in aquatic animal health?

( ) Yes ( ) No ( ) Don’t know

15.3 If **no**, indicate percentage increase required over next 5 years?

SECTION 16. Current challenges

16.1 List the **main aquatic animal health challenges** that currently face your country with respect to:

(a) preventing the entry and spread of exotic pathogens:
(b) preventing the domestic spread of serious pathogens:
(c) meeting international/trading partner standards with regard to health certification of live aquatic animals:
(d) controlling mortalities/losses due to pathogens in aquaculture establishments:
(e) any other serious challenges related to aquatic animal health that your country is facing or is likely to face in the next 5 years:

SECTION 17. Constraints

17.1 List the **major constraints** to implementing an effective aquatic animal health programme for your country, in order of importance:

SECTION 18. Additional information

18.1 Provide any additional information about your country's capacities or capabilities with respect to managing aquatic biosecurity that is not mentioned in the responses to the above questions:

Annex II

List of persons completing the survey questionnaire

Bahrain
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Directorate of Marine Resources
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Annex III

Summary of legislation of the Sultanate of Oman relevant to aquatic animal health

- **Law of Fishing and Protection of Living Aquatic Resources (RD 53/1981, revised RD 59/1993)**
  This law governing the fisheries sector was first issued in 1982 and amended in 1993. Currently, this law is under revision to cope with the development of the fisheries sector. It contains many by-laws including those dealing with the import and export of fish. These are the By-law for Aquaculture and Quality Control of Cultured Organisms and the By-law for Quality Control of Exported Fish.

- **By-law for Aquaculture and Quality Control of Cultured Organisms (MD 36/2004)**
  This bylaw contains two sections and seven chapters. About 48 articles are included covering different aspects of aquaculture, such as licensing and its requirements for aquaculture projects, quarantine procedures and quality issues. Section one contains three chapters that deal with terms used in the law, licensing requirements and aquaculture committee duties. According to the first chapter, a private company cannot start any aquaculture project without permission from the authorized government body. This chapter also states some general rules such as those for quarantine procedures and fish importations requirements. Culture of exotic species is prohibited without permission from the authorized body. Service charges and fees for obtaining license and forms and also for renting governmental land are also stated.

  Chapter 2 of this section describes the flow of applications submitted by a private company from beginning until final approval. The aquaculture committee and its duties are described in Chapter 3 of this section. According to this chapter, there is an aquaculture committee headed by the Director General of the authorized body and comprised of members from the Ministry of Agriculture and Fisheries and other ministries such as the Ministry of Regional Municipalities, Environment and Water Resources; Ministry of Housing, Electricity and Water; Ministry of Transport and Telecommunications; and Ministry of Commerce and Trading, and the Oman Chamber for Commerce and Trading.

  This section consists of 4 chapters that state all the requirements needed for quality of farmed organisms and the hygienic issues of the farms. In chapter one of the previous section, the law states that any aquaculture company should obtain a quality control certification before exporting its products. This certification will be given after the company passes the conditions stated in this law and fish quality control law and HACCP systems.

- **Quality Control Regulation for Omani Fishery Exports (MD 136/1998)**
  This By-law contains 13 chapters on different aspects of quality control for exported fish, including specifications for frozen fish, chilled fish, and chilled and frozen crustaceans. It also contains sections on the display and marketing of fish products and requirements during and after landing.

- **Veterinary System in Gulf Council Countries (RD 93/2000) and the By-law of Veterinary System (MD 8/2001)**
  According to the law and its executive bylaw, the export and import of all animals and their product (including fish) should be first approved by the Ministry of Agriculture and Fisheries. The import of animals from infected countries is prohibited. According to the laws, imported shipments of animals (including live fish) should be accompanied by the necessary documents and certificates, which certify the health conditions of the shipment. Violating

shipments should be quarantined separately and checked. The necessary documents and certificates should arrive in one week, and the shipment should not be released without these documents. These documents include an international health certificate issued by the government of the exporting country and approved by the Embassy of the Sultanate of Oman in that country. The documents should include the following information:

1. Source name and country name, importer name, number of animals and conditions and any other details needed by quarantine authority.
2. Import license from the quarantine authority in Oman.
3. Governmental certification from the source revealing that the shipment is free from disease.

The owner of the animal shipment (including live fish) should notify the quarantine authority about the entry point of the shipment two days prior to the arrival date. The license for import is valid for one month. The quarantine authority can conduct the necessary procedures, which include testing of specimens and vaccination to ensure that the shipment is free of diseases and is fit for human consumption. For live fish, the law states that the shipment should be in good condition and free of the diseases listed by the World Organisation for Animal Health (OIE). The shipment should be also free of any pollutants harmful to humans, animals or the environment. For animal feed and its ingredients, the law states that the feed shipment should be free of any diseases or toxic substances. The shipment should be also accompanied by an analytical certificate approved by the Embassy of the Sultanate of Oman or any embassies of the Gulf countries stating the type of feed, its ingredients and the source of the shipment. The executive bylaw also states the organizing of the work in quarantine places and the procedures that should be followed when a shipment arrives or when any infected shipment arrives.

ANNEX IV

Emergency planning for terrestrial animal and plant diseases:
Sultanate of Oman

Terrestrial animal diseases

In general, there is no emergency response plan for animal diseases, but there is one plan that was put in place for bird flu (Emergency Plan for Follow-up and Management of Bird Flu Diseases) and an a general framework for the plans of confronting infectious and contagious animal diseases and joint diseases in Gulf Cooperation Council (GCC) countries. The plan for bird flu is based on legislation and activities such as:

- Rules and regulations exponent for the plan. These include Royal Decree No. 45/2004 about veterinary law, RD 8/2003 about meadows and livestock management, Ministerial Decree 13/2005 about the executive-by-law for the law of meadows and live stock management and MD 8/2001 about the executive by-law for the veterinary law.
- Establishing a committee for follow-up and management of bird-flu disease.
- Establishing subcommittees in the regions.
- Increasing the measures for biosafety.
- Coordinating with regional and international organizations.
- Executive programme for the plan.

The subcommittees are headed by the Director General of Agriculture, Animal Wealth in each region and have members from concerned authorities in that region. The terms of reference for the subcommittees include:

- Supervising implementation of measures agreed in the plan.
- Submitting reports to the main committee.
- Direct and continuous coordination with the main committee to notify about any developments regarding the disease.
- Coordinating with government authorities in the region to follow up any development regarding the disease.
- Formulating an appropriate mechanism for continuous and direct contacts with bird breeders to follow any developments regarding the disease.

Increasing biosafety measures includes:

- Strict quarantine measures in all ports and inlets in Oman.
- Banning of importations from infected countries.
- Controlling domestic movements of birds and animals between the regions in Oman.
- Taking of random samples from all regions to continuously know their epidemic status.
- Identifying regions epidemically should any epidemic cases be suspected.
- Establishing continuous links with international reference laboratories.

The executive programme includes:

- Support to the laboratories, including provision of technical equipment and diagnostic material.
- Awareness and extension to include all media.
- Epidemic survey.
- Containment of any epidemic, which includes riddance of birds in the infected area.
- Provision of vaccines for the birds in the area adjacent to the infected area.
- Compensation to the owners of birds.

The plan also includes details for actions that should be taken before, during and after an epidemic. This includes the action, the mechanism, the required facilities and the authority to undertake the actions.

The general framework for the plans for confronting infectious and contagious animal diseases and joint diseases in Gulf Council Countries has been formulated and agreed upon by the Gulf countries. It includes the main objectives, the required elements for preparation and implementation of the plan, and the mechanisms of implementation. This framework is very general and includes only very brief points for each element. The main objectives include:

- Protecting and enshielding the animal wealth and birds and limiting the spread of diseases and epidemics related to these animals.
- Protecting humans from the joint diseases that can spread via animals or birds.

There are 10 required elements for preparation and implementation of the plan within this general framework, including implementation of rules and regulations concerning the animal wealth and containment of diseases, activation of early warning programme, development and building of veterinary services, ensuring the application of agreed measures approved by the OIE concerning laboratory diagnostics, coordination with countries and regional and international organizations, increasing awareness and extension programmes, support of programmes and scientific studies on disease and epidemic prevention, encouraging countries to produce vaccines and diagnostic methods for the endemic diseases in GCC countries, applying preventive measures and announcement of the region free from epidemic diseases in accordance with OIE.

The mechanism for implementation of the plan includes:

1. Knowledge of all information concerning the disease.
2. Identification of degree of danger of the disease and degree of notification.
3. Establishment of a committee from the concerned authorities that should have extensive executive proprieties to take all the precautionary measures.
4. Considering all the available human capabilities infrastructure, including technical capabilities in any member country available to the other GCC members.

The concerned authority for these plans related to animal wealth is:

Directorate General for Animal Wealth
Ministry of Agriculture
PO Box 467, PC 100, Muscat
Tel: 24696391; Fax: 24694465

Terrestrial plant pests and invasive pest species

There is no specific plan for this issue as in animal wealth, but there is a Royal Decree and its executive By-law that determine the steps to be taken in any case of pest quarantine. This is the Royal Decree No. 47/2004 Issuing the Plant Quarantine Law and the Ministerial Decree No. 32/2006 issuing the executive regulations for plant quarantine law. The law contains five articles concerning containment and eradication of pests. These articles specify the action to be taken if it is believed that a quarantine pest may be present in an agricultural or storage area. These include entering the place, inspecting any plant or plant product, taking samples, declaring a quarantine area, prohibiting or limiting movement from and into the quarantine area, and the periodic revision of the status. The executive by law details the actions to be taken in such cases.

The concerned authority for this issue is:

Directorate General for Agricultural Development
Ministry of Agriculture
PO Box 467, PC 100, Muscat
Tel: 24696300

APPENDIX H

Proposal for a regional programme for improving aquatic animal health in RECOFI member countries

prepared by

RECOFI Regional Technical Workshop on Aquatic Animal Health
Jeddah, Kingdom of Saudi Arabia
6–10 April 2008

RECOFI. 2009. Proposal for a regional programme for improving aquatic animal health in RECOFI member countries. In FAO/Regional Commission for Fisheries. Report of the Regional Technical Workshop on Aquatic Animal Health. Jeddah, Kingdom of Saudi Arabia, 6–10 April 2008. *FAO Fisheries and Aquaculture Report.* No. 876. Rome, FAO. pp. 101–118.

CONTENTS

SUMMARY

This document outlines a Regional Programme for Improving Aquatic Animal Health Capacity in RECOFI member countries (subsequently called the Regional Programme) to be submitted to the Commission for their consideration during its next Session in May 2009. Once the programme has been endorsed by RECOFI, detailed project proposals will be prepared by the Secretariat of the Working Group on Aquaculture (WGA) with the assistance of the Regional Aquatic Animal Health Advisory Group (AG) to seek funding support from RECOFI, regional agencies and other potential partner organizations/institutions to implement the different Programme Components and the individual elements and activities contained in each component

The Regional Programme is part of the overall regional strategy to address issues related to aquatic animal health management in the RECOFI member countries. The preparation of the full implementation plan of the Regional Programme will be an ongoing process. A brief description is provided at the end of the document.

The major sections of the Regional Programme outlined in this document include:

- **Background**
- **Purpose**
- **Vision**
- **Guiding principles**

- **Programme component 1**: ***Governance***
  - Element 1: National policy and planning
  - Element 2: Legislation and regulation
- **Programme component 2:** ***Disease diagnostics***
  - Element 3: Developing national capacity for aquatic animal disease diagnosis
  - Element 4: Regional and national diagnostics laboratories
- **Programme component 3:** ***Aquatic biosecurity***
  - Element 5: Regionally standardized guidelines/procedures for new aquaculture species
  - Element 6: Pathogen risk analysis
  - Element 7: National/regional disease surveillance, monitoring and reporting
  - Element 8: Regional emergency response planning
  - Element 9: National and regional pathogen lists
  - Element 10: Health certification and regionally standardized health certificates for aquatic animals
  - Element 11: Review of border inspection and quarantine procedures
  - Element 12: Disease zoning
- **Programme component 4:** ***Access to information***
  - Element 13: Pathogen database
  - Element 14: Aquatic animal import/export database
  - Element 15: Legislation database
  - Element 16: Regional aquatic animal health expertise database
- **Programme component 5:** ***Regional cooperation and networking***
  - Element 17: Regional aquatic animal health Web site
  - Element 18: Regional aquatic animal health meetings
- **Programme implementation**
  National Level
  Regional Level

Each Programme Element is accomplished by completing of a number of activities. These include both actions to be taken by individual RECOFI member countries in support of their national aquatic animal health strategies and programmes (national activities), which are typically supported by and essential to successful completion of the regional activities; and regional activities, which are those activities that will be undertaken jointly by RECOFI member countries. The Regional Programme will be coordinated and managed by the Working Group on Aquaculture, under the *aegis* of the RECOFI Commission, and guided by a Regional Aquatic Animal Health Advisory Group consisting of regional and international experts.

BACKGROUND

The RECOFI[1] Working Group on Aquaculture (WGA), during its third meeting in Jeddah, Kingdom of Saudi Arabia (KSA), in May 2007, endorsed the implementation of activities towards the preparation of a "regional strategy on aquatic animal health". The activities include: (i) assessment of institutional and human resource capacities on aquatic animal health at the national level through a questionnaire survey; and (ii) organization of a regional workshop to present the results of the survey, brainstorm on the development of a regional aquatic animal health strategy and conduct a technical seminar as part of capacity building to raise awareness on various issues and concepts of aquatic animal health management. The preparatory work for the strategy development was finalized in Kuwait in November 2007 and this included: (i) finalization, implementation and analysis of the questionnaire survey (December 2007 to March 2008); (ii) implementation of a regional technical workshop in Jeddah, KSA (6–10 April 2008) and (iii) preparation and finalization of a proposal for a regional aquatic animal health development programme.

The scope of the survey and the associated survey form were jointly developed by the RECOFI Secretariat.[2,3] The finalized survey questionnaire was sent by e-mail to the RECOFI Working Group on Aquaculture (WGA) Focal and Alternate Focal Points in late December 2007, while the analysis was completed and presented during the Regional Technical Workshop held in Jeddah, Kingdom of Saudi Arabia, in April 2008. The survey questionnaire contained 18 sections pertaining to: (1) international trade in live aquatic animals and national border controls; (2) control of domestic movement of live aquatic animals and other domestic activities that may spread pathogens; (3) policy and planning; (4) legislation; (5) disease surveillance/monitoring; (6) disease diagnostics; (7) emergency preparedness and contingency planning; (8) extension services; (9) compliance/enforcement; (10) research; (11) training; (12) expertise; (13) infrastructure; (14) linkages and cooperation; (15) funding support; (16) current challenges; (17) constraints; and (18) additional information.

This Proposal for a Regional Programme for Improving Aquatic Animal Health Capacity in RECOFI member countries was developed by the participants of the RECOFI Regional Technical Workshop on Aquatic Animal Health (Jeddah, Kingdom of Saudi Arabia, 6–10 April 2008) using the outcomes of the survey questionnaires and the draft outline of possible contents of the Regional Programme (prepared by J.R. Arthur, FAO consultant, in collaboration with M.B. Reantaso and A. Lovatelli, FAO Fisheries and Aquaculture Department). The draft Regional Programme was further discussed and elaborated by the participants of the Jeddah Workshop, who endorsed the revised Programme Components, Elements and Activities. The workshop participants concurred that the Secretariat would prepare a revised Regional Programme for comments and approval by the WGA Focal Points and workshop participants. It was agreed that the final draft of the Regional Programme would then be

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1 RECOFI Members include: Bahrain, Islamic Republic of Iran, Iraq, Kuwait, Oman, Qatar, Kingdom of Saudi Arabia and the United Arab Emirates.

2 The RECOFI Secretariat consists of: A. Lovatelli and M.B. Reantaso (FAO, Rome) and J.R. Arthur (FAO Consultant).

3 R.P. Subasinghe and R. Perera are acknowledged for making available for the current study, as reference, the National Aquatic Animal Biosecurity Capacity Assessment Questionnaire developed for an FAO initiative towards determining aquatic animal biosecurity capacities in southern Africa.

circulated at the national level for further comments prior to its official submission during the Fifth Session of the Commission planned to take place in May 2009.

In the most recent regional aquaculture review, Poynton (2006)[4] noted that successfully addressing four key priority issues was essential for the continued growth of aquaculture in the Near East and North Africa: (i) farming systems, technologies and species; (ii) marketing and processing; (iii) health and diseases; and (iv) policies, legal frameworks institutions, and investment. This Regional Programme addresses key areas related to improvement of regional aquatic animal health capacity and thus encompasses disease prevention and control (issue iii), and associated areas of policy, legal frameworks, institutions and investment (issue iv).

Improvements in aquatic animal health capacity are considered essential if regional aquaculture production is to achieve the hoped for levels of growth projected by RECOFI member countries. In addition, RECOFI member countries will need increased capacity to meet the increasingly stringent requirements regarding the health status of aquaculture commodities (live aquatic animals and their products) demanded by trading partners, while ensuring adequate protection of their shared aquatic ecosystems and the people who depend on them from the negative impacts of epidemic diseases caused by exotic pathogens.

PURPOSE

This Regional Programme outlines a long-term, agreed-upon plan of activities to improve aquatic animal health capacity in the RECOFI member countries. The Programme identifies the activities of regional interest and importance that can be addressed jointly by RECOFI members and the national aquatic animal health activities that must be accomplished by individual RECOFI member countries in order to accomplish the Regional Programme itself.

The finalized Regional Programme will be submitted to the RECOFI Commission for endorsement and possible funding support. It may also be used to approach international organizations such as the World Organisation for Animal Health (OIE) and other regional and bilateral mechanisms, as well as the RECOFI governments for possible funding and/or organizational support.

The Regional Programme includes a **Vision** and set of **Guiding Principles** for aquatic animal health in the RECOFI region and consists of five **Programme Components**, within which are 18 **Programme Elements** containing a total of 44 **Programme Activities**. The five Programme Components address the broad themes of:

1. Governance
2. Disease diagnostics
3. Aquatic biosecurity
4. Access to information, and
5. Regional cooperation and networking

Throughout the various components of the Regional Programme, where appropriate, emphasis will be placed on developing capacity to deal with health problems in key species that are widely cultured in the RECOFI Region. These include:

- Marine finfishes (e.g. seabreams, groupers, snappers)
- Penaeid shrimp
- Freshwater finfish (e.g. tilapia, common carp)

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[4] Poynton, S.L. 2006. Regional review on aquaculture development. 2. Near East and North Africa – 2005. *FAO Fisheries Circular*. No. 1017/2. Rome, FAO. 80 pp.

The Regional Programme recognizes the importance of human capacity building, and this is addressed primarily in the form of training programmes and workshops for the various areas of aquatic animal health. Development of research capacity is also highly important; however, this generally involves post-graduate training and thus is to be addressed by the national governments.

VISION

The long-term vision of the Regional Programme for Improving Aquatic Animal Health Capacity in the RECOFI member countries is:

> "***To develop and maintain aquatic animal health capacity in the RECOFI Region that will be able to support the sustainable development and management of the aquaculture sector while protecting regional biodiversity and aquatic ecosystems from the impacts of exotic pathogens and epizootic disease***".

GUIDING PRINCIPLES

The following principles were developed to guide the preparation of this Regional Programme[5].

- RECOFI member countries require a minimum level of national and regional aquatic animal health capacity in order to protect their living aquatic resources (including aquaculture), natural aquatic environments and aquatic biodiversity from the negative impacts of pathogens and disease.
- Increased aquatic animal health capacity should enable aquaculture to make a greater contribution to the economies of RECOFI member countries through healthy aquatic production, increased competitiveness in international markets and improved economic viability at the national level.
- RECOFI member countries share a common marine environment and thus serious aquatic animal pathogens introduced to the brackish or marine waters of one country have the potential to spread and negatively affect aquaculture and/or the wild fisheries of other countries. Thus RECOFI member countries have a shared responsibility to prevent the introduction of exotic pathogens and to implement sound and sustainable aquaculture practices.
- Although most RECOFI member countries have limited freshwater ecosystems, countries developing aquaculture in freshwaters (e.g. rivers, lakes, streams, marshes) have a responsibility to apply aquatic animal health standards equally to freshwater and marine situations.
- Movement of living aquatic animals within and across their national boundaries (transboundary movement) is important to RECOFI member countries for their economic, social, development and public resource purposes. The benefits of such movements must be weighed against the potential risks, and authorities should implement informed decisions.
- National and regional aquatic animal health strategies, plans and programmes should be consistent with RECOFI member countries' obligations as members of the World Organisation for Animal Health (OIE) and/or the World Trade Organization (WTO) and other relevant treaties and agreements. All RECOFI member countries reserve the right to take sanitary and phytosanitary measures necessary for the protection of human, animal or plant life consistent with these obligations.
- RECOFI member countries are encouraged to develop and formalize national aquatic animal health strategies and health management procedures. Such strategies and procedures should adhere to international and regional standards and be harmonized on as wide a basis as possible.

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[5] Adapted mainly from: FAO. 2007. Aquaculture development. 2. Health management for responsible movement of live aquatic animals. *FAO Technical Guidelines for Responsible Fisheries.* No. 5, Suppl. 2. Rome, FAO. 31 pp. (available at: ftp://ftp.fao.org/docrep/fao/010/a1108e/a1108e00.pdf).

- RECOFI member countries should encourage industries to use preventative measures to limit their exposure to pathogens and disease. Such measures include but are not limited to the use of better management practices (BMPs), health certification, specific pathogen free (SPF) and high health (HH) stocks, quarantine, and vaccination protocols.

REGIONAL PROGRAMME: COMPONENTS, ELEMENTS AND ACTIVITIES

PROGRAMME COMPONENT 1 – GOVERNANCE

Programme Element 1: National policy and planning

As indicated by the "RECOFI Regional Aquatic Animal Health Capacity and Performance Survey – Summary of Survey Results and Analysis", at present no RECOFI member country has a national policy for aquatic animal health that is expressed in a single coherent national plan or strategy setting out a national programme for development of aquatic animal health. For all countries, formulation of a clear national policy that states a vision for national aquatic animal health and outlines the priorities and means of achieving them is desirable. There is thus a need to develop such formal strategies, policies and plans. The advantages of harmonizing aquatic animal health policy across the RECOFI region are many and include facilitated trade in live aquatic animals and their products and increased aquatic biosecurity for all countries.

Programme activities:

1) Development of draft national aquatic animal health strategies by national focal points;
2) Regional workshop on harmonization of national policy and planning for aquatic animal health; and
3) Adoption of strategies by national governments for use in national policy and planning exercises.

Time frame:

- All activities: short-term (continuing)

Programme Element 2: Legislation and regulation

As noted by the "RECOFI Regional Aquatic Animal Health Capacity and Performance Survey – Summary of Survey Results and Analysis", national legislation is currently in need of review and revision. Among RECOFI member countries, legislation relevant to aquatic animal health varies from nonexistent through to numerous laws and regulations scattered in various legal documents, some which are specific to veterinary or aquaculture law. There is thus a need to review existing legislation and formulate new laws to support improved national aquatic animal health policy.

The activities outlined under this Element should be done in conjunction with development of national aquatic animal health strategies and plans (Component 1, Element 1), which should be harmonized as far as possible, with national veterinary, biosecurity, aquaculture, conservation and marine resource law, and support standardized aquatic animal health procedures, as far as possible, across all RECOFI member countries. This Element is also related to preparation of a regional database on national aquatic animal health legislation (Component 4, Element 3). A review of regional aquaculture legislation was proposed as a priority initiative of the programme of the RECOFI Working Group on Aquaculture (WGA) and thus coordination with this activity is essential. This Element may also be linked with preparation of FAO National Aquaculture Legislation Overviews (NAFLOs).

Programme activities:

4) Establishment of an ad hoc regional working group on aquatic animal health legislation, to be assisted by the FAO Legal Office.

5) In-depth reviews of national legislation related to aquatic animal health to be coordinated by national focal points.
6) Results of the review process to be presented at a workshop on harmonizing national aquatic animal health legislation and regulation.
7) RECOFI member countries to develop and/or revise national legislation, as appropriate to national circumstances.

Time frame:

- Establishment of regional working group, review and workshop: short-term
- Drafting and enactment of new or revised legislation by national governments: medium to long-term

PROGRAMME COMPONENT 2 – DISEASE DIAGNOSTICS

Programme Element 3: Developing national capacity for aquatic animal disease diagnosis

As noted by the "RECOFI Regional Aquatic Animal Health Capacity and Performance Survey – Summary of Survey Results and Analysis", there is presently little capacity to diagnose aquatic animal diseases within the Region. The capacity to provide rapid, accurate disease diagnosis is an important part of a national aquatic animal health plan. Issuance of international health certificates based on the demonstrated ability to diagnose diseases using the standards and tests specified by the OIE *Aquatic Animal Health Code* and *Diagnostic Manual for Aquatic Animal Diseases* for OIE-listed molluscan, crustacean and finfish diseases is increasingly required by importing countries. Disease diagnostics is also an important supporting component of surveillance and monitoring programmes, contingency planning and emergency response.

Programme activities:

8) Assessment of national needs for diagnostic capability by an international expert assisted by national focal points.
9) Short-term training course on recent laboratory techniques in disease diagnosis conducted by international and regional experts that will be developed to address specific areas of disease diagnosis of high concern to RECOFI members (examples include marine finfish diseases, crustacean diseases, molluscan diseases, use of classical and/or molecular diagnostics methods). The training course will be held within the region, if possible, or at a regional centre of excellence (e.g. in Asia) and may have a duration of three months. RECOFI member countries will, as necessary, designate permanent technical staff as responsible for national aquatic animal disease diagnostics.
10) Regional Workshop on Fish Disease Diagnosis, to be facilitated by an international expert; and
11) Post-graduate studies in aquatic animal pathology. This is considered a national activity that will be accomplished with guidance from FAO and international experts, as needed.

Time frame:

- Assessment: short-term
- Training: long-term (continuing)
- Workshop: medium-term
- Post-graduate study: long-term (continuing)

Programme Element 4: Regional and national diagnostics laboratories

As noted by the "RECOFI Regional Aquatic Animal Health Capacity and Performance Survey – Summary of Survey Results and Analysis", there are few aquatic animal disease diagnostic

laboratories present in the RECOFI member countries, and only one or two of these have some capacity to diagnose most OIE-listed diseases to OIE standards. There is no regional aquatic animal health laboratory to assist countries lacking diagnostic capability, and none of the existing national laboratories is an OIE reference centre for any of the OIE-listed aquatic animal diseases.

Programme activities:

12) Official designation by RECOFI member countries of a regional lead laboratory for aquatic animal health and determination of regionally agreed-upon mandates and activities and funding mechanisms for the lead centre. The activities of the regional lead centre could include: (a) conducting regional training programmes, (b) serving as focal point for regional emergency response planning and providing expert assistance to national laboratories in emergency situations; (c) providing advanced diagnostics services; (d) serving as a regional reference laboratory; and (e) acting as the focal point for regional databases, communication and linkages among national laboratories and with international agencies and laboratories.
13) Improving existing diagnostic laboratories in each RECOFI member country, including updating of infrastructure, equipment and human resources, as appropriate, and designation of a national laboratory. This activity is to be undertaken by individual national governments with guidance of RECOFI-WGA, FAO and international experts.

Time frame:

- Regional laboratory: medium-term (continuing)
- Improving national laboratories: short to medium-term (continuing)

PROGRAMME COMPONENT 3 – AQUATIC BIOSECURITY

Programme Element 5: Regionally standardized guidelines/procedures for new aquaculture species

The introduction of a new aquatic species for aquaculture can have far reaching impacts on the receiving aquatic system. Poorly considered introductions that become invasive alien aquatic species (IAAS) can lead to negative environmental, social and or economic impacts on receiving countries and ecosystems. Introduced species may quickly spread to similar aquatic systems in neighbouring countries and territories. Thus introductions may adversely impact not only the introducing country, but other RECOFI members. It is therefore important that RECOFI member countries act responsibly when considering the introduction of new aquatic species.

Programme activities:

14) Development of a regionally standardized and accepted guideline for the introduction of new aquatic species. A draft document will be prepared by an international expert.
15) Regional workshop on development of guidelines for introductions and transfers of aquatic animals; and
16) Adoption of procedures by national governments as policy.

Time frame:

- Development of guidelines and workshop: short-term
- Adoption by national governments: medium to long-term

Programme Element 6: Pathogen risk analysis

The use of risk analysis can assist countries with policy and planning, resource allocation, facilitation of trade and improved aquatic biosecurity. As there is currently little capability or experience with pathogen risk analysis in RECOFI member countries there is thus a need to increase capacity through regional and national training programmes on pathogen risk analysis, to develop appropriate regional or national structures for conducting risk analyses for key aquatic species and, as part of regional and national programmes, to develop capacity in other areas of aquatic animal health to support risk analysis. There is also a need to coordinate pathogen risk analyses with ecological and genetic risk analyses where proposals to introduce new species for aquaculture development are received.

Programme activities:

17) Review of regional risk analysis capacity and needs to be conducted by an international expert assisted by national focal points;
18) Regional training workshop on pathogen risk analysis; and
19) Eventual establishment of risk analysis procedures by national governments.

The workshop can be organized by RECOFI with the assistance of FAO and other international agencies. RECOFI member countries should designate staff responsible for conducting risk assessments within the competent authority so that national capacity can be firmly established.

Time frame:

- Review and workshop: short-term
- Establishment of procedures by national governments: medium-term (continuing)

Programme Element 7: National/regional disease surveillance, monitoring and reporting

As noted by the "RECOFI Regional Aquatic Animal Health Capacity and Performance Survey – Summary of Survey Results and Analysis", there is a need to establish surveillance and monitoring programmes for RECOFI member countries where these are lacking, and to review and improve such programmes where they are already established. Surveillance can be passive (reactive and general in nature) or active (proactive and targeted). In both cases there must be adequate reporting mechanisms so that suspected cases of serious pathogens are quickly brought to the attention of the lead agency. Surveillance and monitoring efforts must be supported by adequate diagnostics capability (both laboratory and rapid-response field diagnostics), linked to national and international (OIE) disease reporting systems, as well as an aquatic animal health information systems that will provide the appropriate analysis, storage, retrieval and feedback mechanisms and which will also contain all relevant databases (see also Activity numbers 12, 13, 14 and 15).

Programme activities:

20) Review of existing national capabilities and protocols by an international expert assisted by the national focal points;
21) Regional training workshop on surveillance, monitoring and reporting of aquatic animal diseases. The workshop will assist national lead agencies in understanding the need for national surveillance, monitoring and reporting systems, help them develop such systems and look at mechanisms to integrate national disease reporting into a regional disease monitoring system and database;
22) Eventual follow-up implementation of national surveillance and monitoring systems by national governments; and
23) Establishment of national aquatic animal disease reporting systems and an aquatic animal health information system linked through national focal points to a regional disease reporting system.

Time frame:

- Review and workshop: medium-term
- Adoption by national governments long-term (continuing)
- Establishment of reporting systems: long-term (continuing)

Programme Element 8: Regional emergency response planning

As noted by the "RECOFI Regional Aquatic Animal Health Capacity and Performance Survey – Summary of Survey Results and Analysis", there is a need to establish and improve national contingency planning and emergency preparedness for outbreaks of serious aquatic animal diseases.

Programme activities:

24) Training workshop on contingency planning and emergency preparedness for aquatic animal diseases; and
25) Actions by national agencies to establish emergency task force, conduct national emergency planning, and allocate necessary resources.

Time frame:

- Workshop: medium-term
- National actions: long-term (continuing)

Programme Element 9: National and regional pathogen lists

As noted by the "RECOFI Regional Aquatic Animal Health Capacity and Performance Survey – Summary of Survey Results and Analysis", few RECOFI member countries have established national pathogen lists. Such lists are an essential starting point for health certification, disease monitoring and surveillance, emergency response planning, etc. Clearly established criteria for listing/delisting of diseases (based on internationally accepted methods) should be established. Regionally harmonized procedures for preparation of national pathogen lists should be considered and a regional pathogen list prepared through discussion and consensus among all RECOFI member countries.

Programme activities:

26) Preparation of national pathogen lists based on uniform criteria (international standards) by national focal points in consultation with national competent authorities and an international expert; and
27) Workshop on national and regional lists of aquatic animal pathogens which will develop a regional pathogen list (this activity may be accomplished in conjunction with another training workshop).

National lists will be updated by national competent authorities as needed, with corresponding changes made to the regional list.

Time frame:

- Preparation of national pathogen lists: short-term
- Workshop and regional list: short-term (continuing)

Programme Element 10: Health certification and regionally standardized health certificates for aquatic animals

As noted by the "RECOFI Regional Aquatic Animal Health Capacity and Performance Survey – Summary of Survey Results and Analysis", the health certificates currently required of importers by RECOFI member countries for importation of live aquatic animals typically testify only to the absence of gross clinical signs of disease in consignments and thus have little real value in preventing the entry

of serious transboundary aquatic animal pathogens into the region. There is thus a need to improve national requirements for import health certificates, shifting from certification of consignments for "general appearance of health" to "certification for freedom from specified pathogens/diseases". Agreed upon formats for regionally standardized generic import/export health certificates should be developed and adopted by RECOFI member countries. To fully access international markets, export health certificates issued by RECOFI members should be based on testing for pathogens (as specified by importing countries) to the standards given in the OIE *Aquatic Animal Health Code* and *Manual of Diagnostic Tests for Aquatic Animals*. A standardized import health certificate should be based on the OIE Code and Manual, a regional pathogen list, and the national pathogen list of the importing country.

This Element should be undertaken concurrently with development of national and regional pathogen lists.

Programme activities:

28) A detailed review of current health certification practices among RECOFI member countries to be conducted by an international expert assisted by national focal points;
29) Drafting of regionally standardized health certificates for import and export of live aquatic animals;
30) Regional Workshop for the Standardization of Health Certificates and Certification for Aquatic Animals; and
31) Adoption of certificates and associated procedures by national agencies.

Time frame:

- Review, drafting of certificates and workshop: short-term
- Adoption: medium-term

Programme Element 11: Review of border inspection and quarantine procedures

Risk management measures can often be applied to reduce the risk of introducing transboundary aquatic animal pathogens to an acceptable level. However, such measures should be based on risk analysis. Border inspection and quarantine and further diagnostics testing of consignments, in particular, if not rationalized by risk analysis, can be both ineffective in preventing pathogen entry and highly consumptive of national resources and manpower.

Programme activities:

32) A review of current border inspection and quarantine procedures used in the RECOFI region to be conducted by an international expert with assistance of national focal points;
33) Regional guidelines or best management practices (BMPs) for their application to be developed;
34) Regional Workshop on Inspection and Quarantine, and
35) Standardized technical procedures to eventually be adopted (minimum standards for quarantine facilities and their operation) by national agencies.

Time frame:

- All activities: medium-term (continuing)

Programme Element 12: Disease zoning

Zoning for aquatic animal diseases is a method that countries may use to allow trade in aquatic animals from certain parts of the country (disease free zones) even though the country has an infected

status. However, before zoning can be initiated knowledge of pathogen distribution must be established and essential expertise and capacity established.

Programme activities:

36) Training workshop on zoning for aquatic animal diseases to be organized to provide awareness and capacity building for RECOFI member countries; and
37) Individual countries to consider the possibility to implement zoning programmes within their national context.

Time frame:

- Long-term (continuing)

PROGRAMME COMPONENT 4 – ACCESS TO INFORMATION

Access to accurate and timely information is essential to all areas of aquatic animal health. The establishment of regional (i) pathogen, (ii) import/export, (iii) legislation, and (iv) expert databases are of particular value. An ad hoc working group will be established to determine the structures and contents of the databases and how they will be maintained. Designation of country focal points that will be responsible for providing historical information in the agreed-upon format and detail, and to provide regular (quarterly or bi-annual) summaries of new information on an on-going basis will be needed. An associated activity might be the preparation and publication of a regional checklist of parasites/diseases and/or a regional disease diagnostic guide.

Programme Element 13: Pathogen database

Lack of information on the pathogens present in the RECOFI Region has been cited as an obstacle to the identification of pathogens in aquaculture and finding appropriate methods for their prevention and treatment. Information on the viruses, bacteria, parasites and fungi present in the RECOFI Region is also essential to conducting pathogen risk analyses and preparing regional and national pathogen lists. Such information can be obtained from various sources, including published and unpublished literature, expert knowledge, surveillance and monitoring programmes, and surveys of pathogens of key cultured and wild species. The information generated will also feed into the Aquatic Animal Disease Information System (see Activity numbers 23 and 39).

Programme activities:

38) Development of a regional pathogen database containing information on pathogen identities, geographic distribution, host species, life cycles, pathogenicity, economic significance, etc. The database will be developed by an international or regional expert with participation of national focal points, will be housed by the RECOFI Regional Aquaculture Information System (RAIS) Web site (www.raisaquaculture.net) and maintained by a regional coordinator with assistance of the national focal points.

Time frame:

- Short-term (continuing)

Programme Element 14. Aquatic animal import/export database

International trade in live aquatic species (both food fishes and ornamentals) by RECOFI member countries is presently quite limited, indicating the potential for significant growth through increased aquaculture production. More detailed information on exportations and on future projections for aquaculture development is needed to fully understand trading patterns and the demands placed on

competent authorities for issuance of health certificates. More accurate and complete data on live exports/imports, including information species compositions, life history stages, numbers of animals by species, origins, health status, destinations, etc. should be systematically collected and stored in a national database in a format that is easily retrievable for use by policy-planners.

Programme activities:

39) Development of a regional database on exports and imports of live aquatic animals, including regionally standardized procedures and responsibilities for data submission and/or entry. Regionally standardized forms for import and export of live aquatic animals will be prepared to assist data collection and harmonize import/export procedures across RECOFI member countries. The database will be developed by an international or regional expert with participation of national focal points, will be housed by the RECOFI Regional Aquaculture Information System (RAIS) Web site and maintained by a regional coordinator with assistance of the national focal points. An additional component will be a database of the current requirements for import and export health certificates of the RECOFI member countries.

Time frame:

- Long-term (continuing)

Programme Element 15: Legislation database

Access to information on national legislation is important to scientists, risk assessors and policy-makers concerned with national aquatic animal health. As noted by the "RECOFI Regional Aquatic Animal Health Capacity and Performance Survey – Summary of Survey Results and Analysis", national legislation is currently in need of review and revision (see Component I, Element 2)

Programme activity:

40) Preparation of a regional database containing information on the national legislation of RECOFI member countries relevant to aquatic animal health. The database will be developed by an international or regional expert with participation of national focal points, will be housed by the RECOFI Regional Aquaculture Information System (RAIS) Web site and maintained by a regional coordinator with assistance of the national focal points. This element will be coordinated with the current initiative of the RECOFI-WGA to establish a database for aquaculture legislation.

Time frame:

- Long-term (continuing)

Program Element 16: Regional aquatic animal health expertise database

Sharing of expertise is an important means of increasing aquatic animal health capacity among RECOFI member countries. A listing of regional experts, fields of expertise and contact information will assist RECOFI member countries in locating aquatic animal health specialists when specific expertise in needed.

Programme activity:

41) Preparation of a regional aquatic animal health expert database. The database will be developed and maintained by a regional expert with participation of national focal points and will be housed by the RECOFI Regional Aquaculture Information System (RAIS) Web site.

Time frame:

- Medium-term (continuing)

PROGRAMME COMPONENT 5 – REGIONAL COOPERATION AND NETWORKING

Linkages between aquatic animal health diagnosticians, researchers, policy-makers and aquaculturists are essential to improve knowledge and capacity and disseminate important information.

Programme Element 17: Regional aquatic animal health Web site

A regional Web site will serve as a focal point for linkages among aquatic animal health workers, house databases, provide current information on activities in the region and provide information and linkages to global events and organizations.

Programme activity:

42) Establishment of a regional aquatic animal health Web site. The Web site will be developed by an international or regional expert with participation of national focal points, will be housed by the RECOFI Regional Aquaculture Information System (RAIS), and maintained by a regional coordinator with assistance of the national focal points.

Time frame:

- Medium-term (continuing)

Programme Element 18. Regional aquatic animal health meetings

Regular meetings of a RECOFI subgroup on aquatic animal health, either separately or as a part of annual RECOFI-WGA meetings are needed to accomplish this Regional Programme. A scientific symposium on regional aquatic animal health will bring together scientists, diagnosticians, aquaculturists and policy-makers to share the latest regional information and be undated by expert reviews of world aquatic animal health events. An example of such meetings held outside RECOFI are the triennial Symposia on Diseases in Asian Aquaculture, organized by the Fish Health Section, Asian Fisheries Society. As noted by the "RECOFI Regional Aquatic Animal Health Capacity and Performance Survey – Summary of Survey Results and Analysis", there is currently no continuing regional cooperation related to development of aquatic animal health other than the current initiative of the RECOFI-WGA.

Programme activities:

43) Appointment of national aquatic animal health focal points by RECOFI member countries and organization of regular regional meetings; and

44) Organization of a regional (Middle East) aquatic animal health symposium, to be organized by RECOFI and coordinated by a national aquatic animal health lead agency, regional scientific organization, research institution or university, to be identified.

Time frame:

- Annual regional meetings: short-term (continuing)
- Symposium on diseases in middle eastern aquaculture: medium-term (continuing)

IMPLEMENTATION STRATEGY

The implementation strategy of the Regional Programme will be done at two levels, i.e. **national level** and **regional level** (Table 1). The implementation strategy emphasizes the need for national-level action to complete a number of essential activities that address national issues and priorities in support

of the Elements of the Regional Programme. Completion of these national activities is essential to implementation the regional activities of the Regional Programme, which tackle issues and priorities with a regional dimension.

National level

National strategies on aquatic animal health (including compliance with international treaties and agreements)

The preparation of a **National Aquatic Animal Health Strategy (National Strategy**) by each RECOFI member country and an associated implementation plan will support national aquatic animal health and attainment of the objectives of the Regional Programme. A National Strategy provides a comprehensive framework that will allow countries to protect aquatic animal health, ensure healthy aquatic production, comply with international agreements, etc. Associated national implementation plans will contain RECOFI member government's individual action plans at the short, medium and long-term. The implementation of a National Strategy should use the concept of "*phased implementation based on national needs and priorities*". Thus it is expected that the National Strategy of the different countries will vary depending on the level of aquaculture development, the importance of the aquaculture sector, socio-economic status and other relevant factors. Nevertheless, a National Strategy presents a number of essential elements, and it will be up to the RECOFI Governments to determine which of these elements are relevant to their individual circumstance. The National Strategy should be supported by legislation and regulation, institutional, human, and financial and other resource requirements.

Examples of national strategies on aquatic animal health exist (including formulation and development process) and they can be used as reference. The National Strategy contains many of the essential elements for a successful aquatic animal health protection programme. These include: (i) policy, legislation and enforcement; (ii) risk analysis; (iii) pathogen list; (iv) information system; (v) health certification and quarantine; (vi) surveillance, monitoring and reporting; (vii) zoning; (viii) emergency preparedness and contingency planning; (ix) research; (x) institutional structure; (xi) human resource development; and (xii) regional and international cooperation. The competent authority or responsible entity that will drive the process of national strategy formulation and development needs to be identified or designated. National-level coordination and stakeholder consultation and priority setting are essential activities that need to be undertaken as part of the process.

The formulation of a National Strategy is a government responsibility and may be done through various ways, e.g. national workshop with expert assistance, regional workshop to build capacity in developing such strategy, expert contract, etc. The Regional Programme is developed to assist RECOFI member countries in accomplishing this task. Furthermore, the National Strategy should be integrated into the appropriate fisheries and aquaculture development plans, biosecurity programmes or rural livelihood programmes and should include planning for monitoring and evaluation of its implementation.

National responsibilities

Table 1 lists the activities of the Regional Programme whose completion is the responsibility of the national governments (numbers correspond to those used in the Regional Programme). In all cases regional activities will provide guidance towards accomplishing these national activities. National governments also have responsibilities towards completion of regional activities outlined in the Regional Programme.

Regional level

As aquatic animal health management involves many issues that are transboundary in nature, an effective aquatic animal health protection programme has to be supported by regional and international cooperation. Table 1 lists a number of activities that will be undertaken at the regional level. As many of these activities require considerable planning and financial support, more detailed proposals will be prepared separately. Key implementation activities include:

Integration into RECOFI and WGA work programmes

The finalized approved Regional Programme will be integrated in to the work programmes of RECOFI and the Working Group on Aquaculture (WGA), which will provide guidance, monitoring and oversight.

Focal points or national coordinators on aquatic animal health supported by a regional advisory group on aquatic animal health

National focal points or coordinators on aquatic animal health for each RECOFI member country will be identified and designated with clear mandate (terms of reference). It is expected that each focal point will ensure appropriate linkages between the National Strategy and the regional-level implementation of the Regional Programme. These focal points will be the nucleus of a regional aquatic animal health network. A regional expert working group, the Advisory Group on Aquatic Animal Health, will be formed whose mandate will be to provide high-level technical support to both levels (national and regional) of implementation of the Regional Programme. Clear terms of reference, membership/composition, activities, funding, etc., will be drawn up.

The focal points/national coordinators and the regional advisory group will both play key roles in implementing the various components of the Regional Programme and will also monitor national and regional progress in implementing the Regional Programme.

The major technical activities to be accomplished at the regional level by the Regional Programme are outlined in Table 1 (numbers refer to Activities listed under the various Elements of the Regional Programme; see Regional Programme for further information).

The regional activities of the Regional Programme address:

- Regional capacity building on development of national strategies on aquatic animal health and development of subject-specific regional technical guidelines;
- Regional technical training on diagnostics, risk analysis, surveillance, disease zoning, emergency response and aquatic animal health information systems;
- Regional harmonization of procedures for diagnostics, health certification and quarantine;
- Regional mechanisms for surveillance, disease reporting, emergency preparedness and contingency planning; and
- Regional and international cooperation and networking

Regional activities

The aspects of the Regional Programme that are shared among all RECOFI member countries as regional activities are listed in Table 1.

Table 1. Indicative activities for the national and regional level implementation of the RECOFI aquatic animal health management programme

Programme components	Programme elements	Activities	Implementation level	
			National	Regional
1. Governance	1. National policy and planning	1. Development of draft national aquatic animal health strategies.	x	
		2. Adoption of strategies by national governments for use in national policy and planning exercises.		x
	2. Legislation and regulation	3. Establishment of an ad hoc regional working group on aquatic animal health legislation, to be assisted by the FAO Legal Office.	x	
		4. Results of the review process to be presented at a workshop on harmonizing national aquatic animal health legislation.		x
		5. In-depth reviews of national legislation related to aquatic animal health to be coordinated by national focal points.	x	
		6. Regional workshop on harmonizing aquatic animal health legislation.		x
		7. RECOFI member countries to develop and/or revise national legislation, as appropriate to national circumstance.	x	
2. Disease diagnostics	3. National capacity for aquatic animal disease diagnosis	8. Assessment of national needs for diagnostic capability by an international expert assisted by national focal points.		x
		9. Short-term training course on recent laboratory techniques in disease diagnosis.		x
		10. Regional workshop on fish disease diagnosis.		x
		11. Post-graduate studies in aquatic animal pathology.	x	
	4. Regional and national diagnostic laboratories	12. Official designation of a regional lead laboratory for aquatic animal health.		x
		13. Improving existing diagnostic laboratories in each RECOFI member country.	x	
3. Aquatic biosecurity	5. Regionally standardized guidelines/procedures for new aquaculture species	14. Development of a regionally standardized guideline for the introduction a new aquatic species.		x
		15. Regional workshop on development of guidelines for introduction and transfers of aquatic animals.		x
		16. Adoption of procedures by national governments as policy.	x	
	6. Pathogen risk analysis	17. Review of regional risk analysis capacity and needs.		x
		18. Regional training workshop on pathogen risk analysis.		x
		19. Establishment of risk analysis procedures by national governments.	x	
	7. National and regional disease surveillance, monitoring and reporting	20. Review of existing national capabilities and protocols.		x
		21. Regional training workshop on surveillance, monitoring and reporting of aquatic animal diseases.		x
		22. Follow-up implementation of national surveillance and monitoring systems.	x	
		23. Establishment of national aquatic animal disease reporting system and an aquatic animal health information system linked to a regional disease reporting system.	x	x

Table 1. Continued

Programme components	Programme elements	Activities	Implementation level	
			National	Regional
	8. Regional emergency response planning	24. Training workshop on contingency planning and emergency preparedness.		x
		25. National actions to establish an emergency task force, emergency planning and allocation of resources.	x	
	9. National and regional lists	26. Preparation of national pathogen list.	x	
		27. Workshop on national and regional pathogen lists.		x
	10. Health certification and regionally standardized health certificates for aquatic animals	28. Detailed review of current health certification practices among RECOFI members.		x
		29. Drafting of regionally standardized health certificates for import and export of live aquatic animals.		x
		30. Regional workshop on standardization of health certification.		
		31. Adoption of health certification procedures by national agencies.	x	x
	11. Review of border inspection and quarantine procedures	32. Review of current border inspection and quarantine procedures in RECOFI.		x
		33. Development of regional guidelines or best management practices and their application.		x
		34. Regional workshop on inspection and quarantine.		x
		35. Adoption of standardized technical procedures.	x	
	12. Disease zoning	36. Training workshop on zoning for aquatic animal diseases.		x
		37. Implementation of zoning programmes within the national context.	x	
4. Access to information	13. Pathogen database	38. Development of a regional pathogen database.		x
	14. Aquatic animal import/export database	39. Development of a regional database on exports and imports of live aquatic animals.		x
	15. Legislation database	40. Preparation of a regional legislation database.		x
	16. Regional aquatic animal health expertise database	41. Preparation of a regional aquatic animal health expert database.		x
5. Regional cooperation and networking	17. Regional aquatic animal health Web site	42. Establishment of a regional aquatic animal health Web site.		x
	18. Regional aquatic animal health meetings	43. Appointment of national aquatic animal health focal points and organization of regular regional meetings.		x
		44. Organization of a regional (Middle East) aquatic animal health symposium.		x

APPENDIX I

Group photograph of workshop participants

The Regional Technical Workshop on Aquatic Animal Health of the Regional Commission for Fisheries (RECOFI), held in Jeddah, Kingdom of Saudi Arabia, from 6 to 10 April 2008, was attended by 19 delegates from five member countries of RECOFI (Bahrain, Kingdom of Saudi Arabia, Oman, Qatar and the United Arab Emirates) and representatives from FAO. The workshop achieved the three objectives: (i) it presented the results and analysis of the "RECOFI regional aquatic animal health capacity and performance survey"; (ii) it prepared and finalized a "Proposal for a regional programme for improving aquatic animal health in RECOFI Member countries" based on the survey outcomes and workshop deliberation and brainstorming; and (iii) it created awareness and initiated capacity building through a technical seminar on basic concepts and emerging issues concerning aquatic animal health.
The long-term vision of the regional programme for improving aquatic animal health capacity in the RECOFI member countries is: "To develop and maintain aquatic animal health capacity in the RECOFI region that will be able to support the sustainable development and management of the aquaculture sector while protecting regional biodiversity and aquatic ecosystems from the impacts of exotic pathogens and epizootic disease".

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