ICAR/NACA WORKSHOP
Aquatic Epidemiology, Surveillance and Emergency Preparedness
(3-7 September, 2007)
Central Institute of Brackishwater Aquaculture,
75, Santhome High Road, R.A.Puram, Chennai-600028

WORKSHOP REPORT AND RECOMMENDATIONS

1. Background to the Workshop

Aquatic animal health and international trade: Diseases of aquatic animals and bio-security measures for managing risks of aquatic animal disease outbreaks have received less attention than livestock diseases. This is despite the fact that India is a major exporter of aquatic animal products annually worth several million US$. Aquaculture (e.g. shrimp, scampi and carp) already makes a significant contribution to rural development, poverty reduction, food security, economic development and trade throughout India, and can make further substantial contributions.

Aquatic animal diseases are a major risk and a primary constraint to the growth of the aquaculture sector in many countries in the Asia-Pacific region and India is no exception. The epidemic spread and devastating impacts of aquatic animal diseases such as epizootic ulcerative syndrome (EUS) in freshwater fish; viral nervous necrosis (VNN) in marine fish; white spot syndrome virus (WSSV) in penaeid shrimps; and the emerging Taura syndrome virus (TSV) in *Penaeus vannamei;* in Asia have clearly demonstrated the vulnerability of aquaculture systems to infectious disease emergencies. More recently, the widespread mass mortalities of koi and common carp in Indonesia and Japan due to infection with koi herpes virus (KHV) have re-emphasized the impact that emerging diseases can have on local economies.

The increasing globalization and trade volume of the aquaculture sector has created new mechanisms by which pathogens and diseases may be introduced or spread to new areas. Known and unknown disease problems may arise quickly in any country's aquaculture sector, often with serious economic, social and ecological consequences, but may be difficult or impossible to eliminate once established.

Regional and International Instruments: Over the years, several regional and international instruments have been developed to help national governments to meet the international standards set by the World Trade Organization under the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) and related scientific standards set by the World Organization for Animal Health (OIE). Outlines for such guidelines are provided by the *International Aquatic Animal Health Code* and the *Manual of Diagnostic Tests for Aquatic Animal Diseases* of the OIE, the Asia-Pacific Regional *Technical Guidelines and Implementation Strategy*, as well as the *National strategic plan for aquatic exotics and quarantine* of the Ministry of Agriculture, Government of India. All these documents take WTO's SPS Agreement into consideration, as well as Articles 9 - *Aquaculture Development* – and 10 – *Integration of Fisheries into Coastal Area Management* of the *Code of Conduct for Responsible Fisheries* (CCRF).

Although a number international regulatory frameworks have been developed, their translation to and implementation at the regional and national levels have been slow to develop, or may be entirely lacking, for a number of reasons. The NACA recognizes that implementation of international/regional/national guidelines and instruments will go a long way in not only helping countries to meet the international standards but also to significantly minimize the impact and spread of serious aquatic animal diseases.

Role of NACA: NACA is an intergovernmental organization, owned by its member governments, of which there are currently 17, including India. The objective of NACA is the expansion of sustainable aquaculture and small-scale aquatic resources management, through the promotion of science-based best practices in policy, sector management and farm management. NACA operates under the principle of Technical Cooperation among Developing Countries (TCDC). The regional program is formulated by the governments, through its Governing Council; with the advice of a Technical Advisory Committee; and a wide range of government, industry and non-government stakeholders, and implemented by the Secretariat. NACA programs and projects are developed through broad participation among stakeholders, and are (i) implemented in a participatory manner, ii) aim to strengthen national capacities while utilizing existing regional and national institutions, (iii) designed to build on rather than duplicate results, and (iv) are shared widely. Aquatic animal health management is one of NACA's core programmes, through which support is provided for cooperation, capacity building and improved communications among countries in addressing aquatic disease problems. The purpose of NACA's regional Aquatic Animal Health Program in the 21 participating countries is to "Reduce risks of aquatic animal disease impacting on livelihoods of aquaculture farmers, national economies, trade and human health". The regional health program of NACA provides technical assistance to countries to implement practical national aquatic animal health strategies.

Role of ICAR: ICAR through its eight fishery institutes is carrying out research on all aspects of fisheries and have trained manpower and facilities on aquatic health. Central Institute of Brackishwater Aquaculture (CIBA) and Central Institute of Freshwater Aquaculture (CIFA) have active research programs on existing and emerging aquaculture diseases. National Bureau of Fish Genetics and Resources (NBFGR) is the nodal research organization entrusted with task of providing research support on quarantine. These three institutes along with fishery colleges under Agriculture Universities are working on various aspects of aquaculture disease management.

National Strategic Plan: In the year 1999, the Department of Animal Husbandry and Dairying, under the Ministry of Agriculture, Government of India entrusted the task of developing national strategic plan and guidelines for dealing with aquatic exotics and quarantine to NBFGR. NBFGR undertook a series of activities (workshops, consultative processes, brainstorming sessions) between 2000 and 2002 involving the relevant stakeholders at the national level and developed two national documents: (1) National strategic plan for aquatic exotics and quarantine and (2) Aquatic exotics and quarantine guidelines. The strategic plan and guidelines have been approved by the Ministry of Agriculture, for implementation in the country. The strategic plan and guidelines cover most of the important elements contained in the "Asia Regional Technical Guidelines (TG)[1] for responsible movement of live aquatic animals". The main elements of the Technical Guidelines incorporated in the national strategic plan are as follows:

[1] Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals and the Beijing consensus and Implementation strategy, 2000. FAO/NACA. Fisheries Technical Paper No 402

1. Pathogens to be considered
2. Disease diagnosis
3. Health certification and quarantine measures
4. Disease zoning
5. Disease surveillance and reporting
6. Contingency planning
7. Import risk analysis
8. National strategies and policy frameworks

The national strategic plan is very broad and provides the basic framework and principles on which to implement a comprehensive health management strategy. The strategic plan covers most of the issues that needs to be implemented at the state level. The national strategic plan has identified the roles and responsibilities of different stakeholders at the state and national levels. To accomplish the vision envisaged in the national strategic plan, it is very essential, that efforts are made to initiate the implementation process with the available resources.

ICAR and NACA have developed the workshop as a collaborative activity to build capacity and awareness in relevant stakeholders and institutions in order to start the process of implementation of some of the key elements identified in the national strategic plan. The 5 day training workshop was held in CIBA, Chennai from 3-7, September 2007.

2. Purpose of the Workshop

The purpose of the 5 day training workshop was to build capacity and awareness of relevant stakeholders in the areas of aquatic epidemiology, risk analysis, surveillance and emergency preparedness. The long term objective was to support implementation of ***National strategies*** *for better aquatic animal health management with a focus on improved surveillance, reporting, early response, emergency preparedness, risk analysis, certification and quarantine*

3. Opening Ceremony

The ICAR/NACA training workshop on "Aquatic epidemiology, surveillance and emergency preparedness" was held from 3-7th September 2007 in CIBA, Chennai. The training workshop was opened with a formal inauguration ceremony attended by Prof Ramachandran, Vice Chancellor of Tamil Nadu Agricultural University, Dr Dehadrai, former DDG of ICAR and Dr Sakthivel, former Director of MPEDA. Dr Ponniah welcomed the guests, resource experts from outside India, and participants. CV Mohan briefed the participants and dignitaries about the workshop. The chief Guest formally inaugurated the training workshop by lighting the traditional lamp and delivered the inaugural address and highlighted the importance of aquatic animal health management and need for establishing national aquatic animal health strategies. Dr Dehadrai and Dr Sakthivel also spoke on the occasion and urged the participants to make use of the opportunity and take up follow up activities. Dr Santiago proposed the vote of thanks

4. Participation

The training workshop was attended by 34 middle and senior level officers from over 18 key national institutions in India (e.g. ICAR institutions, state agricultural universities, state fisheries departments, MPEDA, private sector). The list of participants is provided as Annex 1. Resource experts from Australia (Dr Angus Cameron), Thailand (Dr Supranee Chinabut), Philippines (Dr Celia Pitogo), Indonesia (Dr Agus Priyono), Vietnam (Dr Tiep), India (Dr Indrani Karunasagar, Dr Ponniah, Dr Santiago, Dr Sarada, Dr Ravishankar, Dr Rehana Abidi and Dr. Kalaimani) and NACA (Dr CV Mohan) provided expert inputs to the workshop.

5. Process

The training workshop had three components that were integrated in a logical fashion to ensure continuity and enhance uptake.. The **Training component** included lectures on concepts of epidemiology, application of epidemiology (e.g. disease investigations, conduct of surveys, sampling issues), surveillance, qualitative risk analysis and contingency planning. The second component focused on **sharing of experiences** from other countries (e.g. Australia, Thailand, Philippines, Indonesia, Vietnam) that are implementing national aquatic animal health strategies in the Asia Pacific region. This included areas such as national plans, working of national advisory committee, national list of diseases, national surveillance and reporting framework, national contingency plans, national aquatic animal health networks, etc. The third component consisted of **facilitated interaction sessions**. These sessions were used to discuss and agree on simple and practical approaches to implement national aquatic animal health strategies in India with the available resources and expertise. The time table followed is provided as Annex 2

All workshop participants were provided with CDs containing all the presentations made at the workshop, plus copy of survey tool box text book, software for epidemiological analysis and other resource documents.

The Australian Government Department of Agriculture, Fisheries and Forestry provided CDs of Auqavetplan and copies of Aquaplan 2005-2010 for distribution to all the participants. Organizers and participants recognized the value of the resource material provided and acknowledged the inputs provided by DAFF.

6. Output

The workshop contributed to the following key outputs:

- Increased capacity in aquatic epidemiology, risk analysis, surveillance, and emergency preparedness amongst relevant national stakeholders and institutions
- Increased awareness amongst relevant stakeholders on global treaties and instruments related to aquatic health issues that govern trade in live aquatic animals and aquaculture products
- Establishment of a informal network of individuals and institutions to support implementation of national strategies on aquatic animal health management in India

7. Working Group Outputs

The working groups were asked to prioritize elements for implementation of national aquatic animal health strategies and develop some action plans. The findings of the working groups were presented at the plenary session and used for developing the workshop recommendations.

Outputs from Working Group 1:

1. Establishment of surveillance network for aquatic animal diseases
    - Identified the sources of information and developed a pathway flow chart for surveillance, flow of information and reporting
    - Documentation -National Database
        - National check list of endemic diseases/pathogens
        - List of pathogens of national concern

3. Quarantine facility and health certification
    - Separate Quarantine Directorate
    - 3 ports of entry
    - Uniform Quarantine Policy for all aquatic organisms/products import/export
    - Certification by OIE certified Authority

4. Capacity Building
    - Diagnostic facility at District level
    - Human Resource Development
    - Training to field level technicians
    - Preparation of field guides/manuals

5. Import Risk
    - Koi Carp (KHV)
    - Seabass (Noda Virus)
    - Grouper (Irido Virus)
    - Pacific White Shrimp (IMNV, TSV)
    - Pangasius suchi

Working Group 2:

	Key elements	**Approaches**
1	Database on diseases	• Compilation of existing information available in different research organizations, universities, health laboratories, state governments, peer reviewed journals and grey literatures
2	Reporting of diseases	• Networking of laboratories, identification of mechanism/personnel and systematic flow of information to a designated body for further compilation and necessary action • Networking of aquaclubs/aquaclinics; formation of new aquaclinics • Registration of farmers/farms/hatcheries with state fisheries departments

3	Preparation of national list of diseases of concern	• Through conducting workshop to identify national priority
4	Strengthening diagnostic system	• Recognition of national laboratories for specific pathogens of concern • Accreditation of laboratories • Strengthening of existing diagnostic laboratories and the facilities and capacity building at regional level
5	Import risk analysis	• IRA for potential species/products likely to imported
6	Contingency planning	• Contingency planning for diseases KHV, TSV, IMNV, Monodon slow growth syndrome • Mechanism for compensation to the farmers in case of destruction of products
7	Health certification	• Recognition of personnel/experts by the government authority (DAHDF) for health certification • Linking of groups involved in health certification • SOP for health certification
8	Quarantine	• HRD for quarantine • Establishment of quarantine facilities at focal points for internal and external movements of fish and fish products • Accreditation of private quarantine facilities
9	Legislation	• Amendment of existing livestock importation act for effective implementation of fish quarantine
10	Immediate next action	• Listing and networking of all those who are involved in aquatic animal health • A high level meeting including policy makers concerned with AAH

8. Workshop Recommendations

The recommendations are based on the outcomes of the two working groups.

Considering the existence of national strategy for aquatic animal exotics and quarantine and as a follow up to the ICAR-NACA workshop on Aquatic epidemiology, surveillance and emergency preparedness (3-7 September, CIBA, Chennai) the following draft recommendations have been proposed:

- Develop one national network program to progress the implementation of national surveillance (NBFGR to lead the national initiative)
- Develop one national network program to progress the implementation of epidemiological studies for key national diseases of concern (CIBA and CIFA to lead the national initiatives for BW and FW fishes respectively)
- Initiate actions to develop a national disease database based on surveillance (NBFGR)
- Develop and finalize list of diseases of national concern for the purpose of surveillance and reporting and for undertaking further epidemiological studies on diseases of national concern. This list could be under three categories (i)Diseases not reported from India (ii)Disease reported from India but from select geographic areas and (iii) Diseases widely present in the country but control measures are deemed necessary (CIBA,CIFA,CMFRI &NBFGR to carry out as a post workshop initiative)
- Strengthening diagnostic system with recognition of national laboratories for specific pathogens of concern, accreditation of laboratories and strengthening of existing diagnostic laboratories and the facilities and capacity building at regional level by creating diagnostic facility at district level, human resource development by way of training field level technicians and preparation of field guides and manuals.
- Develop and implement training workshop on IRA in collaboration with NACA (CIBA to lead the national initiative).
- Conduct IRA for (the exotic species which are already present in the country (like Koi Carp, Pacific White Shrimp and *Pangasius suchi*) or likely to be imported in the near future.
- Develop contingency planning for diseases KHV, TSV, IMNV & Monodon slow growth syndrome and possible compensation to the farmers in case of destruction of products
- Develop health certification programme with recognition of personnel/experts by the government authority (DAHDF) for health certification ; linking of groups involved in health certification, and SOP for health certification
- Develop quarantine procedures by formation of a separate directorate for quarantine as in Indonesia, HRD for quarantine, and establishment of quarantine facilities at three ports of entry for internal and external movements of fish and fish products and accreditation of private quarantine facilities and amendment of existing livestock importation act for effective implementation of fish quarantine.
- Develop and implement training workshop on surveillance and reporting in collaboration with NACA
- Develop a policy document of Indian aquatic animal health with the involvement of all stakeholders which will guide the research development activities in this field and integrate it with overall aquaculture planning.
- Develop specific TOR for the national exotics committee to deal with aquatic animal diseases OR consider establishing a national technical working group for dealing with aquatic animal diseases and implementing national aquatic animal health strategies

- The following guidelines may be issued to editors/publishers of books/journals while publishing articles that contain information on exotic diseases and exotic pathogens. The Ministry of Agriculture to be appraise about the potential dangers of publishing work on exotic diseases and exotic pathogens without a proper review.
    - The source of exotic pathogen, clearly intimating the details of the host from which the pathogen was collected, the time and place from where the specimen was obtained, the quarantine measures taken so that the pathogen is not spread to other places, should be clearly reflected in the article.
    - When a exotic disease has been identified in India the same should be confirmed by sending samples through the competent authority to two or three labs duly recognized for the purpose for confirmation before communicating to any journal for publication of the finding.

Note: For some recommendations the institutes were identified by the participants. However this is subject to modification based on the EOIs and mandates of the institutes. For all the recommendations, the concerned lead agencies could develop a work programme which is time-bound with the responsibilities clearly defined with no overlap.

9. Closing Ceremony

The Valedictory function of the workshop was held on 7th September afternoon from 4.00-6.00 PM at the seminar hall of CIBA. NACA welcomed the dignitaries and participants. Prof L Kannan, Vice Chancellor of Theruvalluvar University gave the valedictory address. Dr Alfred Selvakumar, former ADG of ICAR gave the presidential address. Both Prof Kannan and Alfred Selvakumar appreciated the role played by NACA and the collaboration with ICAR. Dr Ponniah provided the concluding remarks and emphasized the importance of need for networking amongst participating institutions to take up follow up activities identified by the working groups. Three participants provided feed back on the workshop. Participants recognized the present workshop as the first attempt in the country in creating awareness in the areas of aquatic epidemiology, surveillance and emergency preparedness. Certificate of participation was distributed to all the participants by Prof Kannan and Dr Alfred Selvakumar. The role played by NACA and CIBA in planning, coordinating and executing the workshop was appreciated by all the participants. The function ended with a vote of thanks extended by Dr. N. Kalaimani.

Annex 2

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Time Table

Time	*Topic*	*Presenter*
	3/9/2007 MONDAY	
8.30-9.00	Registration Formalities	CIBA
9.00-10.30	Inaugural Session	CIBA
10.30-11.00	***Tea Break***	
11.00-11.15	Formal Introductions	NACA
11.15-11.30	Background to the training workshop-Purpose, process, participation and product	NACA/CIBA
11.30-12.15	Global aquatic animal health issues and need for comprehensive national aquatic animal health strategies	NACA
12.15-13.00	Basic concepts in epidemiology and its relevance to national aquatic animal health strategies	AusVet
13.00-14.00	***Lunch Break***	
14.00-15.00	Concept of causation, patterns of disease, measures of disease and measures of associations	AusVet
15.00-15.30	Concept of disease diagnosis and experiences from PCR calibration study conducted in India	NACA
15.30-16.00	***Tea Break***	
16.00-17.00	Types of surveys, Outbreak investigation, sampling and data collection	AusVet
17.00-17.30	Application of molecular tools in disease diagnosis and surveillance	COFM/India
	4/9/2007 TUESDAY	
9.00-10.00	Types of epidemiological studies (e.g. longitudinal, case-control)	AusVet
10.00-10.30	White spot disease risk factor study in India- an example	NACA
10.30-11.00	***Tea Break***	
11.00-12.00	Concept, purpose and types of surveillance	AusVet
12.00-12.30	KHV surveillance in Thailand	Thailand
12.30-13.00	Surveillance and disease reporting in Asia-Pacific	NACA
13.00-14.00	***Lunch Break***	
14.00-15.00	Aquatic animal disease information management and disease reporting	AusVet
15.00-15.30	Molecular epidemiology - Role in vaccines and disease	TANUVAS

	diagnosis	/India
15.30-16.00	***Tea Break***	
16.00-17.00	Risk analysis concept, components, methodology, and applications	AusVet
17.00-1730	Generating and monitoring of animal health information-Indian Scenario.	ADMS/India
	5/9/2007 WEDNESDAY	
9.00-9.30	Application of rapid field diagnostics in surveillance and contingency planning	COFM/India
9.30-10.00	Aquaculture and Aquatic Animal Health-Indian Perspectives	CIBA/India
10.00-10.30	Aquaculture and Aquatic Animal Health-Thailand Perspectives	Thailand
10.30-11.00	***Tea Break***	
11.00-11.30	Aquaculture and Aquatic Animal Health-Philippines Perspectives	Philippines
11.30-12.00	Aquaculture and Aquatic Animal Health-Vietnam Perspectives	Vietnam
12.00-12.30	An Assessment of the Economic Losses Resulting from incidences of Various Diseases in Shrimp Farms in India & Predictors for losses in shrimp aquaculture –a case study	CIBA/India
12.30-13.00	Issues in diagnostics of WSSV in shrimp brooders and post-larvae	CIBA/India
13.00-14.00	***Lunch Break***	
14.00-14.30	Aquaplan-Australia's National aquatic animal health strategy	Australia
14.30-15.00	Development and Implementation of National Strategies on Aquatic animal health-Thailand	Thailand
15.00-15.30	Background to National Strategy development in India	NBFGR/CIBA/India
15.30-16.00	***Tea Break***	
16.00-16.30	National aquatic animal health committee and national list of diseases in Australia	Australia
16.30-17.00	National Aquatic Animal Health Committee and national list of diseases in Thailand	Thailand
17.00-17.30	National Aquatic Animal Health Committee and national list of diseases in Philippines	Philippines
	6/9/2007 THURSDAY	
9.00-10.00	National aquatic animal health committee and National list of diseases in Vietnam	Vietnam
10.00-10.30	National Aquatic Animal Health Committee and national list of diseases in Indonesia	Indonesia
10.30-11.00	***Tea Break***	
11.00-11.30	Surveillance and reporting in Australia	Australia
11.30-12.00	Surveillance and disease reporting in Thailand	Thailand
12.00-12.30	Surveillance and reporting in Vietnam	Vietnam
12.30-13.00	Surveillance and disease reporting in Philippines	Philippines
13.00-14.00	***Lunch Break***	

14.00-14.30	Surveillance and disease reporting in Indonesia	Indonesia
14.30-15.00	Concept of quarantine and health certification	NACA
15.00-15.30	Quarantine and health certification in Thailand	Thailand
15.30-16.00	***Tea Break***	
16.00-16.30	Quarantine and health certification in Vietnam	Vietnam
16.30-17.00	Quarantine and health certification in Indonesia	Indonesia
17.00-17.30	Interactions	
	7/9/2007 FRIDAY	
9.00-9.30	Quarantine and health certification in Philippines	Philippines
9.30-10.00	Concept of contingency planning in aquatic animal health management	NACA
10.00-10.30	Aquavetplan-Australia's National contingency plan	Australia
10.30-11.00	Tea Break	
11.00-11.30	Emergency preparedness in Thailand	Thailand
11.30-12.00	Import risk analysis in Philippines	Philippines
12.00-12.30	Import risk analysis in Thailand	Thailand
12.30-13.00	General Discussions	
13.00-14.00	***Lunch***	
14.00-16.00	Facilitated discussions on Implementation of aquatic animal health strategies in India • Practical approaches • Networking and communication • Coordination • Monitoring, review and revisions	
16.00-16.30	***Tea Break***	
16.30-17.30	Closing Session	CIBA