

# Exercising responsibilities to tackle aquatic animal diseases

CV Mohan, NACA

*Recognize disease as our (common) problem. Facilitate flow of science (information). Exercise responsibilities. Disease impact will be minimized.*

Asia is the hub of aquaculture. Around 80% of the world's aquaculture production comes from here. Diseases are the biggest deterrents to Asian aquaculture. Health management is the buzz-word in aquaculture and is still the most debated and discussed topic in meetings, seminars and workshops. The wealth of information (knowledge), expertise and resources that exist in the Asian region, on aquatic animal health management is remarkable. Significant progress has been made in disease management in Asian aquaculture and it is well documented. However, serious disease problems still continue to cripple the aquaculture industry in several countries of the region, affecting the livelihoods of many people directly and indirectly. Why this is happening? We may never be able to fully understand the underlying reasons and they will differ from country to country and opinions vary from person to person. Long lists of failures/constraints/limitations can be generated. But, three reasons (that can be called as failures) appear to be largely responsible:

- Failure to recognize aquatic animal disease as our problem by stakeholders.
- Failure to facilitate flow of science (information) among stakeholders
- Failure to exercise responsibilities by stakeholders

The term 'stakeholders' in this article is used very broadly to refer to all those linked to the industry directly and indirectly such as producers, service providers, development agencies, research organizations, policy makers and consumers. This article attempts to address these failures, hoping to stimulate some discussions. The generic analysis and comments presented are not specific to any country in the region. Shrimp viral

diseases in Asia are used as examples to base some of the opinions. Before addressing the three identified issues, it is necessary to briefly look into the concept of aquatic animal diseases and health management in aquaculture.

## Concept of disease and health management

Disease is the biggest threats to sustainable aquaculture. White spot disease (WSD) in cultured shrimp and epizootic ulcerative syndrome (EUS) in fish are the best examples. As aquaculture intensifies and expands, more and more new diseases will emerge and health management will become very challenging. Health management can be broadly defined as approaches taken to prevent, control and eradicate aquatic animal diseases.

For a disease to occur, the pathogen must be able to gain entry into the culture system. Possible pathogen carriers include infected hosts (seed, brood, vectors, intermediate hosts, reservoir hosts), non-host biological carriers (birds, dogs, insects, other predators, human beings) and fomites (water, vehicles, buckets, shoes, nets, clothing). The carriers can enter the culture system through waterborne, airborne and overland transport routes. Waterborne transport may include contaminated water (pond effluents and processing plant effluents) and natural hosts in water. Airborne transport (migratory birds, insects, wind) of pathogen carriers is a serious concern in open farming systems. Overland transport (infected seed, human beings, animals, vehicles, farm equipment) of pathogen carriers is often the common route of introducing the pathogen to the culture system.

Understanding the disease process involves understanding the pathogen, host and the environment. A pathogen can cause a clinical disease and mortality only when it can overcome the defense barriers of the host and

establish in the target tissue, proliferate, cause cellular and tissue damage and impair the function of the target tissue. Understanding the pathogenicity mechanisms of the pathogen, disease resistance strategies of the host and the role of the environment will help to gain insight into disease process. The concept of disease in an animal, how it spreads between animals in a pond, and between ponds, farms, provinces and countries is vital for devising measures to minimize pathogen spread. Knowing pathogen transmission pathways helps to better understand pond outbreaks, epidemics and pandemics. Serious disease outbreaks (epidemics) and crop losses are normally caused under certain circumstances by pathogens referred to as Category-1 pathogens. These are highly virulent, spread rapidly, untreatable, have diverse host range, and threaten the very survival of the industry.

Principles of health management should be considered to keep serious pathogens not only out of the cultured host and environment but also out of the country and the region. Once these pathogens enter and become established (endemic) it becomes very expensive to keep them out. Health management involves understanding and managing the host, pathogen and the environment. Aquatic animal disease control strategies broadly include preventive and prophylactic strategies, chemotherapy, epidemiological approaches, risk management, rapid diagnostics and early warning surveillance, biosecurity protocols and specific pathogen free (SPF) and specific pathogen resistant (SPR) based aquaculture programs. There is considerable knowledge and expertise on these approaches. Principles of health management need to be applied at the hatchery, farm, local, provincial, national, regional and international levels in order to minimize the impact. The responsibility of health

management therefore, lies with all the stakeholders.

### **Recognize disease as our problem**

Aquatic animal disease impacts on livelihoods of aquaculture farmers and the people who make their living around aquaculture (suppliers, traders, processors and others), national economies, trade and human health. Disease epizootics have a cascading effect on all stakeholders. Responsible interventions by each of the stakeholders will have a direct or indirect positive outcome on minimizing the impact of disease. Lack of direct benefit should not be seen as a disincentive for exercising responsible intervention. This is where the concept of recognizing disease as “our” problem will help. Otherwise, disease will remain as his or their problem, but never our problem. This should change and it is a challenging task to bring about this change. The flow of science-based information to the stakeholders and demonstrating the benefits of a collective approach, will contribute towards achieving this change. Responsible interventions taken at any level can help the overall sector. The benefits of every positive reactive and proactive intervention will have a trickle down effect to the stakeholders. On the other hand, negative effects of not exercising a responsibility can have a dramatic devastating effect on the stakeholders. Several examples for both these scenarios can be found in the Asia-Pacific region. Examples and lessons learnt in the region should help stakeholders to recognize disease as our common problem.

### **Facilitating flow of science based information**

Considerable knowledge is available on aquatic animal disease process, transmission pathways, diagnostics and management strategies. Information flows to the stakeholders through various channels under different circumstances for various purposes. This flow of information has significantly helped in the management of aquatic animal diseases in the region. The well documented, positive impacts, will not be discussed here.

However, upon close examination of flow of health management information to the stakeholders, it becomes apparent that many times a message reaches the stakeholder but not the science behind it. It works more like promotion of information. Unless the science behind the message reaches the stakeholders, we will continue to hear statements as the following which I offer as food for thought:

- “We are using screened brood stock, our seed is disease free”
- “We are using screened seed, we can increase stocking densities”
- “We have PCR testing facilities in the country and that should solve the shrimp disease problem”
- “Why should I spend money to treat my pond water after losing the crop?”
- “Processors have no role in disease management”
- “We tried everything, but still we get disease”
- “We are using SPF animals, they are resistant, we should not have any health problem”
- “We are diversifying into an alternative exotic species which is resistant”
- “Our products help control shrimp viral diseases”
- “I would not mind trying treatments and health products to manage shrimp viral diseases”

There are many health management concepts that need to be correctly informed to the appropriate stakeholders. At the outset, it may appear that stakeholders are well informed about these concepts. If one goes down to the individual stakeholder level (farmer/policy maker), it will not take much time to realize that very little is known where it is most needed. If the science behind the information becomes available many of the responses of the stakeholders could be different. Devising approaches to channel the information and the science behind the information to the concerned stakeholder is going to be a challenging task. Responsibility to facilitate flow of information rests with many people. Each of the stakeholders can play a vital link to facilitate flow of information. Information should be provided with the objective of creating awareness, and not just promoting hidden agenda.

Following are just a few examples of such health management concepts, where science based information should be made available to the stakeholders.

**Disease risk is inherent with aquaculture.** Aquaculture free of disease risk is an utopian dream. Application of right strategies will minimize the impact of disease significantly. There is no single risk factor for a disease outbreak and hence no single solution. Risk identification, prioritization and management will minimise the impact of the disease. Stakeholder perception of risk and solution should broaden and become more refined

**Chemotherapy is not same as health management.** Treating a clinical disease will be of little use in most circumstances, because damage to the target tissue of the animal has already been done. In addition, chemical use in food fish has potential to create food safety and market related concerns, an issue that is becoming increasingly significant in trade and food safety

**PCR screened shrimp seed.** There is no true PCR negative seed. Virus may be present at levels below the detection limit of the test employed or present in the population at prevalence levels below what could be detected by the sample size selected. PCR screening, correctly applied, significantly minimizes the risk of introducing the pathogen into the system with the seed. Screened seed is negative (only at specific probability level) for pathogens against which it is screened, but not for other pathogens and is not resistant to any pathogens. Their use does not ensure success if exposed to the same pathogen or other pathogens

**Shrimp Broodstock screening before spawning is of little use.** Spawning stress has been shown to stimulate viral replication. Broodstock which test negative prior to spawning might test positive following spawning. Screening to be effective, should therefore, be done after spawning. For screening to be beneficial, hatchery practice should not allow mixing of progeny from different brooders

**SPF stock.** Stocks domesticated and reared in systems where the specific pathogen has been excluded. Domestication and SPF are not

necessarily same. They are not resistant to the specific pathogen. They are not free from other pathogens. SPF stock when exposed may become susceptible to the pathogen. Their use does not ensure success if exposed to the same pathogen or other pathogens

**SPR stocks.** Domesticated animals selected for their ability to survive specific pathogen infection.

**Biosecurity.** Providing security to the cultured organisms from exposure to pathogens of concern. Pathogen carriers (described earlier) can enter the culture system through waterborne, airborne and overland transport routes. Several recommended bio-security approaches are available to prevent the entry of pathogens and their carriers to the pond, farm and the country. Adoption and implementation of principles of a biosecurity can considerably minimise the probability of pathogen introduction. Several biosecurity principles can be very easily implemented at the farm/hatchery level. Disinfection programs at critical points, screening of hosts, not sharing labour and equipments between ponds, restricted access, safe disposal of sick and dead animals are some examples.

**Epidemiology.** Disease causation is multifactorial in nature. Disease will occur only when there is a sufficient cause. Mere presence of pathogen (necessary cause) will not always lead to disease outbreaks. WSD will not occur without the presence of WSSV. But, mere presence of WSSV (necessary cause) will not necessarily lead to WSD outbreaks. Necessary cause, along with component causes (risk factors) become a sufficient cause to produce the disease outbreak. Epidemiological studies identify these risk factors based on population evidence, quantifying their effect on outcome (disease), and assist to formulate intervention strategies. Epidemiological approaches hold great promise for management of aquatic animal pathogens, which have become endemic and established

**Import risk analysis.** Scientific process to assist decision making regarding importing an item (new species/feed/frozen shrimp). IRA involves hazard identification, risk assessment, risk management and risk communication. It should be done

before making the decision and not done to support a decision already made. Any analysis done without the real perception of hazard and associated risks will of little value. IRA puts the onus on the importing countries. Responsibilities for preventing introduction and spread of pathogens lie also with the exporters. IRA (more appropriately, trade risk analysis) should take into account the liabilities and responsibilities of both importers and exporters.

### Exercising Responsibilities

Not exercising responsibilities has cost the aquaculture industry dearly and will continue to hurt the sector, if changes are not brought about. Exercising responsibilities is bound to benefit the industry substantially. What is needed is to demonstrate the benefits, convince the stakeholders and facilitate them to exercise their responsibilities. This can't be policed and there is no need for it. Initiatives and approaches should come voluntarily from the stakeholders, then it is going to be sustainable. Orientation of stakeholders and raising awareness are vital to accomplish this mammoth task.

Responsibilities to manage diseases rests with all stakeholders concerned directly and indirectly with aquaculture. Principles of health management should be considered at the hatchery, pond, farm, local, national, regional and international levels. Adoption of better management practices (BMP) for example, can minimize the impact of diseases at the production level (hatchery/pond/farm). Existing knowledge in the region on BMPs should be communicated to the primary producers. Local approaches like adoption of voluntary codes of practice can assist to manage diseases at the local level. Self-help groups, farmer clubs/associations can take lead role in developing voluntary codes of practice and in implementing them. Such voluntary approaches are important because, despite the value of aquaculture, the support services (extension) are extremely weak in many countries of the region.

So much is known about exotic pathogen introductions associated with transboundary movement of live

aquatic animals. Despite this awareness, introductions take place. In many countries, stakeholder lobbies make strong case for new species introductions largely based on perceived advantages of an exotic over a native species, often with a narrow personal interest. It would be proactive, if a free and fair consultative process is held at the national level involving all the stakeholders. The collective opinion emerging from such consultative processes will be very useful for right decision making. For example, because of the proposed advantages of *Penaeus vannamei*, it has been introduced to many countries in Asia. Reports of taura syndrome (viral disease) and other syndromes are already emerging from some of the countries in the region. Despite this, many countries are eager to introduce the species. Countries in the process of considering introductions, should seriously take into account the associated risks, conduct IRA, seek balanced advice (not just from a few lobbying groups) and learn from the regional experiences, before making decisions. Both exporters and importers have responsibilities for preventing the spread of pathogens across countries.

Effective implementation of National strategies for aquatic animal health can minimize the risk of entry of dangerous pathogens into the country and their subsequent spread. Effective and practical national strategies in countries like Australia ([www.affa.gov.au](http://www.affa.gov.au)) have been successful to keep many serious pathogens out of the country. National strategies should assist to develop skills and facilities to undertake import risk analysis, quarantine and certification, surveillance and disease reporting and preparedness to deal with disease emergencies.

Regional aquatic animal health management program of NACA is developed and implemented in close cooperation and collaboration with member governments, regional organizations, donor agencies and stakeholders. It facilitates sharing of resources (information and expertise) between member governments in the region. Regional initiatives, aim to reduce risks of aquatic animal disease impacting on livelihoods of aquaculture farmers, national economies, trade and

human health. ([www.enaca.org/health](http://www.enaca.org/health)) To support achievement of the goal, NACA regional initiatives aims to:

- Support development and implementation of National Aquatic Animal Health Strategies in Asia-Pacific.
- Promote widespread adoption of better aquatic animal health management practices
- Promote programs for improved surveillance, reporting and response to disease problems
- Facilitate harmonisation of diagnostic procedures and approaches to risk assessment.
- Improve regional and international cooperation in aquatic animal health.

There are several international initiatives, which address management of aquatic animal diseases.

International standards and guidelines are prepared with the objective of promoting responsible trade and minimizing trans-boundary movement and spread of dangerous pathogens ([www.oie.org](http://www.oie.org), [www.fao.org](http://www.fao.org)). Following are some of the important instruments and mechanisms to support it:

- OIE (world animal health organization) Aquatic animal health code and diagnostic manuals
- FAO code of Conduct for responsible fisheries
- FAO/WHO Codex Alimentarius
- List of OIE notifiable diseases and other diseases of significance
- Regional/International reporting of aquatic animal diseases
- OIE Referral laboratories
- Aquatic Animal Health Standards Committee (AAHSC of the OIE)
- Regional Advisory group on aquatic animal health (AG of NACA)

Adhering to international obligations and requirements will contribute to minimize the introduction and spread of serious pathogens

## Conclusion

If some of the following examples are any indication, the future appears to be bright. Stakeholders in the region are gradually beginning to exercise their responsibilities to fight the common problem. This is encouraging and the right way forward. Such initiatives can be good lessons for stakeholders in all the countries of the region. Voluntary proactive approaches coming from

stakeholders are signs of a good beginning. Sustaining the proactive approaches requires commitment from all the stakeholders. Considerable effort and resources are required to stimulate and sustain proactive approaches

**Hatcheries and Farms** are increasingly adopting better management practices aimed at reducing disease risks. Hatcheries/farms are willing to exercise damage control strategies (in the case of white spot outbreak) like isolation of affected unit, removal of hosts, effective disinfection programs and early warning systems

**Collective approaches** in various forms are beginning to make an impact on disease management. Farmer self help groups (clubs/associations/societies) formulating strategies and guidelines to suit local needs and developing voluntary codes of practice are on the increase. Industry is becoming open to application of certification programs and quality assurance schemes (HACCP)

**Extension approaches** are being better understood and new methods are being developed to facilitate flow of science (information) to the stakeholders. Private sector is beginning to play a lead role in enabling information flow.

**Research** in the area of aquatic animal health is active in the region. Population based studies (epidemiological approaches) to identify risks and devise disease management intervention strategies are on the increase. Rapid diagnostics are available to diseases of concern to the region and dedicated efforts are being made to develop rapid diagnostics for emerging infectious diseases.

**National strategies on aquatic animal health management** are being gradually developed and implemented. There is evidence of countries adhering to regional and international obligations and requirements. Capacity for IRA and emergency preparedness are being slowly upgraded in the region.

**Regional/international initiatives** are increasingly facilitating capacity building and sharing of resources. Donor and developmental agencies supporting aquatic animal health

management programs in the region is on the increase.

The above examples of stakeholders proactively exercising responsibilities is hoped to serve as useful models. Only through strong resolve and commitment, stakeholders can ensure responsible health management. "Exercising responsibilities" should become the new buzz-word in aquatic animal health management

---

## Shrimp Health Management Extension Manual now available

This new extension manual summarises the farm level risk factors identified during a NACA/MPEDA technical assistance project on shrimp disease and coastal management. The manual summarises farm level risk factors and practical management practices that can be used to reduce risks of shrimp disease outbreaks and improve farm production. The recommendations are based on the Andhra Pradesh area, India, and are of particular relevance there. However they can also be taken into consideration by farmers elsewhere.

The manual was prepared by NACA and MPEDA, in association with the Aquatic Animal Health Research Institute, Siam Natural Resources Ltd, and AusVet Animal Health Services (Australia) and technical support from the Australian Centre for International Agricultural Research. Download it now, for free from:

<http://www.enaca.org>

