Impeding the Outbreaks of Transboundary Aquatic Animal Diseases in Southeast Asian Aquaculture: the Aquatic Emergency Preparedness and Response System Guidelines

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As aquaculture in Southeast Asia rapidly grows, it is being confronted with incidences of aquatic animal diseases threatening its sustainability. In early 2013, the SEAFDEC Member Countries raised concerns regarding the outbreaks of acute hepatopancreatic necrosis disease (AHPND), one of the causative agents of early mortality syndrome (EMS), that affected the shrimp industry of the region, specifically in Viet Nam, Thailand, Malaysia, and the Philippines that led to low production and significant economic losses. In addressing such concerns, the SEAFDEC Council of Directors during its Meeting in 2014, suggested that health management, particularly the control and prevention of transboundary aquatic animal diseases, should be included in the future programs of the Aquaculture Department (AQD) of the Southeast Asian Fisheries Development Center (SEAFDEC). The pressing situation on AHPND in cultured shrimp in the region prompted SEAFDEC/AQD to seek financial support to fund a consultative meeting that would assess the occurrence of EMS/AHPND and other emerging diseases in farmed shrimps in the ASEAN Member States (AMSs). In response, the Bureau of Fisheries and Aquatic Resources (BFAR) of the Philippine Department of Agriculture (DA) collaborated with SEAFDEC/AQD and agreed to co-host the said consultative meeting, while the Government of Japan committed to fund the meeting through the Japan-ASEAN Integration Fund (JAIF). Thus, the Regional Technical Consultation (RTC) on EMS/AHPND and Other Transboundary Diseases for Improved Aquatic Animal Health in Southeast Asia was organized on 22-24 February 2016 in Makati City, Philippines. While assessing the status of EMS/AHPND and other emerging diseases in farmed shrimps, the RTC identified the gaps and priority areas for R&D and potential collaboration, and formulated the regional policy recommendations that centered on emergency preparedness and response systems (EPRS) through early warning, detection and response, for effective management of aquatic animal disease outbreaks in the region. The recommended EPRS comprises contingency planning arrangements that minimize the impacts of serious aquatic animal disease outbreaks through containment, *i.e.* prevention of further spread or eradication of the diseases whether at regional, national, or farm levels. Thus, establishing a harmonized aquatic EPRS among the AMSs was recognized as a top priority warranting a solid platform for effective and expeditious decision-making with clearly defined responsibilities and authority.

The shrimp aquaculture industry of the Southeast Asian region had been a lucrative industry generating billions of US dollars in export income annually. However, there was a turn around after 2008 (**Table 1**) when production started to dwindle because of occurrences of shrimp diseases brought about by shrimp culture intensification in attempts to increase production. As a result, production was at all-time low as the industry was confronted with episodes of epidemical diseases, *e.g.* white spot syndrome virus (WSSV) and other pathogenic shrimp viruses, *i.e.* the yellow head virus (YHV), Taura syndrome virus (TSV), the infectious hypodermal and hematopoietic necrosis virus (IHHNV), and so on.

The emergence of a new disease in 2009, the so-called acute hepatopancreatic necrosis disease (AHPND) which caused financial havoc to the shrimp-producing countries of Southeast Asia, prompted the SEAFDEC Member Countries to adhere to the call for concerted regional efforts to address this

Table 1. Ten-year production trend of shrimps from aquaculture of the Southeast Asia region (quantity in t)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
*Shrimp culture production**										
Quantity (million t)	2.05	1.05	1.12	1.00	1.20	1.16	1.14	1.11	1.17	1.44
Value (US$ billion)	5.55	3.79	5.11	4.36	5.03	5.94	5.11	4.69	5.80	7.33
Aquaculture production										
Quantity (million t)	11.06	12.38	14.19	15.75	21.16	21.41	22.53	24.18	25.18	24.94
Value (US$ billion)	14.02	15.96	13.38	19.69	21.68	18.01	17.41	15.73	17.52	21.25
Total Fisheries Production										
Quantity (million t)	27.21	28.92	31.44	33.49	39.57	40.42	42.11	44.00	45.34	45.50
Value (US$ billion)	28.59	29.22	38.75	43.78	44.96	41.89	42.72	38.75	41.16	50.57

* *excluding freshwater prawns*
Source: SEAFDEC (2014); SEAFDEC (2017a); SEAFDEC (2020)

concern urgently. Earlier known as early mortality syndrome (EMS) because mortality occurs during the early stages of shrimp culture (SEAFDEC, 2017b), AHPND became the most devastating disease of cultured penaeid shrimps that severely caused mass mortalities not only in whiteleg shrimps (*Penaeus vannamei*) but also to lesser extents in the tiger shrimp (*P. monodon*).

In order to strengthen the regional cooperation for impeding the spread of transboundary aquatic animal diseases, SEAFDEC in collaboration with the Philippine Government convened the Regional Technical Consultation (RTC) on Improvement of Aquatic Animal Health Management in Aquaculture in Southeast Asia in February 2016 in Makati City, Philippines. With funding assistance provided by Japan-ASEAN Integrated Fund (JAIF), the RTC assessed the status of EMS/AHPND and other emerging transboundary diseases in farmed shrimps in the AMSs; identified the gaps and priority areas for R&D; and came up with regional policy recommendations (**Box 1**) which focused on emergency preparedness and response systems (Pakinging *et al*., 2016), *i.e.* early warning, detection, and response, for effective management of aquatic animal disease outbreaks in the region.

Moreover, as also agreed during the RTC, the emergency preparedness and response systems (EPRS) should comprise contingency planning arrangements for minimizing the impacts of serious aquatic animal disease outbreaks through containment, *i.e.* prevention of further spread, or eradication of disease outbreak whether at the regional, national or farm level. Thus, the establishment of a harmonized aquatic EPRS among the AMSs had been considered a top priority, to serve as a solid platform for effective and prompt decision-making with clear responsibilities and authority.

In addressing the recommendations of the RTC, the Philippine-based SEAFDEC Aquaculture Department (SEAFDEC/AQD) and the Government of Thailand through the Aquatic Animal Health Research and Development Division (AAHRDD) of the Department of Fisheries (DOF) of Thailand in collaboration with the ASEAN Network of Aquatic Animal

Box 1. Policy Recommendations on Emergency Preparedness and Response Systems (EPRS) for managing aquatic animal disease outbreaks in the Southeast Asian region

Issues/Gaps	Regional Policy Recommendations
Legislative and policy frameworks	• Develop National Strategy and Policy Frameworks • Member countries to harmonize legislation and regulations related to aquatic animal health management, particularly the legislation for transboundary movement of live aquatic animals
Strategy for prevention, control, and biosecurity	• Promote compliance with good aquaculture practices to maintain optimal environmental conditions during the culture period • Establish an effective prevention system for EMS/AHPND and other diseases based on R&D results • Develop and implement the Guidelines on Health Management and Good Practices to prevent EMS/AHPND and other transboundary diseases • Strictly implement the reporting system to relevant authorities and/or Competent Authority at country, regional and international levels (early warning system, monitoring system, information for the regular report, Annual Report) • Develop emergency preparedness and contingency plans (should be the responsibility of Competent Authority) • Private and public sectors to ensure fund availability and consider this as joint endeavor
Rapid and reliable detection of EMS/AHPND	• Diagnostic methods: should follow the World Organization for Animal Health (OIE) guidelines • Develop tool kits • Ensure availability and capacity of laboratory services, either public or private
R&D program at regional and national levels	• Use of live feeds for broodstock (specifically polychaetes) - potential carriers of pathogen • Effects of inbreeding/genetic erosion on susceptibility to AHPND • Toxin plasmid transfer to other Vibrio species and possibly other bacterial pathogens • Vertical transmission, risk factors, mixed infection • Use of greenwater technology, probiotics, new disease prevention and control strategies
Cooperation among relevant stakeholders	• Strengthen cooperation arrangements among ASEAN Member States (AMSs), international/regional organizations such as OIE, Food and Agriculture Organization of the United Nations (FAO), Network of Aquaculture Centres in Asia and Pacific (NACA), SEAFDEC and ASEAN Network of Aquatic Animal Health Centres (ANAAHC)
Capacity building program	• To also include technology transfer from AMS to another AMS
Awareness building	• Enhance awareness of farmers and relevant stakeholders on R&D developments in transboundary diseases (especially on management and control)

Box 2. Plan of Action for the Effective Management of Transboundary Disease Outbreaks in Southeast Asia

1. SEAFDEC/AQD in collaboration with the AMSs, to complete the EPRS audit questionnaires as basis for a systematic assessment of the EPRS situation in the AMSs
2. SEAFDEC/AQD with support from ANAAHC and Consultation partners, to develop the ASEAN EPRS guidelines including the mechanics based on the following processes:
   a. Use the analysis as a reference point
   b. Form a working group to develop the scope and contents, with zero draft to be circulated to participants including external experts for peer review
   c. To capture in the guidelines the information, analysis and synthesis in the working group matrix either in the situational analysis or guiding principle or actual guidelines
   d. Organize a writeshop to popularize and refine the guidelines including country-level implementation and monitoring
3. To organize Part II of the Consultation for refinement of the draft guidelines and get a consensus, where Part II should not be limited to a workshop but as an actual capacity building on preliminary guidelines implementation, taking into consideration the following aspects:
   a. Simulation exercise
   b. Database registry analysis of surveillance data, experts, laboratories, preparation of contingency plans for high-profile disease, aquatic epidemiology, risk analysis pathology, etc. including private sector leads
   c. ASEAN process for endorsement and approval should be adhered to
4. ANAAHC and the Member Countries, to establish the AEPRS network to include experts from the AMSs, producers, academe, and institutional partners
5. AMSs with collaborating partners, to develop a concept note or proposal for donors and explore new ways of resource generation and mobilization to support all the activities

Health Centres (ANAAHC), the Food and Agriculture Organization of the United Nations (FAO), and the Network of Aquaculture Centres in Asia-Pacific (NACA) convened the ASEAN Regional Technical Consultation (ASEAN RTC) on Aquatic Emergency Preparedness and Response Systems for Effective Management of Transboundary Disease Outbreaks in Southeast Asia in Bangkok, Thailand on 28-30 June 2018. With funding support also from JAIF, the ASEAN RTC came up with the Plan of Action (**Box 2**) as a way forward to fulfill its objectives that included the development of the draft Regional Technical Guidelines for Early Warning System for Aquatic Animal Health Emergencies (Bondad-Reantaso, 2019).

Specifically, on the need to assess the current situation of the AMSs with respect to their respective capacities in terms of preparedness and response system, the EPRS audit should be undertaken to cover all the AMSs. The results of such audit could be used to establish a systematic assessment of the EPRS situation of the region, as well as to develop the ASEAN guidelines including the mechanics for such development.

Regional Technical Guidelines on Early Warning System for Aquatic Animal Health Emergencies

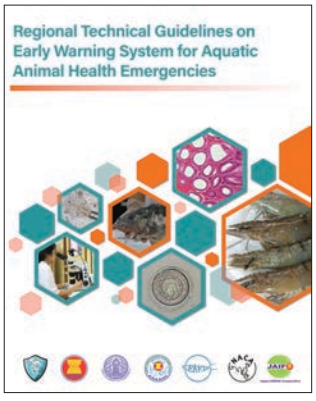
The Draft Regional Technical Guidelines for Early Warning System on Aquatic Animal Health Emergencies was developed to enumerate the actions to be undertaken by the AMSs in case of the occurrence of known, unknown, existing, emerging or re-emerging disease(s). In the draft Guidelines, the key players in aquatic emergency preparedness and response system had been identified, including their roles and responsibilities. In addition, the actions to be undertaken during any disease emergencies had been described. During the ASEAN RTC, the Focal Points for ANAAHC completed the EPRS Audit based on the framework prepared by FAO. The Draft Regional Technical Guidelines, therefore, made use of the analysis of the responses to the questionnaire on Emergency Preparedness and Response Systems Audit for Aquatic Animal Diseases carried out by the ANAAHC Focal Points.

Scope and Purpose

The Regional Technical Guidelines is developed to help national regulators and stakeholders in responding to and managing suspected outbreaks of emergency aquatic animal diseases. Thus, the national emergency preparedness is improved in order to maximize the efficiency of response to serious outbreaks of aquatic animal diseases. The Regional Technical Guidelines is also aimed at providing guidance to Competent Authorities (CAs) in decision-making and in issuing regulations that are meant to minimize the impacts of serious aquatic disease occurrence and/or outbreaks through containment or eradication or mitigation whether at the regional, national, or farm levels. As a harmonized guide for aquatic EPRS among AMSs, the Regional Technical Guidelines also enumerate the actions to be undertaken by the AMS in case of the occurrence of known, unknown, existing, emerging or re-emerging disease(s).

Special Features

During the development of the Regional Technical Guidelines, the set of Guiding Principles used as guide in the implementation of the Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals (FAO/NACA, 2000), were mainly taken into consideration. More particularly, on the movement

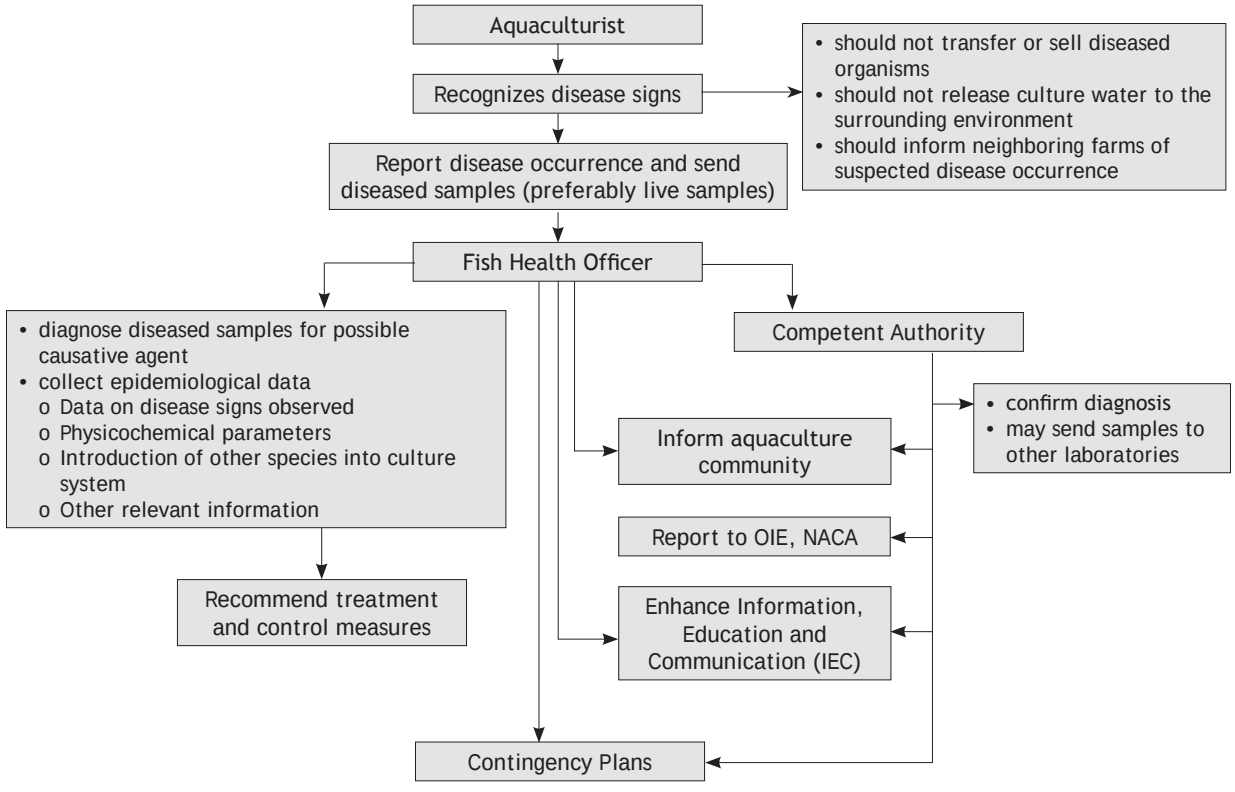


Box 3. Contents of the ASEAN Guidelines on Aquatic Emergency Preparedness and Response Systems for Effective Management of Transboundary Disease Outbreak in Southeast Asia

of living aquatic animals within and across national boundaries which is a necessity for economic, social, and development purposes. However, since such movements could lead to the introduction of new and emerging pathogens, and to disease establishment, posing risks to the importing countries' animal, plant and human health status, the role of sustainable aquatic health management is significant in reducing the risks arising from such introduction or spread of pathogens to a manageable level with the view to protecting animal, plant and human life. This aspect has also been considered in the Regional Technical Guidelines. Nonetheless, health management should also aim to protect the living aquatic resources, the natural aquatic environment, and aquatic biodiversity, as well as support the movement of aquatic animals and protect trade.

Furthermore, considering that there is free movement of aquatic species in transboundary waterways, collaboration among the concerned governments, public institutions, and the private sector, and all stakeholders, is also reflected in the Regional Technical Guidelines to achieve the full purpose of implementing effective aquatic health management in the AMSs. Specifically, the main part which is the Aquatic Emergency and Preparedness Technical Guidelines (SEAFDEC/AQD, in press) comprises three (3) main sections: **Section 1**: General Administration; **Section 2**: Aquatic Emergency and Preparedness System; and **Section 3**: Implementation of the Technical Guidelines as shown in **Box 3.** Moreover, the flow diagram (**Box 4**) which summarizes

Box 4. Flow diagram of the actions to be undertaken during disease emergencies



the different actions to be undertaken during any disease emergencies is also indicated towards the end of the Regional Technical Guidelines.

Way Forward

The ASEAN Regional Technical Guidelines on Early Warning System for Aquatic Animal Health Emergencies, which had been considered by the ASEAN Mechanism and specifically endorsed by the Forty-first Meeting of the ASEAN Ministers on Agriculture and Forestry (AMAF) in August 2019, was submitted for consideration by SEAFDEC Council of Directors during its Fifty-second Meeting which was convened through Teleconference Session on 19 May 2020 to discuss urgent matters, and through *Ad Referendum* Session for the other agenda, organized thereafter. Generally, the SEAFDEC Council made the following recommendations with respect to the implementation of the Regional Technical Guidelines: assessment and follow-up activities should be conducted to monitor the implementation of the Guidelines by the respective the AMSs; and the proposed follow-up actions should include the conduct of workshops where the AMSs could share information and lessons learned on aquatic animal health issues, especially those related to transboundary disease outbreaks in the Southeast Asian region.

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