Background and Objectives of the Meeting on Current Status of Transboundary Fish Diseases in Southeast Asia: Occurrence, Surveillance, Research and Training

Kazuya Nagasawa
Southeast Asian Fisheries Development Center, Aquaculture Department
Tigbauan 5021, Iloilo, Philippines

Background of the Meeting

Status of aquaculture and transboundary disease problems in Southeast Asia

Global aquaculture production has been growing for over two decades, and a steady development of aquaculture has been well recognized in Southeast Asia with its annual yield being about 10% of the world aquaculture production. Four countries (Indonesia, Thailand, Vietnam and Philippines) in the region rank among the top ten aquaculture producers in the world. In 1999, aquaculture production in the ten ASEAN (Association of Southeast Asian Nations) countries reached a total of 2,472.6 metric tons. This indicates that increasing aquaculture production in the region has significantly contributed to global food supply as well as economic development in each country.

Despite these situations, the aquaculture sector has many constraints and problems for its sustainable growth. Disease is one of the major constraints, and infectious diseases caused by viruses, bacteria and parasites have resulted in reduction of aquaculture production in Southeast Asia. In particular, transboundary viral pathogens are known to inflict serious impacts on aquaculture production once they have been transferred to new areas.

White spot syndrome virus (WSSV) is an example of such transboundary pathogen. The disease caused by this virus was first reported in 1993 from Japan, where there were many cases of mass mortality of kuruma shrimp (*Penaeus japonicus*) and its aquaculture production was severely affected (Nakano *et al.*, 1994). WSSV was brought to Japan by importation of live kuruma shrimp larvae from China. In Southeast Asia, WSSV has been reported from Thailand, Malaysia, Vietnam, Indonesia, Philippines, Cambodia and Myanmar (based on NACA and FAO's *Quarterly Aquatic Animal Disease Report (Asia and Pacific Region)*, April-June 2003 and July-September 2003). Although it is not yet clear how this virus has spread in the region, it is most probable that WSSV was transferred from Thailand to Malaysia through the

movement of live broodstock and postlarvae. This virus causes the most devastating losses in the culture of black tiger shrimp (*P. monodon*) and has been threatening the sustainable production of shrimp culture in the region.

Activities of international organizations for transboundary diseases of aquatic animals

Some international organizations, such as the Food and Agriculture Organization of the United Nations (FAO) and the Network of Aquaculture Centers in Asia-Pacific (NACA), have been seriously concerned about aquatic animal pathogens and diseases that are transferred with transboundary movement of live aquatic animals. Since the 1990s, these organizations have held or co-convened with other organizations various workshops and published guidelines and proceedings listed below:

- Health Management in Asian Aquaculture (Subasinghe *et al.*, 1996);
- DNA-based Molecular Diagnostic Techniques: Research Needs for Standardization and Validation of the Detection of Aquatic Animals Pathogens and Diseases (Walker and Subasinghe, 2000);
- Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals and the Beijing Consensus and Implementation Strategy (FAO/NACA, 2001a);
- Manual of Procedures for the Implementation of the Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals (FAO/NACA, 2001b);
- Asia Diagnostic Guide to Aquatic Animal Diseases (Bondad-Reantaso *et al.*, 2001); and
- Transboundary Aquatic Animal Pathogen Transfer and the Development of Harmonized Standards on Aquaculture Health Management (APEC/FAO/NACA/SEMARNAP, 2001).

NACA and FAO have jointly published the *"Quarterly Aquatic Animal Disease Report (Asia and Pacific Region)"* which contains country reports of the occurrence of specified diseases of fishes, molluscans and crustaceans from 21 countries and areas (Australia, Bangladesh, Cambodia, PR China, Hong Kong China, India, Indonesia, Iran, Japan, DPR Korea, Republic of Korea, Lao PDR, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, and Vietnam).

The Office International des Épizooties (OIE) also has issued the following two publications on recommendations and protocols for prevention of international spread of specific diseases of aquatic organisms:

- International Aquatic Animal Health Code. Seventh edition (OIE, 2004); and
- Diagnostic Manual for Aquatic Animal Diseases. Fourth edition (OIE, 2003).

There have been excellent review articles on fish health management in Southeast Asia (Arthur, 1987, 1995, 1996; Arthur and Shariff, 1991) and at global level (Subasinghe *et al*., 2001).

New transboundary fish viral diseases in Southeast Asia

Despite these efforts and publications, new transboundary viral diseases of aquatic animals have been currently reported from some parts of Southeast Asia. The diseases are Taura syndrome (TS) of Pacific white shrimp (*Litopenaeus vannamei*) cultured in Thailand (Limsuwan, 2003a, 2003b) and Indonesia (based on NACA and FAO's *Quarterly Aquatic Animal Disease Report (Asia and Pacific Region*), July-September 2003) and koi herpesvirus (KHV) disease of common carp and koi (*Cyprinus carpio*) cultured in Indonesia (Sunarto *et al*., 2002; Sunarto and Rukyani, 2005).

TS is a serious disease inducing high mortality of Pacific white shrimp that is originally indigenous to the Americas. In Asia, the disease resulted in big reduction of aquaculture production of Pacific white shrimp in Taiwan (Tu *et al*., 1999; Yu and Song, 2000). Although there is no published information on the route of transfer of the disease to Thailand and Indonesia, it may be almost certain that TS virus (TSV) was brought to these countries with international movement of live Pacific white shrimp from other countries.

KHV infection was recently found also in Taiwan (Tu *et al.*, 2004) and Japan (Sano *et al*., 2004, 2005). This disease was introduced to Indonesia with live koi imported from Hong Kong (Sunarto *et al*., 2002). In Indonesia, there have been numerous cases of KHV-induced mass mortality of common carp and koi since March 2002. Losses were estimated to have reached more than US$15 million as of December 2003 (Sunarto and Ryukani, 2005). There is also fragmentary information that KHV is present in Malaysia (see Table 1 in Gilad *et al*., 2003).

Necessity to share experiences and information on fish diseases

When we combat disease threats, we need the most current information on diseases. But due to various reasons such as insufficient reporting system and research facilities to diagnose the diseases, necessary information may not be always available even among fish health management agencies and staff. It is also usual that scientific papers and reports of disease occurrences are published some one or two years after the occurrence of actual cases.

For TSV and KHV, we still have limited information. We need to learn more, especially about experiences in the countries where the diseases occur. Affected countries should share such experiences with other countries in order for them to take necessary counter-measures at national and regional-international levels. In addition, information on fish disease surveillance, quarantine, diagnosis, monitoring, research and training in each ASEAN country is also limited. For future establishment of efficient fish quarantine and surveillance in the region, we have to learn the actual status of these systems.

The Regional Fish Disease Project through the Government of Japan Trust Fund

Since the year 2000, the "Regional Fish Disease Project" has been implemented at the Aquaculture Department of the Southeast Asian Fisheries Development Center (SEAFDEC) in Tigbauan, Iloilo, Philippines, funded by the Government of Japan (GOJ) Trust Fund (Inui, 2002). The first phase of the project entitled "Development of Fish Disease Inspection Methodologies for Artificially-Bred Seeds" started in 2000 and will end in 2004. A renewed, second phase of the project entitled "Development of Fish Disease Surveillance System" has been proposed by GOJ for the period from 2004 to 2008 and is about to start.

One of the major component activities under the Regional Fish Disease Project is to organize and support various international meetings. For example, using the project fund, the SEAFDEC Aquaculture Department organized with OIE the International Seminar/Workshop on Disease Control in Fish and Shrimp Aquaculture in Southeast Asia - Diagnosis and Husbandry Techniques in Iloilo City, Philippines on 4-6 December 2001. The proceedings was published in 2002 as the output of the Seminar/Workshop (Inui and Cruz-Lacierda, 2002). Also, in order to discuss various aspects of an emerging KHV disease, the International Symposium on Koi Herpesvirus Disease that was held in Yokohama, Japan on 13 March 2004 was co-organized by the Fisheries Research Agency of Japan (FRA), SEAFDEC (through the Regional Fish Disease Project), the Ministry of Agriculture, Forestry and Fisheries of Japan (MAFF) and OIE.

Objectives of the Meeting

Under these situations and background, as part of the activities under the Regional Fish Disease Project, the SEAFDEC Aquaculture Department held the two-day meeting on "Current Status of Transboundary Fish Diseases in Southeast Asia: Occurrence, Surveillance, Research and Training" in Manila, Philippines on 23-24 June 2004 to share and collect the most current information on the occurrence of transboundary fish diseases and surveillance, quarantine, diagnosis, monitoring, research and training for aquatic animal diseases in the SEAFDEC member countries. In the meeting, three viruses, namely KHV, WSSV and TSV, were highlighted because of their high virulence and devastating impact on aquaculture in the region. This meeting was expected to be a step to prevent the spread of diseases in the region, which will be achieved efficiently in collaboration with other international organizations.

The objectives of the meeting on "Current Status of Transboundary Fish Diseases in Southeast Asia: Occurrence, Surveillance, Research and Training" are:

- To provide a forum to share the most current experiences and knowledge of transboundary fish diseases and pathogens, especially KHV, WSSV and TSV, with the SEAFDEC member countries;

- To increase our understanding of the current status of fish disease quarantine, surveillance, monitoring, diagnosis, research and training in each SEAFDEC member country;
- To integrate the most current information on various aspects of transboundary fish diseases in the SEAFDEC member countries in order to compile it as the proceedings; and
- To identify and discuss issues to be solved at national and regional-international levels.

Participants

A total of 32 participants and observers attended the meeting (*see* List of Participants). Participation in the meeting was by invitation only. With financial support from the Regional Fish Disease Project, the SEAFDEC Aquaculture Department invited 10 representatives from the SEAFDEC member countries (one person from each country: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, the Socialist Republic of Vietnam) and speakers from Japan, Taiwan, and Canada. OIE and NACA funded their respective representatives who delivered invited lectures. Representing the SEAFDEC Secretariat in Bangkok, the Deputy Secretary-General participated in the meeting. From the SEAFDEC Aquaculture Department, 10 scientists (Chief, Head of the Research Division, Fish Disease Expert, seven from the Fish Health Section) attended. The Philippines dispatched five personnel from the Bureau of Fisheries and Aquatic Resources (BFAR) as observers. The Socialist Republic of Vietnam also sent one observer to the meeting.

References

APEC/FAO/NACA/SEMARNAP. 2001. Transboundary Aquatic Animal Pathogen Transfer and the Development of Harmonized Standards on Aquaculture Health Management. Report of the Joint APEC/FAO/NACA/SEMARNAP Workshop, Puerto Vallarta, Jalisco, Mexico, 24-28 July 2000. NACA, Bangkok. 197 p.

Arthur JR. (ed) 1987. Fish Quarantine and Fish Diseases in South and Southeast Asia: 1986 Update. Report of the Asian Fish Health Network Workshop, Manila, 30 May 1986. Asian Fisheries Society Special Publication 1. 86 p.

Arthur JR. 1995. Efforts to prevent the international spread of diseases of aquatic organisms, with emphasis on the Southeast Asian Region, p. 9-25. *In*: Shariff M, Arthur JR, Subansinghe RP (eds), Diseases in Asian Aquaculture II. Fish Health Section, Asian Fisheries Society, Manila.

Arthur JR. 1996. Fish and shellfish quarantine: the reality for Asia-Pacific, p. 11-28. *In*: Subasinghe RP, Arthur JR, Shariff M (eds), Health

Management in Asian Aquaculture. FAO Fisheries Technical Paper No. 360, FAO, Rome.

Arthur JR, Shariff M. 1991. Towards international fish disease control in Southeast Asia. Infofish International 3/91: 45-48.

Bondad-Reantaso MG, McGladdery SE, East I, Subasinghe RP (eds). 2001. Asia Diagnostic Guide to Aquatic Animal Diseases. FAO Fisheries Technical Paper No. 402, Supplement 2. FAO, Rome. 240 p.

FAO/NACA. 2001a. 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. FAO, Rome. 53 p.

FAO/NACA. 2001b. Manual of Procedures for the Implementation of the Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals. FAO Fisheries Technical Paper No. 402/1, Supplement 1. FAO, Rome. 106 p.

Gilad O, Yun S, Adkison MA, Way K, Willits NH, Bercovier H, Hedrick R. 2003. Molecular comparison of isolates of an emerging fish pathogen, koi herpesvirus, and the effect of water temperature on mortality of infected koi. J. Gen. Viol. 84:2661-2668.

Inui Y. 2002. Fish Disease Control Project of SEAFDEC Aquaculture Department, p. 181-185. *In*: Inui Y, Cruz-Lacierda ER (eds), Disease Control in Fish and Shrimp Aquaculture in Southeast Asia - Diagnosis and Husbandry Techniques. SEAFDEC Aquaculture Department, Iloilo, Philippines.

Inui Y, Cruz-Lacierda ER (eds). 2002. Disease Control in Fish and Shrimp Aquaculture in Southeast Asia - Diagnosis and Husbandry Techniques. SEAFDEC Aquaculture Department, Iloilo, Philippines. 215 p.

Limsuwan C. 2003a. Diseases of Pacific white shrimp (*Litopenaeus vannamei*) in Thailand. The AAHRI Newsletter 12(1):1-4.

Limsuwan C. 2003b. The Taura syndrome virus situation of Pacific white shrimp (*Litopenaeus vannamei*) culture in Thailand. The AAHRI Newsletter 12(2):1-2.

Nakano H, Koube H, Umezawa S, Momoyama K, Hiraoka M, Inoue K, Osako N. 1994. Mass mortalities of cultured kuruma shrimp, *Penaeus japonicus*, in Japan in 1993: epizootiological survey and infection trials. Fish Pathol. 29:135-139 (In Japanese with English abstract).

OIE. 2003. Diagnostic Manual for Aquatic Animal Diseases. Fourth edition. OIE, Paris.

OIE. 2004. International Aquatic Animal Health Code. Seventh edition. OIE, Paris.

Sano M, Ito T, Kurita J, Yuasa K, Miwa S, Iida T, 2004. Experience on common carp mass mortality in Japan, p. 13-19. *In*: Lavilla-Pitogo CR, Nagasawa K (eds), Transboundary Fish Diseases in Southeast Asia: Occurence, Surveillance, Research and Training. SEAFDEC Aquaculture Department, Iloilo, Philippines.

Sano M, Ito T, Kurita J, Miwa S, Iida T. 2005. Diagnosis of koi herpesvirus (KHV) disease in Japan. Bull. Fish. Res. Agency, Supplement 2 (in press).

Subasinghe RP, Arthur JR, Shariff M (eds). 1996. Health Management in Asian Aquaculture. FAO Fisheries Technical Paper No. 360. FAO, Rome. 142 p.

Subasinghe RP, Bondad-Reantaso MG, McGladdery SE. 2001. Aquaculture development, health and wealth, p. 167-191. *In*: Subasinghe RP, Bueno P, Phillips MJ, Hough C, McGladdery SE, Arthur JR (eds), Aquaculture in the Millennium. Technical Proceedings of the Conference on Aquaculture in the Third Millennium, Bangkok, 20-25 February 2000.

Sunarto A, Taukhid, Rukyani A, Koesharyani I, Supriyadi H, Huminto H, Agungpriyono DR, Pasaribu FH, Widodo, Herdikiawan D, Rukmono D. 2002. Field investigations on a serious disease outbreak among koi and common carp (*Cyprinus carpio*) in Indonesia. Paper presented in the 5th Symposium on Diseases in Asian Aquaculture, 24-28 November 2002, Gold Coast, Australia.

Sunarto A, Ryukani A. 2005. Indonesian experience on the outbreak of koi herpesvirus in koi and carp (*Cyprinus carpio*). Bull. Fish. Res. Agency, Supplement 2 (in press).

Tu C, Huang H-T, Chaung S-H, Hsu J-P, Kuo S-T, Li N-J, Hsu T-L, Li M-C, Lin S-Y. 1999. Taura syndrome in Pacific white shrimp *Penaeus vannamei* cultured in Taiwan. Dis. Aquat. Org. 38:159-161.

Tu C, Weng M-C, Shiau J-R, Lin S-Y. 2004. Detection of koi herpesvirus in koi *Cyprinus carpio* in Taiwan. Fish Pathol. 39: 109-110.

Walker P, Subasinghe R. (eds). 2000. DNA-based Molecular Diagnostic Techniques: Research Needs for Standardization and Validation of the Detection of Aquatic Animals Pathogens and Diseases. FAO Fisheries Technical Paper No. 395. FAO, Rome. 93 p.

Yu C I, Song YL. 2000. Outbreaks of Taura syndrome virus infection of cultured shrimp in Taiwan. Fish Pathol. 35:21-24.