



# NACA: Health and Biosecurity Programme

**Regional Workshop for WOAH Focal Points for Aquatic Animals**

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Health and Biosecurity Programme

Network of Aquaculture Centres in Asia-Pacific, Bangkok, Thailand

**7 – 9 July 2026 | Tokyo, Japan**



World Organisation  
for Animal Health



Australian Government  
Department of Agriculture,  
Fisheries and Forestry



国立大学法人

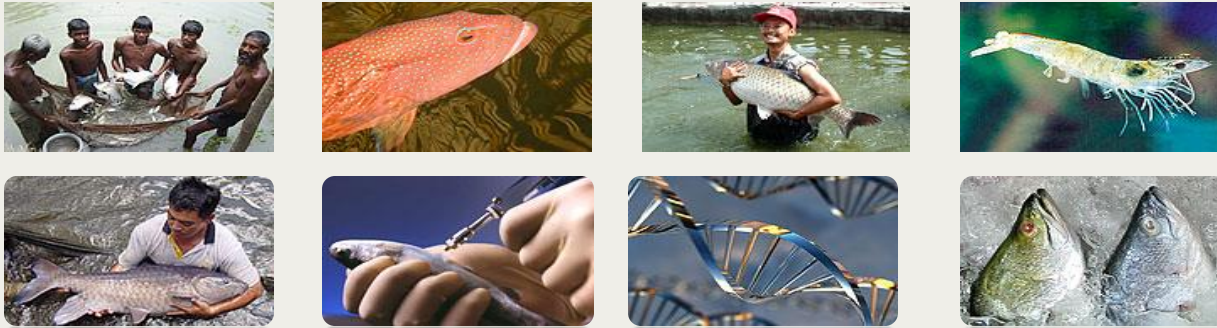
東京海洋大学

Tokyo University of Marine Science and Technology



# Network of Aquaculture Centres in Asia-Pacific

*More than 30 years of Successful Networking*



- **Intergovernmental organization**

- Established in 1990
- 20 Member Governments across the Asia-Pacific region.

Australia, Bangladesh, Cambodia, China, Hong Kong SAR, India, Indonesia, IR Iran, DPR Korea, Lao PDR, Malaysia, Maldives, Myanmar, Nepal, Pakistan, Philippines, Kingdom of Saudi Arabia, Sri Lanka, Thailand, and Vietnam



- Associate Members:  
Secretariat of the Pacific Community (SPC); Network of Aquaculture Centres in Central-Eastern Europe (NACEE)



# Network of Aquaculture Centres in Asia-Pacific

*More than 30 years of Successful Networking*



## Mission:

- Promote rural development through sustainable aquaculture and aquatic resource management.
- Seek to improve the livelihoods of rural people, reduce poverty and increase food security.



# Network of Aquaculture Centres in Asia-Pacific

*More than 30 years of Successful Networking*



## Five Regional Lead Centres

- Freshwater Fisheries Research Centre, P.R. China
- Central Institute for Freshwater Aquaculture, India
- Aquaculture Department, SEAFDEC, Philippines
- Inland Fisheries Research & Development Bureau, Thailand
- Coldwater Fisheries Research Center, Iran

## More than 30 participating centres throughout the region

- Collaborating in research
- Sharing information and resources (including laboratory diagnostics)
- Training and exchanging expertise



# Network of Aquaculture Centres in Asia-Pacific

*More than 30 years of Successful Networking*



## • Thematic Programmes

- Productivity & Sustainability
- **Health & Biosecurity**
- Genetics & Biodiversity
- Food Safety & Security
- Emerging Regional & Global Issues

## • Cross-cutting Programmes

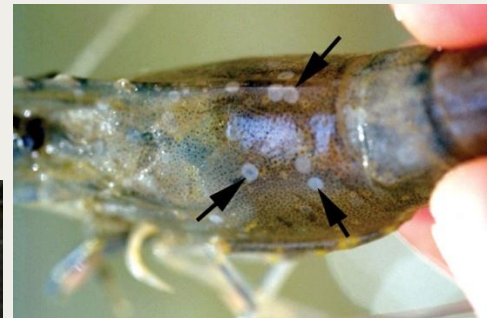
- Education & Training
- Information & Networking
- Strategy & Governance
- One Community



# Asia Regional Health and Biosecurity Programme

## Purpose

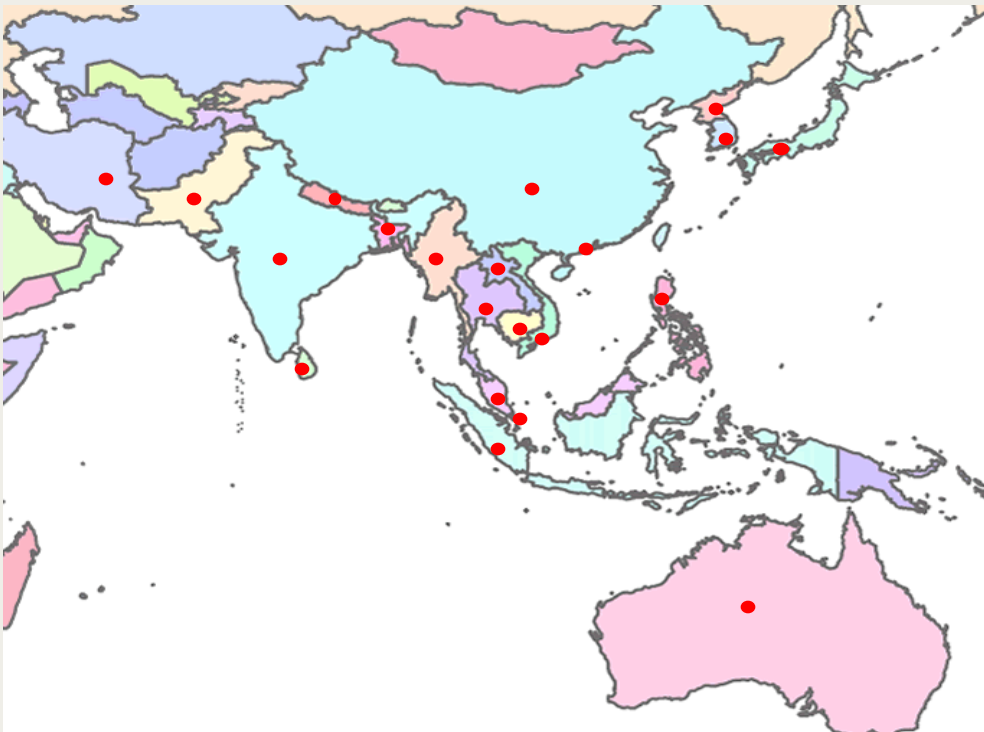
Improve regional cooperation/networking to reduce risks of aquatic animal diseases impacting the livelihoods of aquaculture farmers, national economies, trade, environment, and human health.





# Asia Regional Health and Biosecurity Programme

Participated by 23 member governments from the Asia-Pacific region

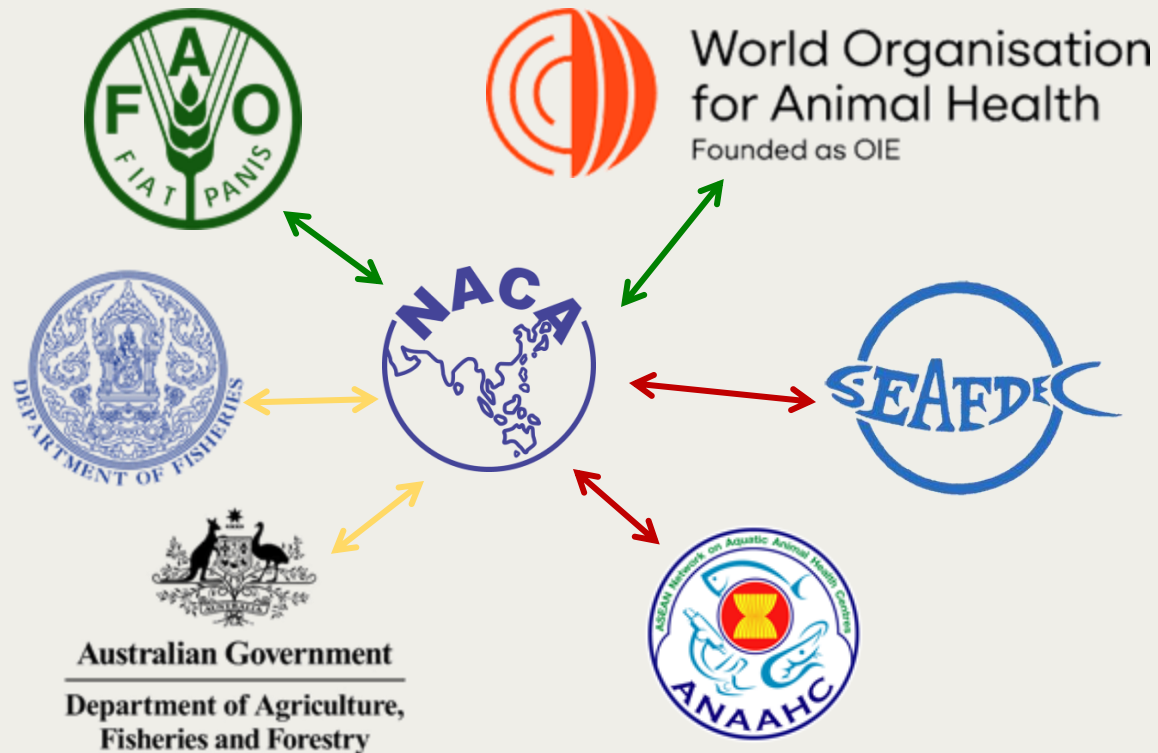


- Australia
- Bangladesh
- Cambodia
- China
- Hong Kong SAR
- India
- Indonesia
- IR Iran
- Japan
- Lao PDR
- DPR Korea
- Rep. of Korea
- Malaysia
- Maldives
- Myanmar
- Nepal
- Pakistan
- Philippines
- Thailand
- Saudi Arabia
- Singapore
- Sri Lanka
- Vietnam



# Asia Regional Health and Biosecurity Programme

**Works closely with international, regional and national organizations:**



## Key activities:

- Promoting regional cooperation and networking in aquatic animal health and welfare;
- Developing and implementing national strategies on aquatic animal health;
- Supporting regional disease surveillance, reporting, and response to disease emergencies;
- Strengthening aquatic animal health capacity and biosecurity in the region;
- Widespread promotion of better aquatic animal health management practices at farm level.



# Regional Aquatic Animal Disease Reporting in the Asia-Pacific

*formerly Quarterly Aquatic Animal Disease (QAAD) Reporting*

First published in 3<sup>rd</sup> quarter of 1998;

Established in response to the need of developing a cohesive strategy for aquatic animal health management in the region;

Collecting and collating of disease data;

Provide insights on the presence or absence of important aquatic animal diseases in the region.





# Regional Aquatic Animal Disease Reporting in the Asia-Pacific

*formerly Quarterly Aquatic Animal Disease (QAAD) Reporting*

## ***Through its almost 30 years....***

- Useful mechanism for recognizing emerging and important aquatic animal diseases in the region;
- Provides up-to-date information on important aquatic animal diseases;
- Serves as a guide to participating countries in revising their national list of reportable diseases
- Valuable source of information to support risk analysis;
- Paved way in the establishment of excellent regional networking in support of disease surveillance and reporting;

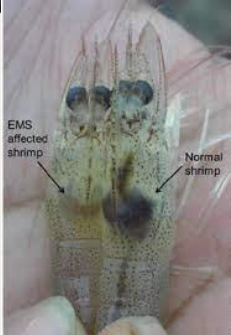


# Regional Aquatic Animal Disease Reporting in the Asia-Pacific

*formerly Quarterly Aquatic Animal Disease (QAAD) Reporting*

## Through its almost 30 years....

- Serves as early warning system for emerging diseases/pathogens in the Asia-Pacific Region



- Diseases initially listed in QAAD that have been listed in WOAHA

- Koi herpesvirus disease (KHV) (listed in QAAD in 2005 ⇒ listed in WOAHA in 2007),
- Infection with abalone herpesvirus (2005 ⇒ 2007),
- White tail disease (MrNV and XSV) (2005 ⇒ 2008),
- Necrotising hepatopancreatitis (NHP) (2005 ⇒ 2010),
- Acute hepatopancreatic necrosis disease (AHPND) (2013 ⇒ 2015)
- Infection with decapod iridescent virus 1 (DIV1) (2019 ⇒ 2021)
- Infection with tilapia lake virus (TiLV) (2018 ⇒ 2022)



## Asia Regional Advisory Group on Aquatic Animal Health (AG)

- Composed of invited aquatic animal disease experts, and representatives from World Organisation for Animal Health (WOAH), Food and Agriculture Organization of the United Nations (FAO), collaborating regional organizations, and the private sector.
- Meet annually to discuss important and current issues on aquatic animal health, revise disease list, and recommend necessary actions for better AAH management in the region.





# Disease Advisories: Emerging aquatic animal diseases in the region



**DISEASE ADVISORY**

**Early Mortality Syndrome (EMS)/Acute Hepatopancreatic Necrosis Syndrome (AHPNS):  
An emerging threat in the Asian shrimp industry**

*Eduardo M. Leão and C.V. Mohan  
NACA, Bangkok, Thailand*

The Asia-Pacific region, being the top producer of aquaculture products in the world, is continuously beset by emerging aquatic animal disease problems causing high mortalities and economic losses among small farmers as well as commercial producers. Over the last couple of decades, several diseases (e.g. luminous vibriosis, white spot syndrome, yellowhead disease, Taura syndrome) have caused significant devastation in the shrimp aquaculture of the region, causing the collapse of some industries (e.g. *Penaeus monodon*). Recently, a new/emerging disease known as early mortality syndrome (EMS) in shrimp (also termed acute hepatopancreatic necrosis syndrome or AHPNS) has been reported to cause significant losses among shrimp farmers in China (2009), Vietnam (2010) and Malaysia (2011). It was also reported to affect shrimp in the eastern Gulf of Thailand (Fiege, 2012).

The disease affects both *P. monodon* and *P. vannamei* and is characterized by mass mortalities (reaching up to 100% in some cases) during the first 20-30 days of culture (post-stocking in grow-out ponds). Clinical signs observed include slow growth, conch screw swimming, loose shells, as well as pale coloration. Affected shrimp also consistently show an abnormal hepatopancreas (shrunken, small, swollen or discoloured). The primary pathogen (considering the disease is infectious) has not been identified, while the presence of some microbes including *Vibrio*, microsporidians and nematode has been observed in some samples. Lightner et al. (2012) described the pathological and etiological details of this disease. Histological examination showed that the effects of EMS in both *P. monodon* and *P. vannamei* appear to be limited to the hepatopancreas (HP) and show the following pathology:

- 1) Lack of mitotic activity in generative E cells of the HP;
- 2) Dysfunction of central hepatopancreatic B, F and R cells;
- 3) Prominent karyomegaly and massive sloughing of central HP tubule epithelial cells;
- 4) Terminal stages including massive intertubular hemocytic aggregation followed by secondary bacterial infections.

Similar histopathological results were obtained by Prachumwat et al. (2012) on Thai samples of *P. vannamei* collected from Chantaburi and Rayong provinces in late 2011 and early 2012 (Figure 1). The progressive dysfunction of the HP results from lesions that reflect degeneration and dysfunction of the tubule epithelial cells that progress from proximal to distal ends of HP tubules. This degenerative pathology of HP is highly suggestive of a toxic etiology, but anecdotal information suggests that disease spread patterns may be consistent with an infectious agent.

In China, the occurrence of EMS in 2009 was initially ignored by most farmers. But in 2011, outbreaks became more serious especially in farms with culture history of more than 5 years and those closer to the sea using very saline water of 20 (Panakorn, 2012). Shrimp farming in Hainan, Guangdong, Fujian and Guangxi suffered during the first half of 2011 with almost 80% losses

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## Early Mortality Syndrome/ Acute Hepatopancreatic Necrosis Syndrome (2012)



**DISEASE ADVISORY**

**Tilapia Lake Virus (TiLV) – an Emerging Threat to Farmed Tilapia  
in the Asia-Pacific Region**

*Network of Aquaculture Centres in Asia-Pacific, Bangkok, Thailand*

**TiLV (an Orthomyxo-like RNA virus) is an emerging disease of cultured tilapia in the Asia-Pacific region;**

**Originally observed and reported in Israel, Ecuador, Colombia and Egypt, TiLV is now confirmed in cultured tilapia in Thailand causing mass mortalities;**

**At risk is here is the US\$7.5 billion global industry per annum, especially among the top tilapia-producing countries in the region including China, the Philippines, Thailand, Indonesia, Lao PDR and Bangladesh.**

Tilapias are highly important (and inexpensive) source of fish protein in the world and are one of the most popular species for aquaculture in several regions including the Asia-Pacific. The top 10 producing countries include China, Egypt, Philippines, Thailand, Indonesia, Lao PDR, Costa Rica, Ecuador, Colombia and Honduras. Since 2009, tilapia aquaculture has been threatened by mass die-offs of farmed fish in Israel and Ecuador (Bacharach et al., 2016). The aetiological agent named as Tilapia lake virus (TiLV) (Eyngor et al. 2014; 2016; Bacharach et al., 2016). This has been reported as a newly emerging virus that causes syncytial hepatitis of tilapia (SHT). As of 2016, countries affected by this emerging disease of tilapia include Israel, Ecuador, Colombia and Egypt (Eyngor et al., 2014; Ferguson et al., 2014; Bacharach et al., 2016; Tsoack et al., 2016; Del-Pozo et al., 2017; Fathi et al., 2017).

Recently, disease outbreaks among cultured tilapias have occurred in Thailand, wherein high cumulative mortalities (20-90%) were observed and recorded (Dong et al., 2017a). Thirty-two outbreaks were investigated during 2015-2016 involving large number of deaths of unknown cause among farmed tilapia (*Oreochromis niloticus*) and red hybrid tilapia (*Oreochromis spp.*) (Suratchatpong et al., 2017). Histopathology (of the liver showing similar signs to SHT), transmission electron microscopy, in-situ hybridization and high nucleotide sequence identity to TiLV from Israel (Dong et al. 2017b) confirmed that these outbreaks were caused by TiLV.

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## TiLV (2017)



**DISEASE ADVISORY**

**Decapod Iridescent Virus 1 (DIV1):  
an emerging threat to the shrimp industry**

*Network of Aquaculture Centres in Asia-Pacific, Bangkok, Thailand*

The shrimp industry has been beset by many devastating diseases in the last three decades, which has caused severe production and economic losses and even caused the collapse of the industry in some countries. These include viral (WSSV, TSV, YHV), bacterial (luminous vibriosis, AHPND), and parasitic (EHP) diseases. Recently, another emerging shrimp viral disease is threatening the shrimp industry in China, one of the top shrimp producers in the world. The virus, formally named as Decapod Iridescent Virus 1 or DIV1 by ICTV, was first detected as early as 2014 from *Cherax quadricarinatus* samples in Fujian Province, and temporarily named the new virus as *Cherax quadricarinatus* iridovirus (CQIV) (Xu et al., 2016). In December 2014, Qiu et al. (2017) identified a new iridescent virus in farmed white leg shrimp *Penaeus vannamei* from Zhejiang Province and named it Shrimp hemocyte iridescent virus (SHIV) based on the infected tissues and susceptible species. The disease has occurred in farmed *P. vannamei* and giant freshwater prawn *Macrobrachium rosenbergii* in some provinces (Qiu et al., 2018c, 2019) and again in February this year, affecting about a quarter of the area under shrimp production in the south of Guangdong Province (He, 2020). The virus infects all stages of shrimps (PLs, juveniles, adults) and has been observed to affect the Pacific white shrimp, crayfish, and giant freshwater prawn.

Currently known susceptible species of DIV1 include *P. vannamei*, *M. rosenbergii*, *Exopalaemon carinicauda*, *M. nipponense*, *Procambarus clarkii*, and *C. quadricarinatus* (Xu et al., 2016; Qiu et al., 2017; Qiu et al., 2019a; Chen et al., 2019). Two species of crab, *Eriocheir sinensis* and *Pachygrapsus crassipes* could be infected with DIV1 in experimental challenge through intramuscular injection (Pan et al., 2017), but cannot yet be identified as susceptible species. DIV1 could also be detected in *P. chinensis*, *P. japonicus*, *M. superbum*, *Nereis succinea* or some cladocera by PCR method (Qiu et al., 2017; Qiu et al., 2018a; Qiu et al., 2019a; Qiu et al., 2019b). Infection with DIV1 has been reported in some provinces of P.R. China since 2014. China has extended the National Targeted Surveillance Program to cover DIV1 since 2017 and revealed that DIV1 has been detected in 9 of 15 provincial administrative regions (Qiu et al., 2018a; Qiu et al., 2019b; BoF et al., 2019). Positive cases have been reported in the wild populations of *P. monodon* caught in Indian Ocean (Srisala et al., 2020). The geographic distribution of DIV1 may be wider than currently known, since mortality may not have been investigated in other countries or regions (NACA, 2019).

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## DIV 1 (2020)



# Disease Cards: Important aquatic animal diseases in the region

## Diseases of Crustaceans – Translucent Post-larvae Disease (TPD)

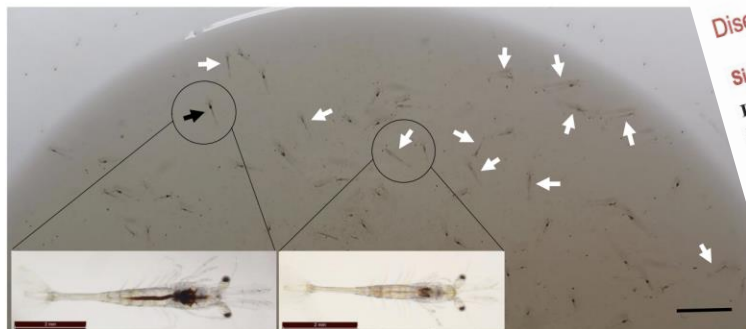


Figure 1. Clinical signs of *Penaeus vannamei* affected by translucent post-larvae disease (TPD) / translucent post-larvae vibriosis (TPV) / glass post-larvae disease (GPD). All the samples were at PL7 stage, and body length was about 0.6~0.9 cm. The diseased individuals (indicated by the white arrows) demonstrated syndromes of abnormal hepatopancreas and digestive tract necrosis. The hepatopancreas and digestive tract of the diseased post-larvae were pale and colorless. The bar scales are 10 mm and 2 mm in the figures and the magnified figures, respectively. Source: QL Zhang

### General Signs of Disease

**Important:** affected animals may show one or more of the signs below, but the infection may be present in the absence of any signs, especially during the early phase of infection.

- The diseased shrimps show pale and colorless of hepatopancreas and digestive tract (Figure 1), as well as pale and shrunken body. The affected post-larvae sink to the bottom of rearing tanks because of the decreased swimming capability caused by the disease.

## Diseases of Crustaceans – Viral Covert Mortality Disease (VCMD)

### Signs of Disease

**Important:** affected animals may show one or more of the signs below, but the infection may be present in the absence of any signs, especially during the early phase of infection.

### Disease signs at pond level (Level I diagnosis)

- Most of moribund shrimp stay at the bottom and die; moribund and dead shrimp can be observed daily;
- High mortality follows a rapid change in water temperature, especially at above 28°C.

### Disease signs at animal level (Level I diagnosis)

The following can be observed in infected shrimps:

- Hepatopancreatic atrophy and necrosis (Figures 1 and 2);
- Empty stomach and gut;
- Soft shell;
- Slow growth;
- In many cases, abdominal muscle whitening and necrosis (Figures 1 and 2).

### Disease Agent



Figure 1. VCMD in cultured white shrimp (*Penaeus vannamei*). White arrows indicate atrophy and a faded colour to the hepatopancreas. Black arrows show whitening of abdominal muscle segments. Source: QL Zhang



Figure 2. VCMD in experimentally infected white shrimp (*Penaeus vannamei*). White arrow indicates hepatopancreas compared to the hepatopancreas (white arrow head). Source: QL Zhang

## Diseases of Crustaceans – Infection with Decapod Iridescent Virus 1 (DIV1)

### Signs of Disease

Infection with DIV1 is an emerging disease in farmed *Cherax quadricarinatus* and *Penaeus vannamei* suffering a high mortality in Zhejiang Province of China in 2014 (Xu et al., 2016; Qiu et al., 2017a). The following disease signs (Qiu et al., 2017a; Qiu et al., 2019) can be used for presumptive diagnosis of the disease.

### Disease signs at pond level (Level I diagnosis)

- Diseased *P. vannamei* exhibit hepatopancreatic atrophy with fading color.
- Upon dissection, the hepatopancreas of DIV1 infected shrimp appears pale.
- Shrimp shells are commonly soft.
- Empty stomach and guts.
- Some shrimp have slightly reddish bodies.
- Onset of clinical signs and mortality starting in few days after infection.
- Moribund shrimp sinks to bottom.
- A unique gross sign of infection with DIV1 can be observed with diseased *Macrobrachium rosenbergii*, which exhibit a typical white triangular area under the carapace at the base of rostrum.

### Disease signs at animal level (Levels II and III)



Figure 1. *P. vannamei* from laboratory: left group (healthy); right group (infected with DIV1). Source: Qiu et al., 2017



Figure 2. Faded hepatopancreas of *P. vannamei* infected with DIV1. Source: Qiu et al., 2017



## Response to Disease Emergencies: Regional consultations

- Asia Pacific Emergency Regional Consultation on Shrimp EMS/AHPNS (2012)
- Emergency Regional Consultation on Tilapia Lake Virus (TiLV) (2017)
- Online Consultation on Strategies for Hepatopancreatic Microsporidiosis caused by *Enterocytozoon hepatopenaei* (EHP) (2021)



### Invited Experts:



Dr. Celia  
Lavilla-Pitogo



Prof. Tim  
Flegel



Dr. Andy  
Shinn



Dr. Celia  
Lavilla-Pitogo



Dr. Diva Cano



## Capacity Building

### Proficiency Testing Program for Aquatic Animal Disease Diagnostic Laboratories in Asia-Pacific



3rd Regional Workshop:  
**Asia-Pacific Laboratory Proficiency Program for  
Aquatic Animal Diseases**

28-29 August 2025  
Bangkok, Thailand



# Other Activities

## AMU/AMR



### In collaboration with FAO

- AMR Risk to Aquaculture and Monitoring of AMR in Bacterial Pathogens in Aquaculture;
- Documentation and Characterization of Antimicrobial Use in the Aquaculture Sector;
- Development of Regional Guidelines on AMR and AMU in Aquaculture

### In collaboration with WOAHA

- Consultation Meeting on Antimicrobial Resistance and Antimicrobial Use in Aquaculture
- *Ad hoc* Group on Technical References for AMR in Aquaculture
- Electronic Expert Group on Antimicrobial Use in Aquaculture at Field Level

### Under IDRC Initiative (InnoVet-AMR 2.0)

- Policy and Private-sector Scoping for InnoVet-AMR 2.0 (focusing on alternatives to antimicrobials)



# Other Activities

## Aquaculture Biosecurity



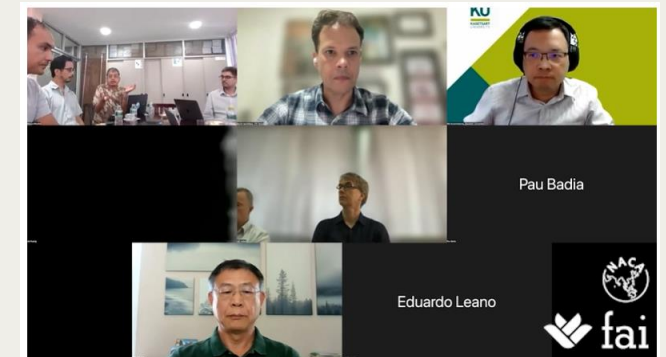
### In collaboration with FAO

- Technical Working Group on PMP/AB
- Development of NACA Regional AAH Strategy for Aquatic Organism Health

### In collaboration with WOAHA

- Collection and Evaluation of Existing Guidelines and Awareness Materials on Aquaculture Biosecurity for Small-scale Farms in the Asia-Pacific Region

## Animal Welfare



Video available at:

<https://vimeo.com/channels/naca2023/page:1>



# Network of Aquaculture Centres in Asia-Pacific

*More than 30 years of Successful Networking*



## Our Strengths:

- Network of individuals, institutions and governments;
- Access to vast resources in the network;
- Network has extensive expertise in aquaculture;
  - Governance & policy, management, production technology, rural development, certification, global and regional standards, and BMPs
- Good Track Record in promotion of international Codes of Practice for Responsible Fisheries and Aquaculture



# Thank you

For more information, visit us at [www.enaca.org](http://www.enaca.org)



World Organisation  
for Animal Health



**Australian Government**  
Department of Agriculture,  
Fisheries and Forestry



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Tokyo University of Marine Science and Technology

