NETWORK OF AQUACULTURE CENTRES IN ASIA-PACIFIC

Twenty Third Meeting of the Asia Regional Advisory Group on Aquatic Animal Health

REPORT OF THE MEETING

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

14-15 November 2024

Prepared by the NACA Secretariat

Preparation of this document:

This report was prepared by the 23rd Asia Regional Advisory Group on Aquatic Animal Health (AG) who met virtually in Bangkok, Thailand on 14-15 November 2024.

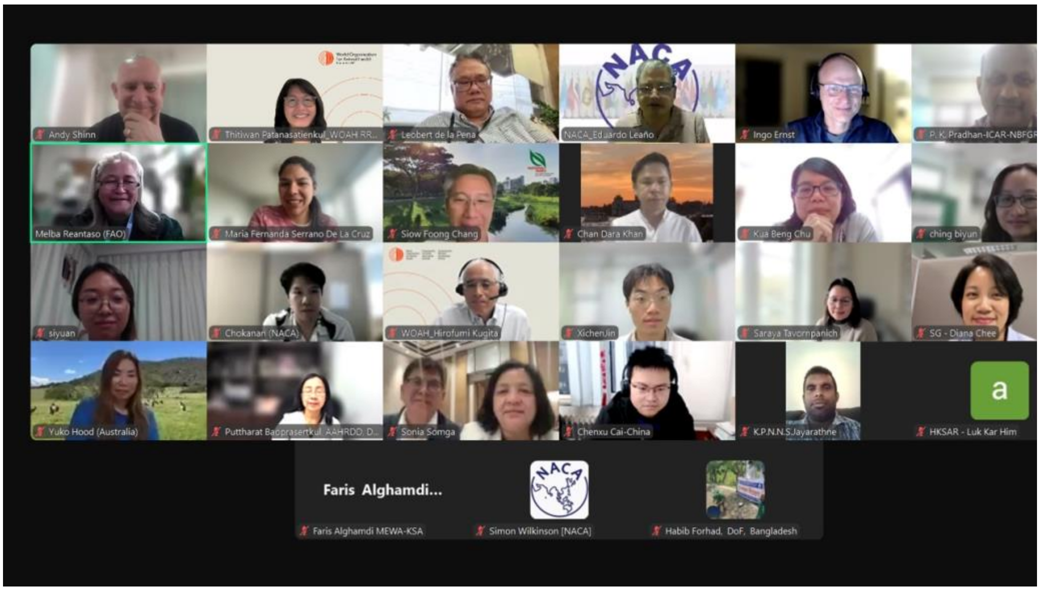
The AG was established by the Governing Council of the Network of Aquaculture Centres in Asia-Pacific (NACA) in 2001 to provide advice to NACA members in the Asia-Pacific region on aquatic animal health management, through the following activities: (a) evaluate disease trends and emerging threats in the region; (b) identify developments with global aquatic animal disease issues and standards of importance to the region; (c) review and evaluate the Quarterly Aquatic Animal Disease reporting programme and assess the list of diseases of regional concern; (d) provide guidance and leadership on regional strategies to improving management of aquatic animal health including those under the framework of the Asia Regional Technical Guidelines; (e) monitor and evaluate progress on Technical Guidelines implementation; (f) facilitate coordination and communication of progress on regional aquatic animal health programmes; (g) advise in identification and designation of regional aquatic animal health resources, as Regional Resource Experts (RRE), Regional Resource Centres (RRC) and Regional Reference Laboratories (RRL); and (h) identify issues of relevance to the region that require depth review and propose appropriate actions needed. Members of the Advisory Group include invited aquatic animal disease experts in the region, representatives of the World Organisation for Animal Health (WOAH) and the Food and Agricultural Organization of the United Nations (FAO), collaborating regional organisations such as SEAFDEC Aquaculture Department (SEAFDEC AQD) and WOAH-Regional Representation in Asia and the Pacific (WOAH-RRAP), and the private sector.

Reference: NACA 2024. Twenty Third Meeting of the Asia Regional Advisory Group on Aquatic Animal Health: Report of the Meeting. Published by the Network of Aquaculture Centres in Asia-Pacific, Bangkok, Thailand.

ABBREVIATIONS AND ACRONYMS

AAD	Aquatic animal disease
AAHSC	Aquatic Animal Health Standards Commission of the WOAH
AG	Asia Regional Advisory Group on Aquatic Animal Health (NACA)
AGM	Advisory Group Meeting
AHPND	Acute hepatopancreatic necrosis disease
AMR	Antimicrobial resistance
AMU	Antimicrobial use/usage
ANAAHC	ASEAN Network of Aquatic Animal Health Centres
AP-AquaNet	Asia Pacific Network for Aquatic Animal Health
ASEAN	Association of Southeast Asian Nations
AST	Antimicrobial sensitivity testing
CEFAS	Centre for Environment, Fisheries and Aquaculture Science (UK)
DIV1	Infection with Decapod iridescent virus 1
DOF	Department of Fisheries-Thailand
DLD	Department of Livestock Development (Thailand)
ECOFF/ECV	Epidemiological cut-off value
EHP	Hepatopancreatic microporidiosis caused by *Enterocytozoon hepatopenaei*
EUS	Epizootic ulcerative syndrome (Infection with *Aphanomyces invadans*)
FAO (HQ)	Food and Agricultural Organization of the United Nations (Headquarters)
GAP	Good aquaculture practices
GESI	Gender equality and social inclusion
ICA	Colombian Agricultural Institute
ICAR	Indian Center for Agricultural Research
IHN	Infection with Infectious haematopoietic necrosis virus
IMNV	Infectious myonecrosis virus
ISKNV	Infectious spleen and kidney necrosis virus
MPEDA	Marine Products Export Development Authority (India)
MSU	Mississippi State University
NACA	Network of Aquaculture Centres in Asia-Pacific
NAPs	National Aquaculture Plans
NVI	Norwegian Veterinary Institute
PMP/AB	Progressive management pathway for improving aquaculture biosecurity
PPP	Public Private Partnership
PRFRI	Pearl River Fisheries research Institute (PR China)
RAOHS	NACA Regional Aquatic Organism Health Strategy
RSIV	Red seabream iridovirus
SBC	Social behavioural change
SEAFDEC-AQD	Southeast Asian Fisheries Development Center, Aquaculture Department
SOP	Standard operating procedures
TCP	Technical Cooperation Programme
TG	Technical Guidelines (Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals)
TiLV	Tilapia lake virus
TPD	Translucent Post-larva Disease
TRBIV	Turbot red body iridovirus
WOAH	World Organisation for Animal Health (Founded as OIE)
WOAH RRAP	WOAH Regional Representation for Asia and the Pacific
WSSV	White spot syndrome virus
YSFRI	Yellow Sea Fisheries Research Institute (PR China)

The 23rd Asia Regional Advisory Group on Aquatic Animal Health



Participants of the virtual AGM 23 composed of AG members and co-opted members from FAO (Rome, Italy), WOAH-RRAP (Tokyo, Japan), WOAH-AAHSC (Paris, France), SEAFDEC AQD (Iloilo, Philippines), AAHRDD (Bangkok, Thailand), Australia, Singapore, Thailand, the private sector (INVE Aquaculture), NVI (Ås, Norway), and NACA Secretariat. Observers from NACA member countries and territories were also invited, and governments represented include: Australia, Bangladesh, Cambodia, P.R. China, Hong Kong SAR, India, Malaysia, the Philippines, Kingdom of Saudi Arabia, and Sri Lanka.

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OPENING SESSION

The 23rd Meeting of the Asia Regional Advisory Group on Aquatic Animal Health (AGM 23) was convened virtually in Bangkok, Thailand on 14-15 November 2024. Originally attended by only AG members, co-opted members and few observers, the meeting was again participated by NACA member country representatives, as in the last four years. NACA member countries and territories represented include Australia, Bangladesh, Cambodia, Hong Kong SAR, India, Indonesia, Malaysia, Myanmar, Nepal, Philippines, Kingdom of Saudi Arabia and Sri Lanka.

The meeting was opened by **Dr. Eduardo Leaño**, Director General and Senior Programme Officer of NACA, and Technical Secretary of the AG.

After a brief self-introduction by all the participants, Chairperson and Vice-chairperson were elected: **Dr. Leobert dela Peña** (SEAFDEC AQD; Chairperson) and **Dr. Andy Shinn** (INVE Aquaculture; Vice-Chairperson). Dr. dela Peña took over in the facilitation of the AGM 23 and moved for the adoption of the Provisional Agenda (**Annex A**). The complete list of participants is attached as **Annex B**.

SESSION 1: PROGRESS REPORT FROM NACA'S ASIA REGIONAL AQUATIC ANIMAL HEALTH PROGRAMME

Dr. Eduardo Leaño (Director General and Senior Programme Officer of NACA) presented the progress report of NACA's Asia Regional Aquatic Animal Health Programme since the previous AGM 22 which was held virtually on 6-7 November 2023. Key points discussed during the AGM 22 include:

- NACA's role in the region. One of the benefits of NACA and the works that it does on aquatic animal health is bringing different groups together and create a link between different organizations. NACA currently supports the recently established Regional Aquatic Animal Health Network in the African Region. Moreover, NACA in collaboration with FAO and key member countries has developed and published the Regional Aquatic Organism Health Strategy (RAOHS). The Strategy listed down 40 activities under 17 programmes which can be implemented by both NACA members and the Secretariat. NACA will also try to mobilize resources to assist some of the member countries in the implementation of the different activities
- WOAH Disease List. Proposal to list ISKNV, which also includes both RSIV and TRBIV, will resolve some of the issues involved in the reporting of these diseases under the current Aquatic Animal Disease Reporting System for Asia-Pacific. Additionally, a new chapter for ornamental aquatic animals is being developed.
- Aquaculture Biosecurity. Limited resources and expertise on parasitology, an important discipline which is often overlooked but should be highly considered in the overall aquaculture biosecurity (e.g. in tilapia where intercontinental transfer of pathogens is common). Small-scale farmers are always considered as the "weak link" for the implementation any farm-level biosecurity measures, thus it is very important to let the

farmers become aware that not all biosecurity measures are expensive or difficult to implement. Enhanced farm-level biosecurity is not that expensive to implement and should not be looked at as another production burden in the production of shrimps or fish.

- WOAH Asia-Pacific Aquatic Animal Health Network (APAquaNet). The role of the network in addressing important issues on regional aquatic animal health management is very important, especially in mobilizing resources for the implementation of some of the priority projects that has been identified.

- Regional Disease Reporting. Concerning issue on the low number of countries submitting reports; data presented only shows that many countries are apparently dismissive with their obligations to WOAH and eventually to their trading partners.

Report of the meeting (e-copy) was widely circulated among NACA member countries and partner organizations, and published at NACA website for free download.

The regional aquatic animal disease reporting requires all Members to submit monthly data as soon as available to WOAH-RRAP and NACA to ensure the timeliness of the disease information. Updated reports are regularly published in dedicated pages at NACA and WOAH-RRAP websites.

NACA was invited to attend several international aquatic animal health symposia, both virtually and in-person. These include:

- **International Mini-Symposium on Aquatic Animal Disease Control (CAAD);** 27 November 2023, National Chengkung University, Tainan, Chinese Taipei.
- **Online Symposium on Fish Disease and Diagnostics;** 14 December 2023, Pukyong National University, Busan, South Korea.
- **Thailand Shrimp Health Workshop;** 15-16 February 2024, Department of Fisheries, Thailand
- **Special Lecture;** Guru Angad Dev Veterinary and Animal Science University, 10 March 2024 Ludhiana, Punjab, India.

NACA, in collaboration with FAO and the Chinese Academy of Fishery Sciences (CAFS), has organized the Updates and Roll-out of the PMP/AB though a workshop held in Qingdao, China on 13-15 May 2024. The Regional Technical Working Group for NACA's Regional Aquatic Organism Health Strategy has formulated three concept notes and were presented to during the workshop:

1. NACA RAOHS Regional Aquaculture Value Chain Pathogen Risk Analysis Framework
2. Understanding Antimicrobial Use/Resistance (AMU/AMR) in Aquaculture
3. Strengthening and Harmonization of Surveillance, Monitoring and Reporting of Aquatic Animal Diseases

Back-to-back with the PMP/AB roll-out was the Workshop on Antimicrobial Resistance in Aquaculture, held on 16-18 May 2024 at the same venue. Details of these two workshops are presented by Dr. Melba Reantaso in her report.

NACA continues to closely collaborate with WOAH on several aquatic animal health programmes in the region and beyond. In 13-16 November 2023, NACA was invited to present the progress made on APAquaNet during the WOAH 33rd Conference of the Regional Commission for Asia and the Pacific (Delhi, India). Additionally, Dr. Ingo Ernst presented the process of revisions to the WOAH Aquatic Code. A back-to-back workshop was organized by WOAH in Singapore on 29 October – 1 November 2024: 1) Emergency Preparedness and Response; and 2) AMU/AMR in Aquaculture. NACA was invited as one of the resource persons for both workshops. Specifically on AMU and AMR, Dr. Leaño presented the progress made on the activities of two WOAH Ad Hoc groups (wherein NACA is a member): Technical References for Aquatic Animals; and, Electronic Expert Group on AMU at Field Level. NACA also continues its membership to the WOAH Observatory Consultation Group which was established to monitor the implementation of WOAH international standards. The group is currently headed by Dr. Caroline Paquier.

During the 33rd Governing Council Meeting of NACA held in Delhi, India on 5-8 March 2024, Dr. Leaño was elected as the new Director General of NACA. He replaced Dr. Jie Huang (China) who ended his 5-year term on 30 April 2024.

SESSION 2: UPDATES FROM WOAH AQUATIC ANIMAL HEALTH STANDARDS COMMISSION

Dr. Ingo Ernst (Vice President, WOAH Aquatic Animal Health Standards Commission) gave a presentation on the progress of the Aquatic Animal Health Standards Commission's (AAHSC) work to develop new and revised standards for the WOAH Aquatic Animal Health Code and WOAH Manual of Diagnostic Tests of Aquatic Animals. The presentation highlighted key outcomes from the September 2024 meeting, including recently adopted changes, proposed amendments, and draft standards open for member country comments.

Commission Members. The Commission introduced new leadership, with Dr. Alicia Gallardo Lagno elected as president. Dr. Hong Liu was re-elected, ensuring continuity. The Commission maintains a balanced mix of expertise in policy, trade, science, and laboratory diagnostics, strengthening its ability to develop effective and scientifically sound standards.

Aquatic Code – Key Updates from May 2024. The listing of "Infection with *Megalocytivirus pagrus 1*" now includes three genogroups: ISKNV, RSIV, and TRBIV. While supported for standardized disease control, concerns were raised about TRBIV diagnostics, ISKNV's spread, and trade risks. Despite this, only four countries opposed the listing. Additionally, other updates included Article 3 revisions on safe commodities and susceptible species updates for DIV1, IHNV, TILV, and *Perkinsus marinus* based on new scientific data.

Aquatic Manual – Key Updates from May 2024. The Commission continued revisions to the Aquatic Manual, ensuring that scientific data, diagnostic protocols, and case definitions remain up to date. The following chapters were substantially revised and adopted:

- Crustacean diseases:
    - Chapter 2.2.0: General information
    - Chapter 2.2.2: *Aphanomyces astaci* (crayfish plague)

    - Chapter 2.2.6: *Macrobrachium rosenbergii* nodavirus (white tail disease)
    - Chapter 2.2.9: Yellow head virus genotype 1
    - Chapter 2.2.X: Decapod iridescent virus 1
- Mollusc diseases:
    - Chapter 2.4.0: General information
    - Chapter 2.4.1: Abalone herpesvirus
    - Chapter 2.4.4: *Marteilia refringens*

New WOAH Reference Centres. Two new WOAH Reference Centres were adopted by the Assembly. The first is a WOAH Collaborating Centre for Reference Materials of Molecular Diagnostic Techniques in aquatic and terrestrial animal diseases, initiated by Dr. Hyoung-Jun Kim from the National Institute of Fishery Science in Korea. The second is a WOAH Reference Centre for Fish Health Management in the Middle East, based in Egypt.

September 2024 Meeting Report. The Commission's September 2024 report includes proposed amendments to the Aquatic Code and Aquatic Manual, with marked revisions and justifications for each change. A new approach was introduced in this report: Annex 3 now includes all member country comments in a de-identified format, along with the Commission's responses, improving transparency and accountability.

Disease Preparedness and Control. Several new chapters were introduced as draft amendments to the Aquatic Code for member comments. Chapter 4.X on Emergency Disease Preparedness and Chapter 4.Y. on Disease Outbreak Management, which had been previously circulated, were refined based on member country feedback. Another key addition was Chapter 4.Z. on the Control of Pathogenic Agents in Traded Gametes and Fertilized Eggs of Fish, developed with industry input to enhance biosecurity measures in the trade of fish eggs and milt. Initially, this chapter focuses on salmonid species but may be expanded in the future.

Movement of Ornamental Aquatic Animals. This new chapter 5.X was circulated for the third time, with further revisions based on member country input. Updates focus on surveillance periods, targeted surveillance, and biosecurity conditions necessary before self-declaration of disease freedom. These revisions aim to ensure a more standardized approach to disease monitoring in ornamental aquatic animals.

Surveillance Periods and Biosecurity Conditions. The framework introduced in May 2022 for determining surveillance periods and biosecurity conditions has now been applied to all listed diseases, ensuring evidence-based, standardized surveillance protocols for self-declaration of disease-free status.

Revisions to Susceptible Species Lists. The Commission has nearly completed susceptible species assessments, covering all fish and crustacean diseases, with only mollusc and amphibian diseases remaining. Article 1.5.9. was applied to ensure a balanced risk approach, particularly for WSSV and EUS, which have the widest host ranges. These updates play a significant in trade, as susceptible species classification directly impacts the scope of disease-specific regulations and trade measures.

Additionally, errors in Articles 10.4.11. and 10.4.12. of Chapter 10.4. for Infectious Salmon Anaemia Virus (ISA) were corrected to address inaccuracies from the 2022 revision, including differences across the three official languages of the Code. With the listing of *Megalocytivirus pagrus 1*, a new Code chapter (10.X.) was introduced, along with an updated susceptible species list. In addition, susceptible species lists for *Perkinsus olseni* and *Xenohaliotis californiensis* (Withering Syndrome) were also revised.

Commission Work Programme. The Commission is nearing completion of updates in Section 4 (Disease Prevention and Control), with revisions to compartmentalization (Chapter 4.3.), fallowing in aquaculture (Chapter 4.7.), and a new zoning chapter (4.X.). A working group is reviewing diagnostic methods for *Megalocytivirus pagrus 1*, conducting literature reviews, interlaboratory comparisons, and drafting a new manual chapter, with initial guidance in February and comparison results in September. The Commission proposed using *Megalocytivirus pagrus 1* as a case study for the WOAH Observatory. To improve the Aquatic Code's usability for trade, the Commission is restructuring articles, integrating SPS Agreement principles, and updating Section 5 on trade measures and health certification. Meanwhile, the Aquatic Manual is nearly complete, with 5 of 31 chapters remaining. Chapter 1.5. is being applied to refine susceptible species classification across disease-specific chapters.

Dr. Ingo Ernst stated that member countries are responsible for submitting comments on the September 2024 report by January 6, 2025. The Commission will review all feedback during its February 2025 meeting before finalizing decisions on proposed standards and amendments.

DISCUSSION

- A proposal to include *Megalocytivirus pagrus* 1, which covers three genome groups (ISKNV, RSIV, and TRBIV), in the WOAH reporting system has been introduced to address inconsistencies in the current Aquatic Animal Disease Reporting System for Asia-Pacific. For example, India currently reports ISKNV under "Infection with RSIV," while Hong Kong listed it under "Other Diseases." Concerns were raised that countries should specify which genome group is being reported, as RSIV has been associated with very high mortality, while ISKNV generally results in lower mortality rates.
- WOAH plans to enable genotype-specific reporting by 2025, allowing countries to specify whether the infection is ISKNV, RSIV, or TRBIV. This approach is expected to help maintain disease-free status for unaffected genome groups. An expert working group has already been formed to ensure accurate diagnostic methods are developed to support this process.
- Compartmentalization has been suggested as a more applicable approach than zoning for aquaculture, especially in cases where zoning is not practical for aquatic systems. This method provides a structured framework to isolate facilities or production areas to prevent pathogen spread. While case studies so far focus mainly on terrestrial diseases, it has been proposed that aquatic systems be included in future case studies.
- The new standards for compartmentalization are expected to offer more flexible approaches, including dependent compartments. These compartments have lower biosecurity levels but can still operate within disease-free zones, making them suitable for

products intended for human consumption. Meanwhile, highly biosecure compartments, such as recirculating aquaculture systems, may be more appropriate for broodstock and genetic materials. These flexible standards are expected to facilitate wider adoption of compartmentalization practices.

- Examples of compartmentalization practices have already been implemented in the region. In Singapore, a form of compartmentalization is used for ornamental fish exports. Fish are sourced from disease-free farms, kept in specific quarantine spaces, observed, and tested if required before being exported with health certificates. However, this system does not fully meet the formal definition of compartments as applied to terrestrial animals, as the population of ornamental fish is transient.
- In the Philippines, intensive shrimp farming applies compartmentalization principles through systems designed with separate areas for sedimentation, reservoirs, treatment ponds, rearing ponds, and wastewater ponds. This setup aims to control water quality and improve biosecurity. While these practices reflect compartmentalization concepts, clearer alignment with WOAH standards may be needed.
- Expanding case studies to include aquatics has been proposed to complement existing examples for terrestrial systems. Such case studies should consider variations in biosecurity needs across commodity types, such as high-health shrimp broodstock facilities versus ornamental fish exporters.
- Training programs on surveillance and compartmentalization have also been proposed to support the implementation of new standards. Focus has been placed on balancing disease prevention with sustainable trade practices, particularly for small-scale producers, to avoid imposing excessive compliance burdens.

SESSION 3: AQUACULTURE BIOSECURITY

3.1. THE PROGRESSIVE MANAGEMENT PATHWAY FOR IMPROVING AQUACULTURE BIOSECURITY (PMP/AB): AQUACULTURE BIOSECURITY AND FAO'S AQUATIC ANIMAL HEALTH INITIATIVES IN THE ASIA PACIFIC REGION

Note: *This AGM marks Dr. Reantaso's final presentation (for AG) before her retirement in January 2025, ensuring a transition of leadership in FAO's aquatic biosecurity efforts.*

Dr. Melba Reantaso (Team Leader of Fish Food Safety, Nutrition, Biosecurity, and Health at FAO's Fisheries and Aquaculture Division) presented an update on the implementation of the Progressive Management Pathway for Aquaculture Biosecurity (PMP/AB), FAO's ongoing initiatives, and key developments in aquatic animal health and biosecurity in the Asia-Pacific region.

Progress in the Progressive Management Pathway for Aquaculture Biosecurity (PMP/AB)

The Progressive Management Pathway for Aquaculture Biosecurity (PMP/AB) has evolved significantly since discussions began in April 2018. Through a series of multi-stakeholder consultations, technical working group meetings, and expert discussions, the initiative has transitioned from a conceptual framework to field application at both national and regional levels. PMP/AB was developed under the technical oversight of the Global PMP/AB Technical Working Group, an official FAO group established following a recommendation from the FAO Subcommittee on Aquaculture. This group comprised experts from governance authorities, the aquaculture industry, and international organizations. One of the most critical milestones was the endorsement and adoption of PMP/AB during the 10th Session of the FAO Committee on Fisheries Subcommittee on Aquaculture in Norway. Subsequent discussions at the 11th and 12th sessions focused on monitoring progress and encouraging broader implementation.

In June 2024, both the Global PMP/AB Technical Working Group and the NACA Regional Technical Working Group concluded their terms, coinciding with the completion of the NORAD-funded project. However, the work on PMP/AB continues as countries transition from policy development to on-ground implementation. The PMP/AB framework has been designed to accommodate countries at different stages of aquaculture development and biosecurity capacity. The stepwise approach ensures that all countries, regardless of their biosecurity status, have an entry point into the PMP process.

Key developments include the establishment of the NACA Technical Working Group, which serves as a think tank for driving the implementation of the NACA Regional Aquatic Organism Health Strategy (RAOHS). This group has worked closely with national authorities to integrate PMP/AB principles into country-specific biosecurity strategies. Led by experts, including representatives from FAO and NACA, this initiative has provided technical guidance and training to ensure that PMP/AB principles are effectively adopted across the region. PMP/AB's success in aquaculture has influenced FAO's broader progressive control approach, leading to its expansion into other fields. FAO has since introduced PMP models for Terrestrial Animal Biosecurity (PMP-TAB, 2023), Antimicrobial Resistance (PMP-AMR, 2023), and Beekeeping (PMP-Bees, 2022). This reflects the scalability of progressive management thinking beyond aquaculture and its relevance to global biosecurity efforts. With the completion of initial phases, PMP/AB is now shifting towards practical field applications. This transition marks an important step in strengthening aquaculture biosecurity in the Asia-Pacific region, ensuring long-term sustainability and resilience against aquatic animal disease outbreaks.

FAO's Aquatic Animal Health Initiatives in the Asia-Pacific Region

FAO continues to support aquaculture biosecurity and aquatic animal health initiatives across the Asia-Pacific region through various national strategy developments, technical collaborations, and regional policy frameworks. These efforts aim to improve disease management, enhance biosecurity measures, and strengthen institutional capacity in partner countries. A key initiative under this effort is the NACA Regional Aquatic Organism Health Strategy (RAOHS), which was adopted during the 32nd NACA Governing Council Session in September 2023. Following its development and approval, it was officially launched in Qingdao in 2024. The launch was attended by members of the regional technical working group and representatives from NACA member countries. The RAOHS serves as a structured framework to enhance cooperation and provide strategic direction for aquatic animal health management in the region.

Several countries in the region are actively engaged in developing or implementing national strategies for aquatic animal health. China is working on this under the FAO South-South Cooperation framework, with a proposal already submitted. The Philippines is in the discussion phase regarding its national strategy. Thailand has not yet developed a national strategy but is a recipient of the Global Health Security Project, which is administered by the FAO regional office. Malaysia had previously developed a national strategy with FAO's support under a Technical Cooperation Programme (TCP) and could request updates if needed. India is in discussion with the Indian Council of Agricultural Research (ICAR) regarding its national strategy. In Bangladesh, a small USAID-funded project under the Fish Innovation Lab, implemented by Mississippi State University, is contributing to biosecurity efforts. Sri Lanka is working on national strategy development under a Korean-funded project and has recently conducted an EHP (*Enterocytozoon hepatopenaei*) investigation at the request of the government. Indonesia has made significant progress as a main recipient of the Northland-funded project. The country has already developed a national strategy and has an ongoing TCP on emergency preparedness. Meanwhile, the Maldives is implementing a World Bank-funded project, which includes national strategy development and capacity-building activities in aquaculture. A recent meeting was held with Maldivian representatives to discuss project implementation and further collaboration.

FAO remains committed to providing technical guidance and capacity-building support to countries in the region. Through these initiatives, FAO ensures that national and regional aquatic animal health strategies align with global best practices, enabling sustainable aquaculture development while enhancing resilience against disease outbreaks.

PMP/AB Toolkits and Training Programs

FAO has developed several PMP/AB toolkits to support aquaculture biosecurity, with some toolkits completed and others ongoing. These toolkits cover risk management, contingency planning, surveillance, diagnostics, governance, cost-benefit analysis, public-private partnerships, and communication strategies to strengthen biosecurity practices in aquaculture. The Stepwise Guidance for PMP/AB is a completed toolkit that provides a structured framework, including checklists and national strategy development guidance. The Risk Analysis in the Aquaculture Value Chain toolkit, completed in September 2023, includes a guidance document, an e-learning module, and in-person training. The e-learning module, developed with the FAO e-Learning Academy, has trained 1,079 participants, with 597 from the Asia-Pacific region. A related in-person training, held in September 2023, was organized in response to ASEAN's request, led by Thailand through the ASEAN Network of Aquatic Animal Health Centres (ANAAHC). It was attended by 70 participants from 12 ASEAN, FAO, and NACA member countries.

The Contingency Planning for Mass Mortality Events (MMEs) toolkit is also completed, with an e-learning module set for release by December 2024. It includes five lessons covering aquatic disease understanding, outbreak investigation, diagnostics, surveillance, and contingency planning. FAO has also developed strategy manuals for diseases such as IMNV, APHND, TiLV, EHP, EUS, DIV1, and WSSV, some of which are already in the FAO Publication Workflow System.

Several toolkits are on-going in terms of their preparation/development, including Training Modules on Surveillance and Diagnostics, Governance and Biosecurity Action Plans, and Public-Private Partnerships (PPP) in Aquaculture Biosecurity. The Cost-Benefit Analysis of Aquatic Biosecurity Systems currently in its advance stage of development, with a conceptual framework developed in 2023 and pilot case studies ongoing in few countries: India, Saudi Arabia, and the Philippines. The Communication Strategy toolkit is also in the process, focusing on improving the dissemination of biosecurity knowledge and risk management strategies.

These toolkits provide essential resources for countries implementing PMP/AB, ensuring structured guidance, technical support, and capacity building through e-learning, in-person training, and technical publications to enhance aquaculture biosecurity at national and regional levels.

Antimicrobial Resistance (AMR) and Aquatic Biosecurity

FAO has designated several Reference Centres for Antimicrobial Resistance (AMR) and Aquatic Biosecurity to support research, training, and policy development in aquaculture. These centres are located in four countries:

- China: Pearl River Fisheries Research Institute (PRFRI) and Yellow Sea Fisheries Research Institute (YSFRI) under the Chinese Academy of Fisheries Sciences (CAFS)
- India: Nitte University
- United Kingdom: Centre for Environment, Fisheries and Aquaculture Sciences (CEFAS)
- United States: Mississippi State University

FAO's work on AMR in aquaculture is part of its broader Action Plan on Antimicrobial Resistance (2021–2025). This initiative aims to support countries in integrating aquatic-specific AMR strategies into their National Action Plans (NAPs). FAO has also developed guidance documents to assist in surveillance, responsible use of antimicrobials, and improving aquatic animal health management. In February 2024, Nitte University (India), an FAO AMR Reference Centre, hosted the *International Hands-on Training on Neutralized Microbiome and Genomic Resources for AMR* in collaboration with Mississippi State University (USA) and CEFAS (UK). The five-day course covered AMR detection, antimicrobial susceptibility testing, genomic surveillance, and more. With 40 participants from 20 countries, FAO is considering making it as a recurring program.

The Mississippi State University (MSU) has collaborated with FAO to support capacity-building efforts in AMR surveillance and disease management. This partnership has contributed to training programs and technical publications that focus on responsible antimicrobial use, biosecurity frameworks, and sustainable aquatic animal health practices. Since 2022, FAO has actively supported the World Antibiotic and Antimicrobial Awareness Week through webinars and outreach programs. These efforts aim to increase awareness of AMR risks in aquaculture and promote sustainable practices to reduce antimicrobial dependency.

Upcoming Key Publications

- ***Responsible Management of Bacterial Diseases in Aquaculture*** – A long-overdue publication covering approximately 40 major bacterial diseases in aquaculture, categorized into Vibriosis, Aeromonasis, Edwardsiellosis, and others. Developed in collaboration with Mississippi State University (MSU) and FAO Reference Centres, it provides key management strategies for disease prevention and control.

- ***Diagnostic Guide to Diseases of Aquatic Organisms*** – An updated version of the 2001 Asia Diagnostic Guide to Aquatic Animal Diseases, now expanded to include aquatic plants. The guide details 33 fish diseases, 11 mollusc diseases, 14 crustacean diseases, 4 seaweed diseases, and a section on parasites and bacterial zoonoses, making it a comprehensive reference for aquatic disease diagnostics.

- ***A Guide to Developing Diagnostic Laboratories for Aquatic Diseases*** – Created in response to private sector demand, this guide outlines three levels of laboratory development (basic, intermediate, and advanced) and includes sections on diagnostics, data management, quality management, and application. The expected release is early 2025.

- Two manuscripts, '*Vibrio* spp. Risk Profile' and '10-Point Checklist for Designing an AMU Survey', are expected to be finalized between late 2024 and early 2025.

FAO's Global Strategy, Collaborations, and Future Directions

FAO's Strategic Framework is centred around the Four Betters: Better Nutrition, Better Production, Better Life, and Better Environment. The organization's work on aquaculture biosecurity and AMR aligns with Blue Transformation, One Health, Climate Change, and Safe Food priority program areas (PPAs). Key events in 2024 included the *FishVet+ Dialogue II: One Health and Biosecurity (June 2024)*, attended by 400 participants, and the *"To Vaccinate or Not to Vaccinate" Seminar*, which featured discussions on fish and shrimp vaccination strategies, including oral nanovaccines from India, fish vaccination strategies in China, and shrimp vaccine development from Thailand. The *FAO Reference Centres closed-door meeting* facilitated discussions on advancing aquatic biosecurity and disease management, with virtual participation from the U.S. and CEFAS (UK).

FAO's voluntary instruments guiding aquaculture biosecurity and AMR include the FAO Code of Conduct for Responsible Fisheries, with recommendations on the prudent use of veterinary medicine and health management for live aquatic organisms. The FAO Action Plan on AMR (2021–2025) continues to support countries in developing their national AMR action plans.

Discussion

- Risk analysis and emergency preparedness are essential pillars of aquaculture biosecurity, focusing on identifying hazards, mitigating risks, and ensuring proactive planning to address new and evolving threats, as demonstrated by Thailand and Vietnam's responses to Translucent Post-Larvae Disease. It was noted that this disease has emerged in some countries in the region but has not yet been detected in Thailand. Both Thailand and Vietnam have taken proactive steps to prepare for potential outbreaks, with Thailand establishing a task force and Vietnam implementing monitoring and prevention measures.

- The role of industry involvement was also underscored. Producers often have deep practical knowledge of aquatic animal health and farming systems. Engaging them in biosecurity initiatives and simulation exercises can help develop more practical and effective strategies, including designing of these programs to enhance relevance and applicability.
- Aquaculture health economics was proposed as an emerging area that needs further exploration. Economic frameworks such as the global burdens of animal diseases (GBAD) and CBA can help quantify impacts and justify resource allocation for biosecurity measures. Bringing economists into discussions was suggested to strengthen decision-making and improve funding applications, especially for initiatives tied to pandemic preparedness and workforce development.
- The concept of One Health was acknowledged as an integrated approach to aquatic animal health. Collaboration among experts from different disciplines, including veterinarians, biologists, and economists, is essential. Respecting each professional's role was emphasized and involving producers as critical for achieving sustainable and effective health management systems.
- Resource mobilization through mechanisms like the pandemic fund was identified as a key opportunity. Despite calls for proposals, no projects focusing on aquaculture have yet been submitted. Focusing on zoonotic diseases was suggested, such as *Streptococcus*, and aligning proposals with global health priorities to secure funding. The advisory group was encouraged to explore these areas to ensure aquaculture remains relevant in addressing future health challenges.

3.2. FAO/ASEAN Training on Risk Assessment for Developing an On-Farm Biosecurity Plan in the Aquaculture Value Chain

Dr. Yuko Hood (Principal Science Officer, Animal Health Policy Branch, Australian Government Department of Agriculture Fisheries and Forestry; and official country representative from Australia) gave a special presentation, as requested by the current AG, on 'Risk Assessment for Developing an On-Farm Biosecurity Plan in the Aquaculture Value Chain'. This involves using a risk-based approach to protect farms from diseases, maintain productivity, and facilitate trade. Dr. Hood shared insights from her experience with similar training courses, particularly those based on Australia's aquaculture biosecurity guidelines.

Aquatic animal diseases pose a significant threat to aquaculture industries by affecting productivity, trade and environment. The training conducted by FAO/ASEAN Network of Aquatic Animal Health Centers in collaboration with the Thai Department of Fisheries, focused on risk assessment for developing on-farm biosecurity plans within the aquaculture value chain. It emphasised biosecurity's role in disease prevention, trade facilitation and profitability. The presentation provided by the author as part of the course showcased a structured risk analysis framework, covering hazard identification, risk assessment, and risk management.

A critical component of biosecurity planning is to understand the six major transmission pathways:

1. People – farm workers, visitors, and unauthorized entrants.
2. Animals – broodstock, seed stock, wild animals, and aquatic animal products.
3. Fomites – equipment, vehicles, and vessels that can transfer pathogens.
4. Water – the role of intake and effluent water in disease spread.
5. Feed – risks associated with live, fresh, frozen, and manufactured feeds.
6. Waste – proper disposal of processing waste, effluent, and mortalities.

To systematically evaluate risk, biosecurity measures must be implemented at three levels:

- Entry-level biosecurity – Preventing disease introduction onto the farm.
- Internal biosecurity – Limiting disease spread within the farm.
- Exit-level biosecurity – Preventing disease transmission off the farm.

Participants learnt to identify key aquatic animal diseases of concern, to assess potential transmission routes, and to plan mitigation strategies to reduce the likelihood and consequences of disease risks. The risk assessment process involved assigning likelihood and consequence ratings, hence risk ratings, and identifying critical control points where interventions can effectively reduce risk. These interventions included enhanced pathogen screening, biosecure infrastructure, water filtration, feed management, and emergency response protocols. By adopting structured biosecurity risk assessments, aquaculture operators can proactively develop tailored biosecurity measures and prioritise areas of greatest concern.

This training course provided a train-the trainer opportunity, equipping participants with the knowledge and tools necessary to support aquaculture operators in designing and implementing effective on-farm biosecurity plans. These efforts contribute to the long-term resilience and sustainability of the aquaculture industry.

Discussion

- On farmers' perception of disease risk, below are insights from experiences in Colombia:
    - Farmers' awareness of disease risk is shaped by personal experiences. In regions affected by mass mortality or disease outbreaks, they are more aware of the risks and interested in adopting biosecurity measures to prevent future incidents. For those who haven't faced these issues, explaining the need for biosecurity is more challenging, as they may view it as unnecessary, especially when their farm location or water quality has kept them fortunate.
    - Experience sharing among farmers is more effective in raising awareness than receiving information from authorities. Farmers tend to trust the experiences of

other farmers, highlighting the importance of creating spaces for them to exchange knowledge.

- Economic incentives are crucial for encouraging farmers to invest in biosecurity. Farmers who haven't faced disease outbreaks may view it as an unnecessary expense, like avoiding insurance. It was suggested that the government regulate biosecurity standards at hatcheries and other facilities outside the farms to ensure consistency.
- Social behavioural change (SBC) is becoming increasingly important in promoting biosecurity practices. Farmers are more likely to adopt biosecurity measures if they see support from their peers or the local community. Understanding these social dynamics is crucial for encouraging broader adoption of biosecurity measures.
- Gender equality and social inclusion (GESI) are also gaining more attention in aquaculture biosecurity projects around the region. It is essential to involve "everyone" in the community, including women and marginalized groups, to ensure that biosecurity efforts are more effective and equitable. Donor agencies now require that GESI be integrated into such kind of projects.
- It was suggested that both SBC and GESI be incorporated into the upcoming DAA symposium in 2025, particularly if the program is not finalized yet. Further discussions on this will be undertaken during succeeding meetings of the Executive Committee of the Fish health Section.
- The biosecurity measures discussed in the presentation are aligned with the standards in Chapter 4.1 of the Aquatic Animal Health Code, adopted in 2021. This chapter provides detailed guidance on biosecurity and compartmentalization, which are essential for managing disease risks in aquaculture. This framework is helpful for improving biosecurity practices on farms, especially for countries interested in compartmentalization.
- Cultural factors play an important role in adopting biosecurity measures. In some communities, hospitality is a key cultural value where people actively make efforts to welcome visitors, even into their farms. Understanding these cultural practices can help introduce biosecurity measures in ways that respect local traditions but still protect the farm area and facilities. This approach is especially useful in rural or isolated farming communities.

3.3. Methodology for Assessing Biosecurity Risk in Small-scale farms: Experience from Colombia

Dr. Maria Fernanda Serrano dela Cruz (Department of Aquatic Animal Health and Welfare of the Norwegian Veterinary Institute) presented a methodology for assessing biosecurity risks in small-scale farms, sharing her experience from Colombia. The Colombian Agricultural Institute (ICA), the veterinarian Authority, established a mandatory biosecurity certification program for all aquaculture establishments through ICA Resolution 20186-2016. To assess the implementation level and promote the certification, ICA initiated preliminary inspections of non-certified farms starting in 2020. These visits identified key bottlenecks to implementing the regulation: significant costs and difficulties in obtaining necessary permits, a lack of technical and veterinary support for small-scale producers, and challenges related to low literacy levels affecting record-keeping and application of Standard Operating Procedures (SOPs).

To better understand biosecurity practices in small-scale aquaculture and update the requirements based on current risk levels, a qualitative risk assessment was conducted. This analysis utilized data from 334 ICA biosecurity inspections across five Colombian regions, employing ICA's standardized 43-point biosecurity checklist. Data were processed in Microsoft Excel, with each measure assigned a weighted value for risk assessment.

A panel of 22 experts, including researchers, academics, and field professionals from both public and private sectors, evaluated the risk associated with non-compliance for each measure. These evaluations were summed, and percentiles were calculated to determine overall risk levels. The assessment resulted in identifying measures considered low or insignificant risk, which were then proposed for removal from the requirements for small-scale farms. This adjustment reduces the required measures from 43 to 14, focusing on those considered moderate to high risk.

Additionally, the study assessed inadequate implementation of each risk factor across the five regions, assigning risk levels of negligible, low, medium, or high.

Conclusions and recommendations

- The current regulations should be revised to reduce the biosecurity requirements for small-scale aquaculture farms by approximately 60%, from 43 to 14 measures.
- For small-scale farms, the spread of diseases poses a higher risk compared to the introduction of new pathogens.
- The origin of aquatic animals and the use of ICA-approved supplies are the most critical factors for preventing disease introduction.
- Increase Training and Risk Communication programs are essential to improve biosecurity implementation in small-scale farms.

Discussion

- The biosecurity assessment tool used in Colombia was adapted for small-scale farms, using numerical data for assessment, making it easier to understand and apply. The tool is effective in evaluating biosecurity risks, focusing on key criteria that can be practically implemented. This work utilises knowledge and experiences from the assessment tool developed by NVI for salmon, and creating a methodology that can be applied for other cultured species in other countries, especially for small-scale farms.
- The tool can be modified to assess the biosecurity measures that are being implemented in small-scale farms in the Asia-Pacific region, particularly for species like tilapia and trout. The modification should aim to enhance the management of small-scale farms by focusing on key, practical biosecurity criteria that are easier to apply in the region.
- Registration of small-scale farms remains a significant challenge in some countries. If there is an aquaculture development plan, it should be a requirement to register small-scale farms

as this is crucial in allowing countries to implement a more effective aquaculture biosecurity systems.

- Cluster management is an effective approach for managing numerous small-scale farms, particularly in countries like India. This model has been successfully applied previously among shrimp farmers in India, with support from NACA and MPEDA. Cluster farming practices include some farm-level biosecurity measures for overall pond management and disease prevention.
- As an update, results of the NVI biosecurity assessment (tool) applied in European sea bass and seabream, has been accepted for publication.

3.4. FARMING WITHOUT FEAR: THE POWER OF PROACTIVE BIOSECURITY

Dr. Andy Shinn (Senior Technical Support Manager of INVE Aquaculture) presented a topic on "Farming without fear: the power of proactive biosecurity". Biosecurity is the foundation of disease prevention in aquaculture, yet it often falls victim to human nature's inclination for shortcuts. Without proper planning, disease outbreaks can devastate entire operations, leading to catastrophic losses. From simple handwashing and foot dips to sophisticated quarantine facilities and production system separations, biosecurity measures must be tailored to each farm's specific risks. As the saying goes, *a failure to plan is a plan to fail!*

Complacency is the silent enemy of biosecurity. When disease threats are not immediate, protocols tend to lapse. The reality, however, is that an outbreak can spread rapidly and wreak havoc in a matter of days. This is why farms must have clear, well-structured plans that can be enacted at the first sign of infection. Without them, response times lag, containment falters, and losses multiply.

Understanding risk analysis is crucial. A systematic approach, risk analysis consists of four key steps: identifying hazards, assessing the likelihood and impact of their occurrence, implementing measures to manage these risks, and communicating the necessary information to all stakeholders. It does not dictate what level of risk is acceptable, nor does it guarantee outcomes. Instead, it serves as a vital tool to evaluate vulnerabilities and inform sound decision-making.

Many factors influence the risk of infectious disease in aquaculture. A farm's history of disease, stocking density, species type, location, water movement, proximity to other farms, shared equipment, and personnel movement all contribute to its risk profile. Understanding these factors helps farmers prioritise interventions and minimise exposure to potential threats.

Consider three scenarios. First, a farmer is offered a discounted batch of "trash fish" as feed. Without knowing the source and potential pathogen load, this presents a high risk. Second, a nearby shrimp farm reports an outbreak of White Spot Disease. Birds frequenting both farms could carry the virus, posing a moderate risk. Lastly, an auditor arrives on-site but has not visited an aquaculture facility in weeks. The likelihood of introducing pathogens in this case is low to negligible. By categorising risks in this manner, farms can take appropriate actions to safeguard their stock.

Simplicity and consistency are the backbone of an effective biosecurity plan. Overly complex procedures become difficult to follow and easy to ignore. Biosecurity measures should be practical, routinely enforceable, and responsive to emerging threats. Farmers must conduct risk assessments for all activities, identify control points where intervention can reduce disease risks, and establish clear protocols for managing external threats. Regular audits ensure these measures remain relevant and effective.

A well-structured Veterinary Health Plan (VHP) is essential. Developed in collaboration with veterinarians, the VHP integrates biosecurity, health, and welfare strategies. This comprehensive document should include disease control measures, farm management protocols, record-keeping structures, and training programs for farm personnel. Details on biosecurity, disease monitoring, treatment strategies, pond preparation, water treatment, stocking densities, mortality handling, and reporting structures must be outlined clearly. The VHP is not just a policy document—it is a living strategy that guides daily operations and long-term planning.

Real-world success stories reinforce the value of these plans. One moderately sized farm spent a year developing a robust biosecurity and VHP. When revisited, they reported that 30% of the plan formalised existing practices, 40% had led to improved procedures, 15% introduced entirely new strategies, and another 15% identified future improvements requiring additional resources. By proactively refining their biosecurity approach, they raised the overall health and safety standards across their operation.

The threat of infectious disease in aquaculture is ever-present. Proactive biosecurity measures protect not just fish and shrimp but entire livelihoods. Strong hygiene protocols, risk-based decision-making, and Veterinary Health Plans provide the necessary defence against disease outbreaks. In the end, biosecurity is an investment that pays dividends in sustainability and profitability. The key is to remain vigilant, informed, and prepared—because when it comes to biosecurity, prevention is always better than cure.

Discussion

- On farm-level aquatic animal health management, practical strategies emphasizing biosecurity and veterinary health plans were highlighted. Structured protocols and internal audits were shown to enhance farm operations, particularly after experiencing high mortality events.
- Biosecurity plans need to be aligned with the capacities of individual farms. While larger farms may develop comprehensive plans, smaller farms can implement simpler strategies tailored to their resources and capacities. Shared templates and basic guidelines were proposed to support the development of customized veterinary health plans.
- Applying biosecurity concepts remains challenging, especially for small-scale farmers with limited resources. Simplifying these concepts and presenting them in clear, practical terms can improve understanding and adoption. Farms that have invested in biosecurity measures often report noticeable improvements in outcomes.
- Disease risks, including *Vibrio parahaemolyticus* infections, resulted from failures in water treatment systems and aerosol contamination. Site evaluations and risk assessments were

emphasized, along with recommendations for aerosol barriers and biosecurity measures to reduce pathogen spread.

- Studies on aerosol transmission revealed that *Vibrio parahaemolyticus* could disperse up to 20 meters under farm conditions, raising concerns about wider contamination. Proposed solutions included tree barriers and netting to reduce aerosol spread, but further evaluation was suggested to assess their long-term effectiveness.
- Making biosecurity measures accessible to small-scale farmers was emphasized. Risk assessments, along with simple training sessions and awareness programs, were proposed to help farmers adopt biosecurity practices without excessive costs or burdens.

SESSION 4: AMR IN AQUACULTURE: IMPORTANCE OF EPIDEMIOLOGICAL CUTOFF VALUES FOR AQUATIC ANIMAL HEALTH ANTIMICROBIAL SENSITIVITY TESTING

Dr. Biyun Ching (Senior Scientist of National Parks Board) presented the importance of cutoff values for AAH antimicrobial sensitivity testing. Antimicrobial resistance (AMR) is a serious emerging threat to global health and development, permeating multiple sectors. Besides posing a direct threat to human health, increasing antimicrobial use and AMR in the aquaculture industry has resulted in adverse effects on aquatic animal health, leading to significant production and economic losses. In addition, efforts to conduct AMR surveillance for aquatic animal health have been hindered by a lack of internationally standardised interpretive criteria for antimicrobial susceptibility testing (AST) data. While clinical breakpoints developed for human therapies are available, these may not be inherently accurate for predicting clinical outcomes in aquatic animals. Consequently, there is an urgent need to develop harmonised AST interpretive criteria in the context of aquatic animal health. International collaborations are currently underway to establish epidemiological cut-off values for interpreting AST data in aquatic animals. However, these efforts may be limited by an under-representation of bacterial isolates from Asia. To address this gap, there is a need for increased data collection from Asian isolates. Aquatic animal health laboratories and experts in Asia are encouraged to participate in this important endeavour.

DISCUSSION

- The lack of data on aquatic pathogens from Asia is a significant issue, as the region is the largest producer of aquaculture globally. Despite the prevalence of bacterial diseases affecting farmed shrimp and fish, there is a lack of representative isolates of pathogens from the region which can be used for establishing cutoff values for AMR assessment. Collaboration with research laboratories and universities that maintain bacterial isolates could help fill this gap and contribute to establishing ECOFFs for aquatic pathogens.
- FAO-RAP is taking a proactive approach to improve regional capabilities for Antimicrobial Sensitivity Testing (AST). Their planned steps include capacity building, a data call, identifying regional gaps, and eventually gathering data from isolates in Asia. These efforts

will support the establishment of ECOFFs and contribute to internationally harmonized AMR management.

- Understanding the bacterial diseases affecting the 600-plus cultured species is crucial. It is important to prioritize which diseases to focus on based on the challenges faced by the aquaculture sector in different countries. Limited resources and economic constraints make surveillance difficult, especially in countries with less capacity. Establishing a clear understanding of the most important bacterial diseases will guide effective management strategies.
- The selection of bacteria for the ECOFFs project is largely supported, with *Vibrio*, *Streptococcus*, and *Aeromonas* identified as major pathogens by countries during FAO's regional consultations. However, this selection is not static; pathogen rankings may change over time, as new threats emerge or as pathogens' impact varies across different regions. Collaboration between countries to exchange diagnostic pathogen material will accelerate the development of solutions to prevent AMR.
- Setting ECOFFs at the genus level, rather than focusing solely on specific species, will allow broader applicability across regions. FAO's efforts to gather more data will support this approach, making ECVs and ECOFFs more widely usable for different species within each genus, improving AMR management in the aquaculture sector.

SESSION 5: UPDATES ON WOAH ASIA-PACIFIC NETWORK ON AQUATIC ANIMAL HEALTH (AP-AQUANET)

Dr. Thitiwan Patanasatienkul (Aquatic Animal Health Officer of WOAH-RRAP) gave a presentation on the updates on activities of the Asia-Pacific Aquatic Animal Health Network (AP AquaNet). The AP AquaNet aims to strengthen laboratory capacity, enhance regional collaboration, and improve information sharing on aquatic animal health. Key priorities for 2023-2025 include 1) conducting emergency response exercises for emerging aquatic animal diseases, 2) assessing farm-level biosecurity implementation in small-scale aquaculture, and 3) improving disease reporting through WOAH WAHIS and regional aquatic animal disease reports.

Priority 1, focused on emergency response exercises, has commenced with the first phase—**Preparatory Workshop 1 on Preparing for Emerging Diseases in Aquatic Animals**, held in Singapore on **29 October 2024**. This initiative will continue through a series of workshops and scenario-based exercises to refine best practices and response strategies. Priority 2, the biosecurity assessment aims to identify and address gaps in farm-level aquaculture biosecurity among small-scale farms. Priority 3, efforts to enhance disease reporting seek to overcome transparency barriers and increase country participation.

Additionally, a regional workshop on **antimicrobial use (AMU) and antimicrobial resistance (AMR) in aquaculture** was organized in Singapore from **30 October to 1 November 2024**. This initiative focuses on improving AMU data reporting, supporting national action plans, and promoting the responsible use of antimicrobial agents in aquaculture.

Discussion

- Biosecurity, as one of the highlighted initiatives of AP-AquaNet should be kept aligned with FAO's PMP/AB to strengthen biosecurity measures and their implementation across the region.
- The project prioritizes small-scale farms by assessing existing strategies, identifying gaps, and recommending cost-effective solutions. Flexibility in implementation was emphasized to ensure measures are adapted to local contexts, including agroecological conditions, species, and administrative setups. Biosecurity measures should be practical and not overly burdensome, enabling small-scale farms to adopt strategies suited to their capacities.
- Risk assessments and critical control points were identified as essential tools for targeting vulnerabilities and prioritizing interventions, particularly in systems with numerous producers, such as tilapia farming. An example was mentioned of a country with approximately 500,000 licensed producers, highlighting the need for scalable and practical biosecurity strategies to address management challenges effectively.
- The importance of involving small-scale farmers in biosecurity programs was emphasized. It was noted that Colombia has implemented similar approaches in conducting risk assessments for small-scale farms, focusing on facility risks, production systems, and resource limitations. These efforts could potentially serve as examples for adaptation in other countries.
- Aquaculture health economics was highlighted as a tool for promoting biosecurity adoption. Studies by ICAR-NBFGR in India focused on small-scale farms managing *Saprolegnia* outbreaks during winter months. Cost-benefit analyses (CBA) showed that medicinal applications yielded high returns, with a cost-benefit ratio of 2.42. These findings demonstrated the economic feasibility of biosecurity measures and encouraged broader adoption.
- Collaboration across disciplines, including veterinarians, biologists, economists, and policymakers, was seen as vital for effective implementation of biosecurity strategies. Strengthening linkages between authorities and stakeholders was encouraged to facilitate practical and sustainable biosecurity measures, ensuring strategies are context-specific and adaptable to varying scales of production.
- Capacity-building programs were emphasized to support sustainable practices by raising awareness and building trust among farmers. It was noted that small-scale farmers often perceive biosecurity as costly and suitable only for large farms. However, practical and affordable measures can be adapted to their capacities. An example from the Philippines showed that enhanced biosecurity measures could be implemented at very low costs, only a few pesos per unit of production, making biosecurity accessible and feasible even for small-scale farms.

SESSION 6: UPDATES ON REGIONAL DISEASE REPORTING AND DISEASE LIST

Dr. Eduardo Leaño presented the status of aquatic animal disease reporting in the Asia-Pacific region. In 2023, a total of 12 countries has submitted disease reports, while disease reports were received from only 10 countries during the first two quarters of 2024 (Table 1).

Table 1. Disease reports received in 2023 and 2024 (2Q).

Country/Territory	2023	2024 (2Q)
1. Australia	4	2
2. Bangladesh	4	1
3. Chinese Taipei	4	3
4. Hong Kong SAR	4	2
5. India	4	2
6. Malaysia	4	1(+)
7. Myanmar	4	2
8. New Zealand	4	2
9. Philippines	4	2
10. Singapore	2	2
11. Thailand	2	-
12. Vietnam	4	-

The following diseases were reported from the 3rd quarter of 2023 to the 2nd quarter of 2024:

1. **Finfish Diseases:** Infection with epizootic haematopoietic necrosis virus (Australia); Infection with *Aphanomyces invadans* (EUS) (Bangladesh, Chinese Taipei and India); Infection with red seabream iridovirus (Chinese Taipei and India); Infection with Tilapia lake virus (India, the Philippines and Singapore); Grouper iridoviral disease (Chinese Taipei and

the Philippines); Viral encephalopathy and retionopathy (Australia and Chinese Taipei); Enteric septicaemia of catfish (Vietnam); and, Infection with carp edema virus (India).

2. **Molluscan Diseases:** Infection with *Perkinsus olseni* (India); Infection with abalone herpesvirus (Australia); Infection with *Bonamia ostreae* (New Zealand); and, Infection with Marteilioides chungmuensis (Chinese Taipei).
3. **Crustacean Diseases:** Infection with White spot syndrome virus (Australia, Chinese Taipei, Inida, Malaysia, the Philippines and Vietnam); Infection with infectious hypodermal and haematopoietic necrosis virus (Australia and the Philippines); Acute hepatopancreatic necrosis disease (the Philippines and Vietnam); Infection with infectious myonecrosis virus (India); and, Hepatopancreatic microsporidiosis caused by *Enterocytozoon hepatopenaei* (Chinese Taipei, India, Malaysia and the Philippines).
4. **Amphibian Disease:** Infection with *Batrachochytrium dendrobatidis* (Australia).
5. **Other Diseases:** Infection with *Streptococcus agalactiae* (Bangladesh); Infection with *Aeromonas* spp. (Bangladesh); Infection with Tilapia parvovirus (India); and, Infection with infectious spleen and kidney necrosis virus (India and Singapore).

Again, it is emphasized to the member countries that disease reporting is important for the control of transboundary diseases of aquatic animals by complying with their obligations to the WOAH to notify the occurrence of listed and emerging diseases. Sharing of information (including disease occurrences): create awareness so that the industry and regulators can actively take the needed risk management measures including emergency preparedness and response. Additionally, disease reporting is useful for countries which are having negotiations with their trading partners/countries (e.g. export of shrimp products), as most importing countries usually check their disease reporting history with reference to WOAH six-monthly report and/or NACA-WOAH-FAO AAD Reports. This transparency for disease information is very important for the country to build TRUST with their trading partners for export of their aquaculture products.

Dr. T. Patanasatienkul presented updates on WOAH WAHIS and Regional AAD Report. The current disease reporting systems for aquatic animal diseases in the Asia-Pacific region are WOAH WAHIS and the Regional Aquatic Animal Disease (AAD) Report. Members submit reports biannually to WAHIS and quarterly to the Regional AAD Report. WAHIS covers WOAH-listed and emerging diseases, while the Regional AAD Report includes both WOAH-listed and non-WOAH-listed diseases. Reporting is facilitated through a web-based interface for WAHIS and via Excel or PDF submissions for the Regional AAD Report. The compiled data is published on the WOAH Global website for WAHIS and on the WOAH Regional and NACA websites for the Regional AAD Report.

However, a decline in reporting from Members has raised concerns, prompting discussions on integrating and coordinating the two systems to reduce the reporting burden. To address this, NACA and WOAH RRAP have proposed integrating the two reporting systems by updating the Regional AAD Report template to ensure that WOAH-listed diseases are reported to WAHIS, while non-WOAH-listed diseases are recorded in the Regional AAD Report. Additionally, NACA and WOAH RRAP will collaboratively publish combined data from WAHIS and the Regional AAD Report to enhance accessibility and benefit Member countries.

DISCUSSION

- In Bangladesh, the focal point for animal health was recently changed. Due to a critical situation over the past three months, the country was unable to submit the quarterly report. The newly appointed focal point expressed hope that moving forward, communication with relevant organizations will improve, and reports will be submitted regularly in the future.
- The regional disease reporting format is a rolling report, meaning that countries can submit their reports during any quarter of the year. When submitting, these reports should include data from January of the current year to the present quarter to ensure that no data is missed, even if some quarterly reports are not submitted on time.
- The quarterly reporting system, which began 25 years ago, faced several challenges in its early stages. Initially, countries submitted reports with "plus" or "minus" signs, which did not provide clear or meaningful information. To address this, a grading system with levels 1, 2, and 3 was introduced to offer greater clarity: Level 1: based on clinical signs and field observations; Levels 2 and 3: based on more thorough diagnostic methods.
- Throughout the years, the quality of reports has been questioned, especially in terms of whether countries have shifted to passive or active surveillance and whether they have benefited from capacity-building activities. Additionally, there was a query regarding whether reporting is mandatory or merely recommended by WOAH, as feedback from CBOs has varied on this matter.
- Over the years, many countries have improved their disease reporting through the use of levels 2 and 3 diagnostics, while very few still use level 1 (clinical observation). However, only a few countries (less than 40%) currently submit reports, and even fewer provide detailed epidemiological comments. Some countries conduct active surveillance for specific pathogens, but the overall number of countries submitting the disease reports remains a concern.
- Australia's reporting is recognized for providing detailed epidemiological comments in their reports. These comments help to better understand the disease situation, going beyond simple "plus" or "minus" signs. The thorough approach is a model for other countries to follow in disease reporting.
- The use of AI and big data tools was mentioned as a way to analyze the data collected over the past 25 years to find trends. The question of whether disease reporting is mandatory or just recommended was also raised, as there are differing opinions on this matter.
- Disease notification has been a foundational obligation of WOAH members since its inception in 1924, and it remains a mandatory requirement for member countries at the present time. This is one of the few obligations where the word "must" is used rather than "should." A suggestion was made to focus quarterly reporting on emerging and non-listed diseases to improve its relevance. Concerns were raised about countries that consistently fail to report, with a suggestion to ask these countries directly why they are not participating in the system.
- The issue of non-reporting may be due to duplication in the system. A proposal was made to reduce duplication, which could encourage more countries to participate. Additionally, it

was suggested to directly ask countries what they need and why they are not engaging in the reporting process.

- Improving disease reporting in the region is part of AP-AquaNet's Priority 3. Some surveys have already been conducted to identify gaps and reduce the reporting burden. One major issue is the coordination between focal points for disease notification and aquatic health. Sometimes, countries have separate focal points, and not all of them have access to the WAHIS system, causing inconsistencies in reporting. It was suggested that countries could have multiple accounts to access WAHIS, which might resolve some of these issues. There are ongoing discussions with the WAHIS team at headquarters about how to approach this issue.
- The discussion clarified that regional quarterly reporting and reporting directly to WAHIS are different systems with different purposes. The surveys conducted were specifically related to reporting into WAHIS, not regional reporting, which means the information gathered may differ between the two systems
- For India, there has been notable improvement in disease reporting, particularly through their National Surveillance Program. New diseases, such as Tilapia Parvovirus, Carp Edema Virus, and Red Sea Bream Iridoviral Disease (RSIVD), have been consistently reported. Furthermore, India acknowledges Australia's detailed epidemiological comments as a model, as they provide valuable insights into the disease situation.
- Thailand recently changed its focal point for aquatic animal health reporting, which caused a delay in the reporting process. The WOAH delegate is now under the Department of Livestock Development (DLD), and the process of requesting an account access for the WAHIS system took some time. Thailand has now received the account access and plans to submit reports to WAHIS once the system setup is complete. Additionally, the report for 2024 will soon be sent to NACA.

SESSION 7. OTHER MATTERS AND CLOSING

- **Disease card for Translucent Post-larvae Disease (TPD). Dr. Qingli Zhang** (Yellow Sea Fisheries Research Institute) made a summary presentation on Translucent post-larvae disease (TPD). The disease, caused by *Vibrio parahaemolyticus* (Vp_{TPD}), is a severe emerging shrimp disease. Vp_{TPD} was highly infectious, particularly to post-larvae at four to seven days old (PL4~PL7). The cumulative mortality of the infected post-larvae could reach up to 100% in three days in a typical disease case. The infected shrimp post-larvae exhibited typical clinical syndromes, such as pale or colorless hepatopancreas and empty digestive tract, making the diseased individuals to become transparent and translucent; therefore, these diseased individuals were named “translucent post-larvae” or “glass post-larvae” by local farmers. The emerging disease has affected shrimp nurseries in Ecuador, China and Vietnam in recent years. It led to the closure of more than 80% of coastal shrimp nurseries in China in the spring of 2020. A novel protein, *Vibrio* high virulent protein (VHVP)-2 (VHVP-2) (MW> 100 KD), is responsible to the lethal virulence of *V. parahaemolyticus* to shrimp post-larvae.

Different *Vibrio* species carrying the key virulence genes of Vp_{TPD} can infect post-larvae of *P. vannamei* and cause TPD, revealing the diversity of TPD pathogens, and the pathogenic *Vibrio* strains has been temporarily named as *Vibrio* causing TPD *(*V_{TPD}). Polyhexamethylene biguanide hydrochloride (PHMB) is an alternative disinfectant against V_{TPD} in *Penaeus vannamei*. One mg/L PHMB showed a strong protective effect on the shrimp challenged with 10^1-10^4 CFU/ml of V_{TPD}.

Discussion

- Following the presentation, the occurrence of the shrimp luminous bacterial disease in the late 80s and early 90s was recalled, which had a significant impact on *Penaeus monodon*. The disease was primarily identified by observing the larvae or post-larvae in the dark, where they would glow. This glowing characteristic helped confirm the presence of the infection, which had devastating effects on shrimp farming during that time.
- In Vietnam, surveillance and testing for TPD so far have shown negative results, despite some suspected cases. Researchers in Vietnam are actively monitoring the situation and have confirmed that TPD has not yet occurred in the country. Concerns are more on its potential future threat in the shrimp industry.
- Thailand has been actively responding to TPD by establishing a taskforce committee that includes academic professionals and experts. Surveillance activities, particularly on imported shrimps have been initiated. The country has also developed detection methods using the V_{HVP} primer to diagnose TPD, with ongoing efforts to improve surveillance and preparedness against emerging shrimp diseases. Thailand's proactive measures have been acknowledged, and it was mentioned that other shrimp-producing countries are also preparing for potential outbreaks by conducting surveillance and strengthening biosecurity measures to prevent the spread of emerging diseases like TPD.
- Two key questions were raised concerning TPD disease card:
  - Whether the 2015 report on TPD in Ecuador had been verified through analysis of archived samples or was based solely on physical appearances. It was clarified that the report was based on a publication from 2015, in which workers from a company discussed the occurrence of TPD during a meeting, but no archived sample analysis was involved.
  - Whether *Vibrio* species other than *Vibrio parahaemolyticus* were also linked to TPD. It was clarified that several species of *Vibrio*, including *Vibrio parahaemolyticus* (V_p), *V. campbelli* (V_c), and *V. owensii* (V_o), could carry the plasmid responsible for causing TPD. It was also noted that no species had yet been identified that could carry both the V_{TPD} and V_{AHPND} plasmids simultaneously.
- On other susceptible species for TPD, squids can carry the pathogen but do not typically show any signs of the disease. Infected nereid worms also do not show any visible disease signs, despite being capable of transmitting the disease. The investigation involved collecting samples and performing molecular analysis, but no histopathological analysis or detailed observation was undertaken on these other susceptible species.

- In Bangladesh, *P. vannamei* culture is relatively new and has been introduced on a small-scale basis. The government requires confirmation that all biosecurity activities, including Good Aquaculture Practices (GAP), and related security measures have been followed before granting permission for cultivation. Once these requirements are confirmed, farmers are permitted to culture *P. vannamei* on a small-scale. So far, no TPD infection has been observed in *P. vannamei* culture. A request is made for training of staff and upgrading of diagnostic laboratories to improve the health management of this new industry.
- The detection of TPD involves specific plasmid, the V_{TPD} plasmid which is significantly larger (around 180 kbp) than the V_{AHPND} plasmid (60-70 kbp). This difference affects the detection method, and while the TC toxin gene is part of the V_{AHPND}, it is not essential for detecting TPD specifically. It was also clarified that several *Vibrio* species can also carry the plasmid responsible for causing TPD.
- On disease management methods for TPD, it was clarified that while methods applied for management of AHPND can work to some extent, they are not as effective for TPD. This is because TPD has a unique mode of transmission, particularly through aerosols, which makes it more difficult to control. In some cases, if one hatchery gets infected with the *Vibrio* causing TPD, neighbouring hatcheries can be infected within the following days. Therefore, new strategies to prevent aerosol transmission have been recommended to manage TPD more effectively.
- On TPD detection in culture water, the pathogen can be detected by molecular methods in filtered water. Additionally, bacterial culture method can also be used for detection.

- **Other Matters:** The 12th Symposium on Diseases in Asian Aquaculture (DAA 12) will be held on September 2025 in Chennai, India. The Secretary of the AG is proposing to have the next meeting (AGM 24) as a back-to-back in-person event with DAA 12 (which was the practice pre-pandemic). If agreed by AG members and co-opted members, NACA member country representatives will not be invited to attend as Observers.

- The AGM 23 officially closed at 16:30 PM (BKK time), 15 November 2024.

GENERAL RECOMMENDATIONS

From the extensive discussions made throughout the meeting, the following recommendations were formulated by the group:

- Compartmentalization (instead of zoning) should be promoted in aquaculture systems, as this has already been applied in some countries to identify areas with established biosecurity (sone including quarantine) measures for proper health maintenance of the cultured stocks (whether it is for ornamental or food fish industries).
- As some countries have already established free compartments and use them for international trade, these compartments are not formally declared as disease-free under

WOAH standards through self-declaration of freedom. It is therefore recommended that a formal declaration should be facilitated which will highlight the need for clearer guidelines and greater transparency to support international recognition and trade.

- As aquaculture often evolves faster than supporting policies and programs, functional linkages between food safety authorities, aquaculture and fisheries authorities, and veterinary services are essential to keep pace with technology development. Promoting multidisciplinary teams, including aquatic veterinarians, aquaculturists, biologists and economists was, therefore, recommended to strengthen collaboration and decision-making towards further development of the aquaculture sector. Strengthening linkages among these authorities and stakeholders will facilitate practical and sustainable biosecurity measures, ensuring strategies are context-specific and adaptable to varying scales of production.
- It is recommended that "healthy production" should be promoted over "profit-driven" approaches, as it supports profitability by reducing disease losses and it emphasizes stakeholders involvement in biosecurity planning and capacity-building programs, with examples from Thailand and Vietnam.
- It is recommended that the industry, in general, should be engaged in biosecurity initiatives and simulation exercises to help them develop more practical and effective strategies for disease prevention and health management.
- On resource mobilization for aquatic animal health management, it is recommended to look out for potential donor funding where aquaculture is under-represented. Example is the pandemic fund wherein proposal focusing on zoonotic aquatic animal diseases can be developed for a possibility of securing project funds for the region.
- With the increasing importance of social behavioural changes (SBC) and gender equality and social inclusion (GESI), it is recommended that both SBC and GESI be incorporated into upcoming important meetings (e.g. DAA12) and projects on aquatic animal health.
- It is recommended that survey tools be developed for assessing biosecurity measures, similar to the one developed for economic loss (due to diseases) analysis by NVI in collaboration with WorldFish, which can easily be applied in developing countries and be useful for small-scale farmers.
- On the development and implementation of biosecurity plans, it is recommended that shared templates and basic guidelines be developed to support a customized veterinary health plans, especially for small-scale farms.
- For improved understanding and adoption of farm-level biosecurity measures, it is recommended that biosecurity concepts should be simplified and presented in clear/practical terms, especially to farms with limited capacity to implement biosecurity measures.
- Effective implementation of biosecurity requires collaboration across disciplines. It is, therefore, recommended that centralized repositories for shared protocols (e.g. tank disinfection and chlorination) which can enable farms to download and adapt them as needed. It was also suggested that conducting regular team works should be done to monitor risks, address weaknesses, and strengthen practices. Enhancing connections

between authorities and stakeholders was also encouraged to promote sustainable biosecurity measures.

- On disease reporting, it was recommended that Australia's report serve as a model for other countries as it contains detailed epidemiological comments for a better understanding of the disease situation in the country.
- It was recommended that the disease card prepared for TPD be reviewed again to decide whether this new disease should be included in the aquatic animal disease reporting system as a non-WOAH listed disease. This would help to provide clearer guidelines for reporting and tracking the disease's prevalence across affected regions.

Annex A

23RD Meeting of Asia Regional Advisory Group on Aquatic Animal Health (AGM23)
(Virtual Meeting)
14-15 November 2024
13:00-16:00 (BKK time; GMT+7)

Provisional Agenda:

Day 1 (14 November; Thursday)

Welcome and Introduction (15 mins)

- Introduction and welcome remarks (**Dr. Eduardo Leaño, DG NACA**)
- Self-introduction (**all participants**)
- Election of Chair and Vice-Chair

Chairperson will take over in moderating the meeting

- Progress since AGM 22 (20 mins; **Dr. Eduardo Leaño, NACA**)
- Updates from WOAH Aquatic Animal Health Standards Commission (20 mins; **Dr. Ingo Ernst, AAHSC, WOAH**)
- Aquaculture Biosecurity (PMP/AB) and FAO's AAH Initiatives in the AP region (20 mins; **Dr. Melba Reantaso, FAO-TBC**)
- Updates on WOAH Asia-Pacific Network on Aquatic Animal Health (AP-AquaNet) (20 mins; **Dr. Thitiwan Patanasatienkul, WOAH-RRAP**)

Day 2 (15 November; Friday)

- Welcome and recap of day 1 (5 mins; **NACA Secretariat**)
- Recent Updates of Farm-level Aquatic Animal Health Management (20 mins; **Dr. Andy Shinn)**
- Application of risk analysis at the farm-level (20 mins; **Yuko Hood, DAFF Australia**)
- Methodology for Assessing Biosecurity Risk in Small-scale farms: Experience from Colombia (20 mins; **Maria Fernanda Serrano dela Cruz, NVI**)
- AMR in Aquaculture: Importance of Epidemiological Cutoff Values for Aquatic Animal Health Antimicrobial Sensitivity Testing (20 mins; **Dr. Biyun Ching, NParks**)
- AP Aquatic Animal Disease Reporting (status and new proposal) and disease list (15 mins; **Dr. Eduardo Leaño, NACA; Dr. Thitiwan Patanasatienkul, WOAH-RRAP**)
- TPD Disease Card (15 mins; **Dr. Qingli Zhang; YSFRI**)
- Discussion (and possible endorsement for listing) on TPD (20 mins)
- Other matters (DAA12-Chennai, India; AGM24-virtual or in-person?) and Closing (20 mins)

ANNEX B

List of Participants (AGM 23)

I. Advisory Group Members
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Annex C:
List of Diseases in the Asia-Pacific

Reportable Aquatic Animal Diseases
(Beginning January 2025)

1. DISEASES PREVALENT IN THE REGION	
1.1 FINFISH DISEASES	
OIE-listed diseases	**Non OIE-listed diseases**
1. Infection with epizootic haematopoietic necrosis virus	1.Grouper iridoviral disease
2. Infection with infectious haematopoietic necrosis virus	2.Viral encephalopathy and retinopathy
3. Infection with spring viraemia of carp virus	3.Enteric septicaemia of catfish
4. Infection with viral haemorrhagic septicaemia virus	4.Carp edema virus disease (CEVD)
5. Infection with *Aphanomyces invadans* (EUS))	
6. Infection with red seabream iridovirus	
7. Infection with koi herpesvirus	
8. Infection with tilapia lake virus	
1.2 MOLLUSC DISEASES	
OIE-listed diseases	**Non OIE-listed diseases**
1. Infection with *Bonamia exitiosa*	1. Infection with *Marteilioides chungmuensis*
2. Infection with *Perkinsus olseni*	2. Acute viral necrosis (in scallops)
3. Infection with abalone herpes-like virus	
4. Infection with *Xenohaliotis californiensis*	
5. Infection with *Bonamia ostreae*	
1.3 CRUSTACEAN DISEASES	
OIE-listed diseases	**Non OIE-listed diseases**
1. Infection with Taura syndrome virus (TSV)	1. Hepatopancreatic microsporidiosis (HPM) caused by *Enterocytozoon hepatopenaei* (EHP)
2. Infection with White spot syndrome virus (WSSV)	
3. Infection with yellow head virus genotype 1	2. Viral covert mortality diseases (VCMD)
4. Infection with Infectious hypodermal and haematopoietic necrosis virus (IHHNV)	3. *Spiroplasma eriocheiris* infection
5. Infection with Infectious myonecrosis virus (IMNV)	
6. Infection with *Macrobrachium rosenbergii* nodavirus (MrNV; White tail disease)	
7. Infection with *Hepatobacter penaei* (Necrotising hepatopancreatitis)	
8. Acute hepatopancreatic necrosis disease (AHPND)	
9. Infection with *Aphanomyces astaci* (Crayfsh plague)	
10. Infection with Decapod iridescent virus 1 (DIV1)	
1.4 AMPHIBIAN DISEASES	
OIE-listed diseases	**Non OIE-listed diseases**
1. Infection with *Ranavirus* species	
2. Infection with *Bachtracochytrium dendrobatidis*	
3. Infection with *Batrachochytrium salamandrivorans*	
2. DISEASES PRESUMED EXOTIC TO THE REGION	
2.1 Finfish	
OIE-listed diseases	**Non OIE-listed diseases**
1. Infection with HPR-deleted or HPR0 salmon anaemia virus	1. Channel catfish virus disease
2. Infection with salmon pancreas disease virus	
2. Infection with *Gyrodactylus salaris*	
2.2 Molluscs	
OIE-listed diseases	**Non OIE-listed diseases**
1. Infection with *Marteilia refringens*	
2. Infection with *Perkinsus marinus*	

Annex D:

ASIA REGIONAL TECHNICAL GUIDELINES – STATUS OVERVIEW (ADOPTED FROM AGM 9 REPORT)

Element of technical guidelines	Progress / status	Gaps / opportunities
1. Disease reporting *An understanding of the basic aquatic animal health situation is a pre-requisite for prioritising activities, developing national policy and identifying pathogens of national importance.*	• Regional QAAD reporting system established – participation has increased • The QAAD list has incorporated emerging diseases that were later listed by the OIE • Many countries have established national lists for reporting purposes with appropriate supporting legislation	• Participation could improve further – some countries report irregularly • The proposed regional core utilising the OIE's WAHID will streamline reporting and may improve participation • The exact status of individual countries with regard to adoption of national lists and supporting legislation is not know
2. Disease diagnosis *Diagnosis requires various levels of data, starting with farm- or site-level observations and progressing in technical complexity to electron microscopy, immunological and nucleic acid assays and other biomolecular methods. This means all levels of expertise, including that of the farmer and extension officer working at the pond side, make essential contributions to rapid and accurate disease diagnosis.* *Effective diagnostic capability underpins a range of programs including early detection for emergency response and substantiating disease status through surveillance and reporting.*	• Diagnostic capabilities have improved in many countries • NACA disease cards have been developed and maintained for emerging diseases • The Asia regional diagnostic manual has been developed • An Asia regional diagnostic field guide has been developed • OIE reference laboratories • Regional reference laboratories – where no OIE reference laboratory exists • Regional Resource Experts are available to provide specialist advice • Ad hoc laboratory proficiency testing programs have been run	• OIE twinning programs are a means to assist laboratories to develop capabilities • The exact status of diagnostic capability in individual countries is not certain • There is limited or no access to ongoing laboratory proficiency testing programs • Some areas of specialist diagnostic expertise are lacking • Network approaches are a means draw on available diagnostic expertise
3. Health certification and Quarantine measures *The purpose of applying quarantine measures and health certification is to facilitate transboundary trade in aquatic*	• Strong progress has been made, particularly for high risk importations (e.g. importation of broodstock and seed stock) • Training has been provided through regional initiatives (e.g. AADCP project)	• The importance of supporting aquatic animal health attestations through sound aquatic animal health programs continues to be underestimated, with possible ramifications for trade

animals and their products, while minimising the risk of spreading infectious diseases	• Commercial implications for trade have driven improved certification practices • Harmonisation with OIE model certificates has occurred	• Some inappropriate or illegal activities continue and threaten to spread trans-boundary diseases
4. Disease zoning and compartmentalisation *Zoning (and compartmentalization) allows for part of a nation's territory to be identified as free of a particular disease, rather than having to demonstrate that the entire country is free. This is particularly helpful to facilitate trade in circumstances where eradication of a disease is not feasible.Zoning is also an effective tool to restrict the spread of important pathogens and aid in their eradication.*	• Is an emerging need to meet requirements of importing countries • To facilitate trade, some countries are working toward having compartments and zones recognised	• Where common health status can be identified restrictions on trade can be reduced • Training opportunities would be beneficial • Learn from the experience of terrestrial animal industries (e.g. poultry)
5. Disease surveillance and reporting *Necessary to produce meaningful reports on a country's disease status by providing evidence to substantiate claims of absence of a particular disease and thereby support import risk analysis, justify import health certification requirements, and enable export health certification*	• Regional Resource Experts are available to provide specialist advice • Training has been provided through a number of initiatives (e.g. AADCP project) • Many published resources are available, including those of the OIE (publications and the OIE centre for aquatic animal epidemiology) • Collation of surveillance information has improved through participation in international reporting	• Remains a reliance on passive surveillance. Active surveillance may be beneficial but cost is often a barrier. • Methodologies to undertake effective but low-cost active surveillance would be of assistance • Epidemiological expertise is often limited • There is a need to increase surveillance of wildlife to support health status
6. Contingency planning *Important to provide a rapid and planned response for containment of a disease outbreak—thereby limiting the impact, scale and costs of the outbreak*	• Important provides a rapid and planned response for containment of a disease outbreak Some countries have advanced contingency planning with appropriate supporting legislation • Some countries have tested contingency plans through simulation exercises • Resources are available (e.g. Australia's AQUAVETPLAN, FAO guidelines, OIE links to resources)	• The exact status of contingency planning in individual countries is not certain • Training in emergency management frameworks may be useful • Support for developing contingency plans might usefully be directed at particular disease threats e.g. IMN

7. Import risk analysis *The movement of live aquatic animals involves a degree of disease risk to the importing country. Import risk analysis (IRA) is the process by which hazards associated with the movement of a particular commodity are identified and mitigative options are assessed. The results of these analyses are communicated to the authorities responsible for approving or rejecting the import.*	• Numerous resources and case studies published • The approach has been applied, particularly for some circumstances e.g. import of live *P. vannamei* • However risk analysis is not always applied, or is not applied appropriately • Regional training has been provided (e.g. AADCP project)	• There is a need to build awareness of the concepts • Training can be abstract and disengaging - should aim at trainees learning on scenarios relevant to their circumstances • This is a high priority generic need that is suited to development of a central training program
8. National strategies *The implementation of these Technical Guidelines in an effective manner requires an appropriate national administrative and legal framework, as well as sufficient expertise, manpower and infrastructure.*	• Many countries have developed national strategies • Detailed assistance has been provided to some countries (e.g. AADCP project)	• The exact status of national strategies in individual countries is not certain • The OIE's PVS tool provides a means of assessing the progress of individual countries

Annex E: Proposed Disease Card