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Aquatic Emergency Preparedness and Response System in Viet Nam

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Abstract

Viet Nam is one of the top worldwide producers of aquaculture products which accounts for about 22 percent of total agricultural GDP of Viet Nam. Recently, diseases have become the biggest challenge for global aquaculture development therefore the Vietnamese government has paid close attention to develop an effective aquatic emergency preparedness and response system to timely deal with disease introduction and outbreaks. The Department of Animal Health (DAH), under the Ministry of Agriculture and Rural Development (MARD), which is the competent authority of aquatic animal health management. To monitor transboundary diseases (especially the OIE-listed diseases), the current Vietnamese regulations only allow import of aquatic animals and its products which are certified as disease-free by competent authority of exporting country, and export aquatic animals and its products complying with importing conditions of importing country. Regional Animal Health Offices (belong to DAH) shall carry out sampling for testing pathogens and isolation for imported aquatic animals and its products as regulated in Circular 26/2016/TT-BNNPTNT dated 30 June 2016 before granting permit to import or export. For domestic transportation of aquatic animals, provincial sub DAH is responsible for monitoring infectious pathogens to certify disease-free status of aquatic animals before issuing health certificate for movement. In addition, a reporting and response system to aquatic animal diseases was established in the country from farm level to central level (DAH). Early detection and warning of diseases is critical for disease prevention and control, thus since 2014, the DAH has implemented national surveillance programs focusing on dangerous diseases in the key farming species (brackish-water shrimps, pangasius catfish) according to Circular 04/2016/TT-BNNPTNT dated 10 May 2016 of MARD and support exportation of aquatic animals and its products complying with international regulations and importing countries based on OIE recommendations and Circular 14/2016/TT-BNNPTNT dated 2 June 2016.

Introduction

Viet Nam is one of the top worldwide producers of aquaculture products which accounts for about 22 percent of total agricultural GDP of the nation. The mainland of Viet Nam is divided into seven different ecological parts including the northern midland and mountain (with two sub regions of northeast and northwest), the Red River Delta, the North Central Coast, the South Central coast, the Central Highlands, the South East and the Mekong Delta (Figure 1A), of which the Highland and the northern mountainous area (except for Quang Ninh province) rearing mostly freshwater aquatic animals, the five remaining regions have freshwater, brackish and marine aquaculture areas. The provinces of the Southwest region (Mekong delta area) have aquaculture area and the farming production accounts for 70% of the total national production. Among the cultured species, brackishwater shrimp and *Pangasius* catfish are the two major cultured species in Viet Nam, mainly for export demand. Currently, Viet Nam has 30 shrimp farming provinces (Figure 1B), with black tiger shrimp (*Penaeus monodon*) and white leg shrimp (*Litopenaeus vannamei*) as the two dominant cultured species. *Pangasius* catfish are cultivated intensively in 10 provinces in Mekong River Delta in the South of Viet Nam (Figure 1C). In addition, tilapia, traditional freshwater fish, marine fish and lobsters are also important to

the aquaculture industry of Viet Nam. Recently, diseases have become one of the biggest challenges for global aquaculture including Viet Nam, especially diseases in shrimps and *Pangasius* catfish, therefore Vietnamese government has paid close attention to develop an effective aquatic emergency preparedness and response system to timely deal with disease introduction and outbreaks.

Aquatic animal health system in Viet Nam

Aquatic animal health structure

The Ministry of Agriculture and Rural Development (MARD) is a governmental agency performing governance functions in the fields of nationwide agriculture, forestry, salt production, irrigation/ water services and rural development; governance functions for public services of the fields under its management.

Its subordinate agencies related to aquatic animal health are the Department of Animal Health (DAH), Directorate of Fisheries (D-FISH), National Agro-Forestry and Fisheries Quality Assurance Department (NAFIQAD), National Centre for Agriculture Extension, Research Institute for Aquaculture, and aquaculture universities. Of which the DAH, D-FISH and NAFIQAD take the main responsibilities (Figure 2).

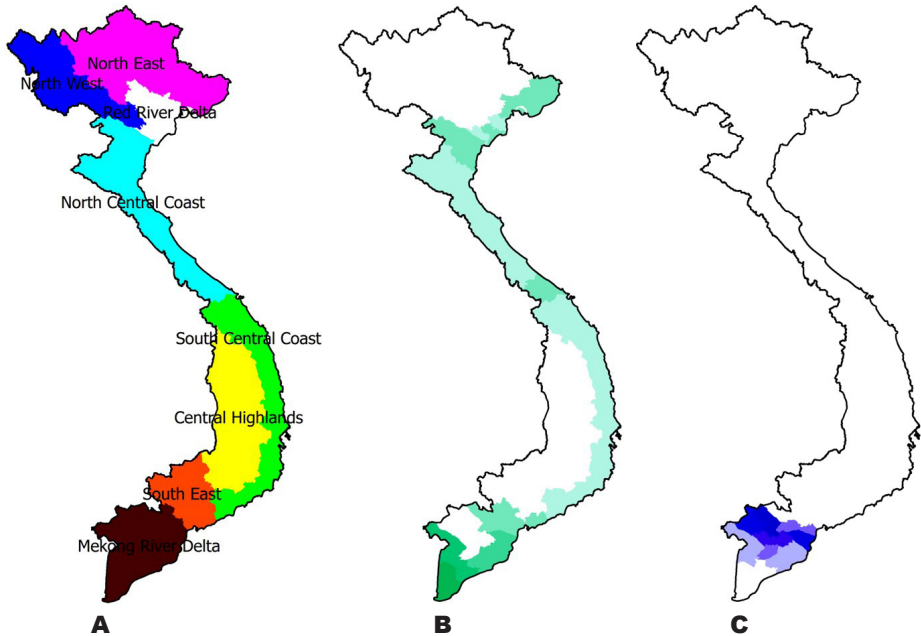


FIGURE 1. Ecological regions in Vietnam (A), 30 provinces produce brackish shrimps (B), and 10 provinces produce *Pangasius* (C)

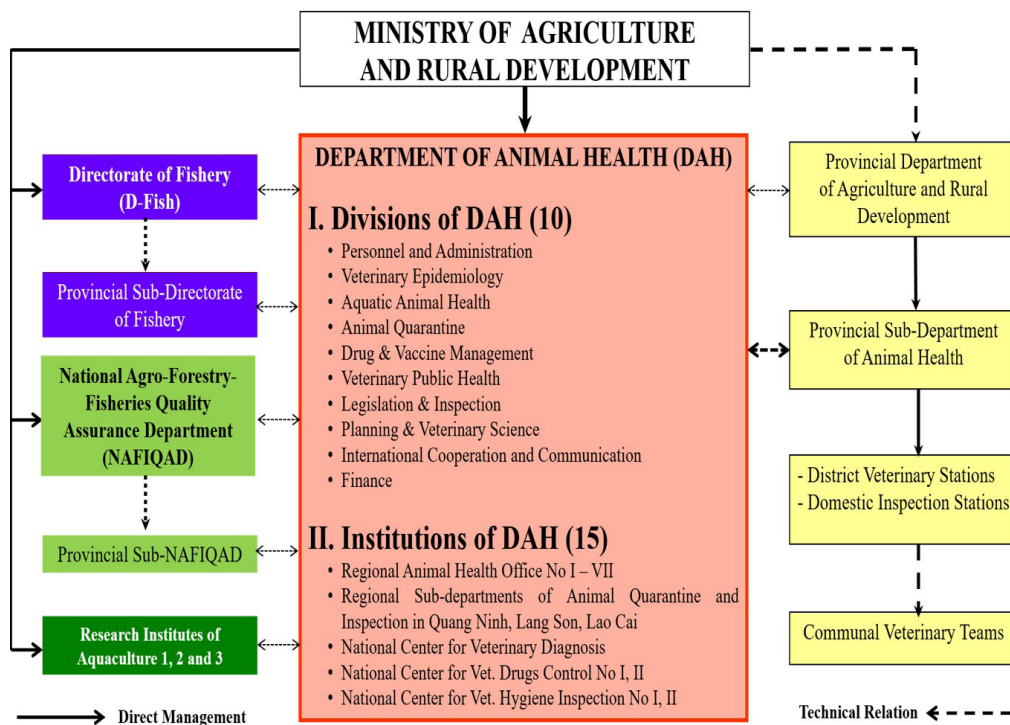


FIGURE 2. Organizational chart of aquatic animal health system in Viet Nam

The DAH is the aquatic animal health competent authority of Viet Nam. The DAH headquarters is located in Hanoi, it has 10 functional divisions. Division of Aquatic Animal Health takes the responsibilities for prevention and control of aquatic animal diseases; Division of Animal Quarantine in charge for animal quarantine and inspection (inspect and supervise quarantine for aquatic animal and aquatic animal products for export not intended for human consumption and import and domestic transportation) and Division of Veterinary Drugs and Vaccines Management is responsible for control of veterinary medicines, veterinary biologicals and vaccines for aquatic animal treatment. The agencies under DAH's management include 5 technical centres, 7 Regional Offices for Animal health (RAHOs) in charge of aquatic animal health management, diagnosis of aquatic animal diseases for the provinces of the region; 3 Animal border control stations responsible for quarantine of aquatic animals and aquatic animal products for export, import transferred through border gates. Local authorities are 60 provincial sub DAHs and 3 provincial sub D-FISH throughout the country (Figure 3).

The NAFIQAD is an agency in charge of governance in agro-forestry and fisheries quality and food safety

including inspection and granting certification for aquatic animals export intended for human consumption. The D-FISH manages nationwide aquaculture including fishery feed and biological products used in farming.

Aquatic animal quarantine in Viet Nam

Legislations on import and export of aquatic animals/products

Regulations on import and export of aquatic animals/products are specified in the Animal Health Law in 2015, Decree No. 35/2015/ND-CP of the Government dated 15 June 2015 of the Government detailing for implementation of number of Articles of the Animal Health Law, Circular No. 26/2016/TT-BNNPTNT dated 30 June 2016 of the Ministry Agriculture and Rural Development regulating on quarantine of aquatic animals and aquatic animal products. Accordingly, aquatic animals and its products are only allowed to be imported to Vietnam when they are certified as disease-free by competent authority of exporting country, and exported complying with importing conditions of importing country.

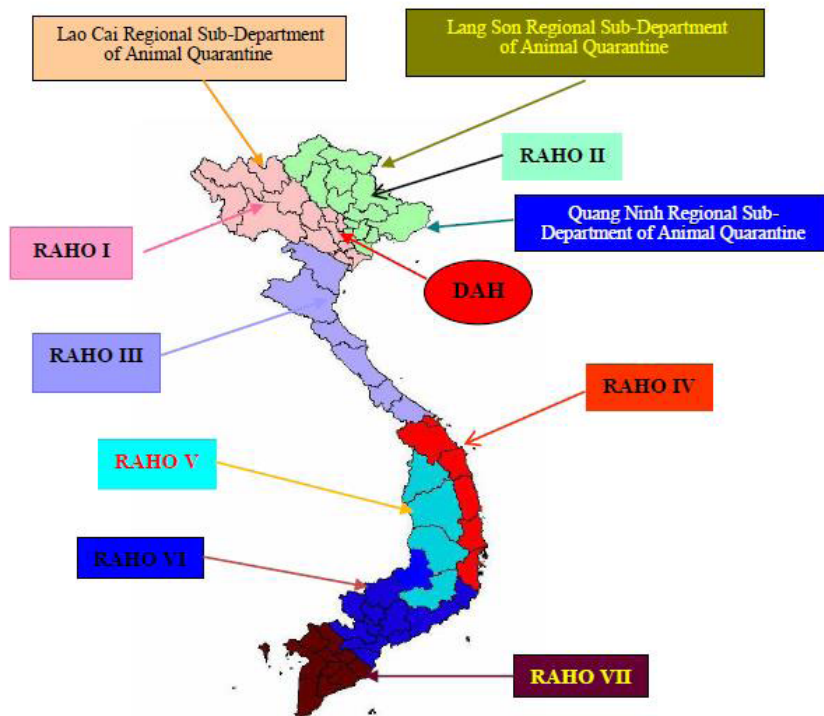


FIGURE 3. Locations of DAH headquarter and its units

Structure of aquatic animal quarantine system

The agencies belonging to Aquatic animal health system performing aquatic animal quarantine functions are Animal Quarantine section in DAH (DAH headquarter, 7 Regional Animal Health Offices I-VII, 3 Regional sub Department of Animal Quarantine in Lang Son, Lao Cai and Quang Ninh (3 provinces of border gates) and 63 provincial Sub-DAHs.

The DAH manages import and export of animals and animal products, including aquatic animals and issues Health Certificate for imported/exported aquatic animals/products (except Health Certificate for aquatic animal products exported for human consumption is granted by NAFIQAD), 63 Sub-DAHs manage local transportation of animals and animal products through animal Quarantine Checking Points along transportation roads (Figure 4).

Lists of aquatic animals, aquatic animal products; aquatic animal diseases

Subject to quarantine and inspection before import into Viet Nam. It is specified in Circular 26/2016/TT-BNNPTNT dated 30 June 2016 of MARD.1.3.

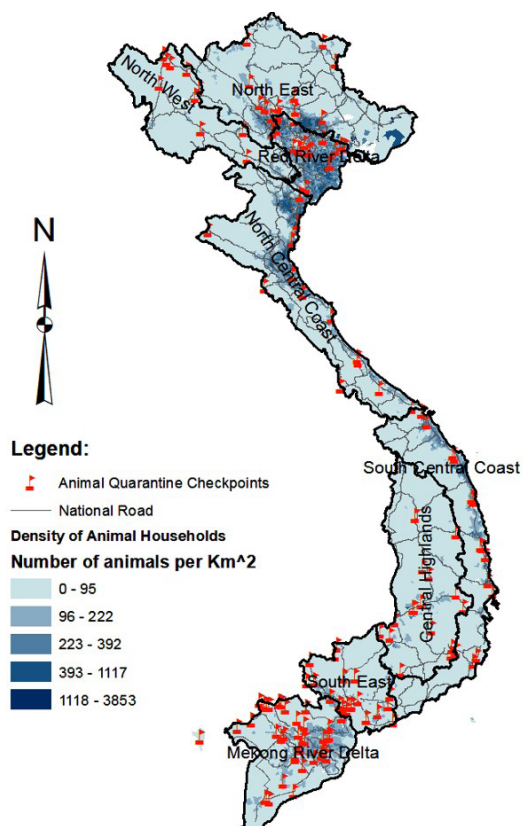


FIGURE 4. Map shows domestic animal quarantine checkpoints in Viet Nam

Legal texts on aquatic animal disease prevention and management

Structure of aquatic animal disease response system

(DAH, MARD). In case of disease occurrence in one farm, the farm owner must notify competent authorities at communal or district levels, then the information will be transferred to provincial level (sub DAH), and to the DAH (headquarter and regional office). After receipt and the information clarified, the provincial Sub DAH shall conduct a field investigation to assess the situation and take samples for testing to identify the pathogens. As they detected the pathogens/causes, an updated report will be submitted to the DAH and RAHO. The DAH will supervise the implementation of provincial sub DAH, guide and support in case of new or dangerous disease outbreaks. The DAH reports aquatic disease situation to the MARD and international organizations, co-operate and request for their help in emergency disease occurrence. The collaborating agencies include D-FISH, national extension system, Research Institutes and Universities, and farmer associations.

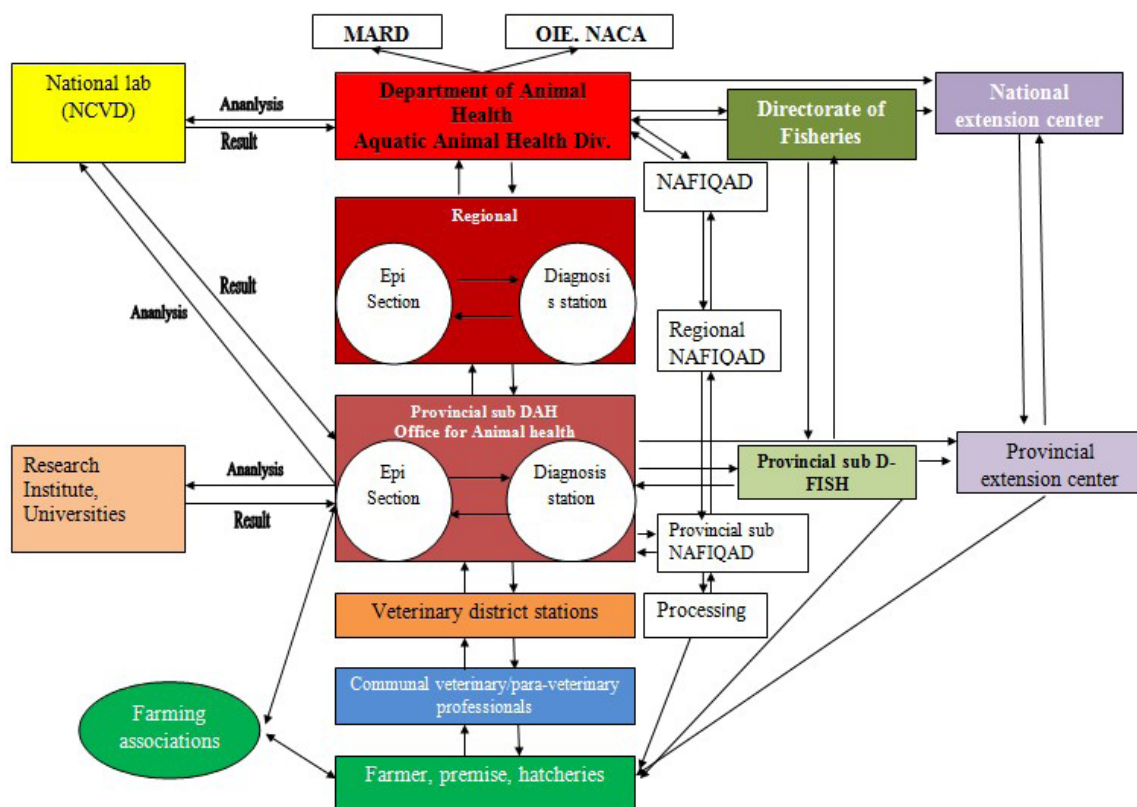


FIGURE 5. Flowchart for gathering disease information and response to disease outbreaks

List of aquatic animal diseases subject to compulsory declaration

According to Circular No 04/2016/TT-BNNPTNT, the following diseases must be reported to the competent authorities:

Shrimp diseases (8)

- White Spot Disease (WSD)
- Taura Syndrome (TS)
- Yellow Head Disease (YHD)
- Infectious Myonecrosis Disease (IMD)
- Infectious Hypodermal and Hematopoietic Necrosis Disease (IHHN)
- Acute Hepatopancreatic Necrosis Disease (AHPND)
- Lobster Milky Disease (LMD)
- *Enterocytozoon hepatopenaei* (EHP)

Fish diseases (4)

- Spring Viraemia of Carp (SVC)
- Koi Herpesvirus Disease (KHD)
- Viral Nervous Necrosis/Viral Encephalopathy and Retinopathy (VNN)
- Enteric Septicaemia of Catfish (ESC)

Mollusk (2)

- *Perkinsus marinus*
- *Perkinsus olseni*

Standard operating procedures

Circular No 04/2016/TT-BNNPTNT of MARD specifies standard operating procedures for monitoring, detection, reporting and response to disease outbreak as follows:

The farm owner, private aquatic animal health professional, or the person who identified diseased aquatic animals or observed mass mortality in aquatic animal populations or clinical signs of disease or observed the abnormal behaviors must inform veterinary staff in the communal or district level or the nearest specialized bodies of aquatic animal health.

The communal veterinary staff after receiving notification must visit the place where diseased or dead or aquatic animals exhibiting abnormal behavior were detected to clarify the information and report to the veterinary station.

Veterinary station shall carry out on-site verification of outbreak information in the farm and send report

of verified results to the provincial body responsible for specialized management of animal health at provincial sub DAH. In case the epidemic disease has complicated evolution that exceeds its competence, the station must inform provincial sub DAH. Sub DAH sends staff to the suspected infected farm to recommend treatment, take samples for pathogen testing at designated laboratories, and verify origin of infection. If the sample is positive for pathogens, the farmer is guided on the proper disposal of the infected aquatic animals and taught how to disinfect the farming area then sends report to RAHO and the DAH headquarter.

Regional veterinary health office (RAHO) is responsible for summarizing and sending report to the DAH on aquatic animal disease situation of provinces in the region. The DAH shall report to the Minister of the MARD; to international organizations (NACA, OIE) in which Viet Nam is a member country or has commitment to notify disease occurrence.

In addition to early warning of disease occurrence, the provincial sub DAHs annually submits to the local competent authorities for approval, plans for the prevention and control of aquatic animal diseases including monitoring and information dissemination, training of local professionals, and supervise the implementation of the approved plan. The DAH develops national programs/strategies on prevention and control of aquatic animal diseases (national program on surveillance, epidemiological research, outbreak investigation).

During implementation of disease prevention and control, the DAH collaborates with other agencies from public and private sectors as follows:

- D-FISH system monitors the aquaculture environment, guides farmers on the prevention and control of diseases and shares environmental monitoring results in aquaculture and disease data for early warning and response to outbreaks.
- NAFIQAD collaborates with DAH to certify commodities that meet conditions for export (pathogens testing) intended for human consumption and recommend to treat infected commodities. Provincial sub NAFIQADs collaborate with provincial sub DAHs in monitoring

the harvest and transportation of aquatic animals to processing plants; in monitoring diseased aquatic animals, in farms; disseminate information on the violation of food safety in farm; and carry out investigation on the origin of the disease

- National extension center system collaborate in prevention and control of aquatic animal diseases, and propaganda and promote good farming practices models to farmers.
- Aquaculture associations collaborate and propose measures in prevention and control of aquatic animal diseases.
- Research Institutes for Aquaculture and universities provide testing and diagnostic services. They also provide information on research and experiment done or needs to be done for re-emerging or new disease for the DAH and submit research proposals on measures for the prevention and control of aquatic animal diseases.

Active surveillance programs

Surveillance of shrimp diseases

From 2014-2015

DAH collected about 8,770 samples for surveillance of pathogens (WSSV, AHPND, EHP, and IHNV), including shrimp, water, sediment, vector animals and feed from 169 commercial establishments (5,764 samples) in five provinces (Quang Ninh, Nam Dinh, Ha Tinh, Ben Tre and Soc Trang) and 60 breed establishments (3,007 samples) in two provinces (Ninh Thuan and Binh Thuan).

In 2016

DAH continued to cooperate with provincial competent authorities to conduct active surveillance for WSSV, AHPND, EHP, and IHNV in brackishwater shrimp in Ninh Thuan, Binh Thuan, Ben Tre, Bac Lieu and Soc Trang provinces from July to December of 2016.

In 2017

Disease surveillance following the “National Plan on disease surveillance in farmed shrimp and pangasius catfish for export, in the period 2017-2020” (issued together with Decision No. 1038/QĐ-BNN-TY dated 29 of March 2017 by the Minister of MARD). Tested pathogens were those important to shrimp farming and listed by the OIE or under concern of importing countries, including WSSV, AHPND, YHV, TSV and IHNV.

Surveillance of *Pangasius* diseases

From 2015-2016

Implementation of the “National Plan on prevention and control of diseases in *Pangasius* catfish in the period from 2015-2020” issued with Decision No. 4995/QĐ-BNN-TY dated 20 November 2014 of the Minister of MARD, DAH carried out a pilot surveillance of two infectious diseases in *Pangasius* catfish in the three key farming provinces of *Pangasius* catfish (An Giang, Ben Tre and Dong Thap). A total of 120 *Pangasius* farms (consisting of 30 hatcheries and nursing farms and 90 commercial farms) in three key farming provinces were continuously sampled every two weeks for five months, frequency two weeks/sampling round. Fish, water and sediment samples were collected for testing to detect pathogens of enteric septicemia of catfish disease (caused by *Edwardsiella ictaluri*) and hemorrhage disease (caused by *Aeromonas hydrophila*) in order to figure out some epidemiological characteristics of these diseases.

In 2017

Implementing the “National Plan on disease surveillance in farmed shrimp and *Pangasius* catfish for export, in the period 2017-2020,” two *Pangasius* establishments were selected for surveillance program from August 2017 in Dong Thap and Ben Tre provinces. Five sampling rounds were conducted with 244 samples collected to monitor pathogens of enteric septicemia of catfish disease (caused by *Edwardsiella ictaluri*) and hemorrhage disease (caused by *Aeromonas hydrophila*).

Diagnosis and testing systems for aquatic animal diseases in Viet Nam

Public laboratory for testing aquatic animal diseases

(1) Aquatic animal health system (national laboratories, under DAH's management and local laboratories under provincial sub DAH and sub NAFIQAD): 41 public laboratories at both levels, of which 20 public laboratories were granted with ISO 17025 and accredited by Competent authority as follows:

- Central level: 8 aquatic animal disease testing laboratories of the Regional Animal Health Offices (RAHO) and the National Centre for Veterinary Diagnosis (NCVD).
- Local level: provincial sub DAH 27 laboratories (testing by conventional and Real-time PCR techniques).
- Agro-Forestry and Fishery Quality Assurance Department's management (NAFIQAD): 6 labs accredited in line with ISO 17025.

and (2) Laboratories at three Research institutes for Aquaculture and fisheries universities.

Private laboratories

Some private laboratories are also accredited to provide testing service for aquatic disease.

Awareness raising and training activities

Training programs

The officially approved training and education plans is for 630 participants per year on average at national level. At provincial level, each province annually organizes training for local staff and farmers on new regulations, knowledge and skills for prevention and control of aquatic animal disease.

Training contents

Official training programs focused on the following topics:

- Enhancing aquatic animal disease management capacity for veterinary officials from central, regional and provincial levels: Post graduate education at educational institutions in Viet Nam and overseas on veterinary epidemiology (i.e. data analysis and disease warning), disease diagnosis, pathology, and biosecurity
- Strengthening capacity of local aquatic animal health system on legislation, disease surveillance, reporting and response to disease outbreaks.

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