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Aquatic Animal Health Surveillance

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Definition of surveillance:

+ **it is the collection, analysis and dissemination of health information about a specified population**. An ongoing process capable of handling health information from different sources, including surveys.

+ in this presentation, the term ‘surveillance’ is used **regardless of whether that information refers to an apparently absent health problem or an existing health problem**.

+ is the systematic ongoing collection, collation and analysis of information related to animal health **and the timely dissemination of information to those who need to know so that action can be taken**.

Objectives of surveillance:

Surveillance activities are usually performed to achieve one or more of the following objectives:

a) demonstrating the absence of one or more diseases;

b) identifying disease events requiring notification to OIE as listed in Article 1.1.3. of the Aquatic Code;

c) determining the occurrence or distribution of endemic disease, including changes to their incidence or prevalence (or its contributing factors), in order to:

   i) provide information for domestic disease control programmes,

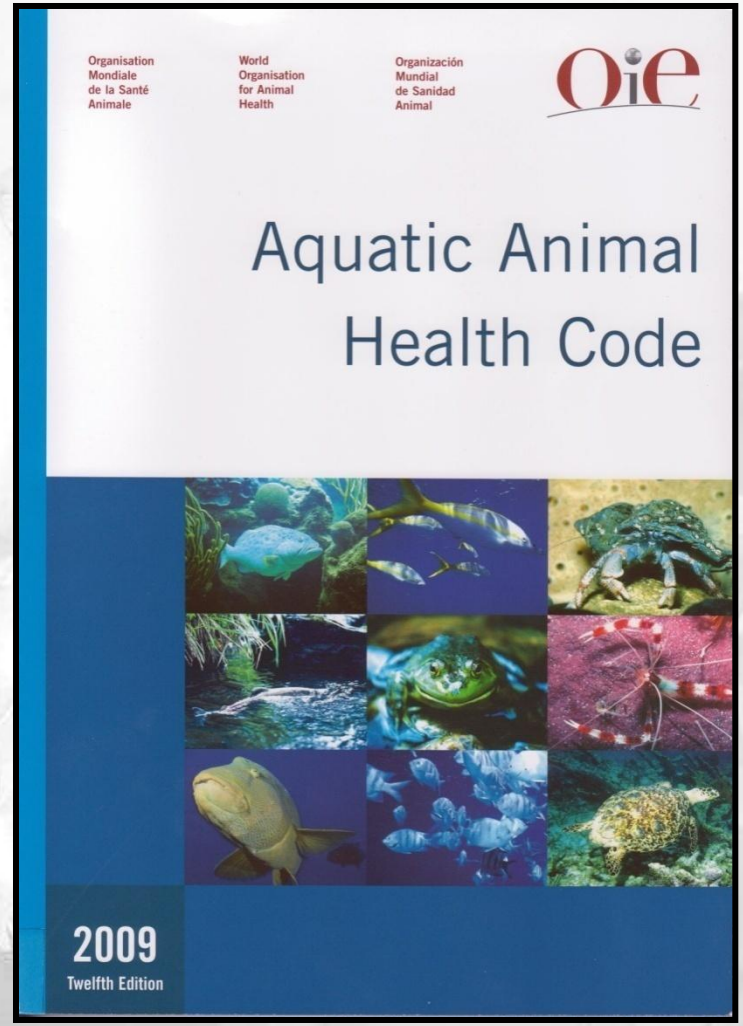
   ii) provide relevant disease occurrence information to be used by trading partners for qualitative and quantitative risk assessment.

Essential prerequisites to enable a Member to provide information for the evaluation of its animal health status are:

a) that the particular Member complies with the provisions of Chapter 3.1. of the Aquatic Code on the quality and evaluation of the Competent Authorities;

b) that, where possible, surveillance data be complemented by other sources of information (e.g. scientific publications, research data, documented field observations and other non-survey data);

c) that transparency in the planning and execution of surveillance activities and the analysis and availability of data and information, be maintained at all times, in accordance with Chapter 1.1. of the Aquatic Code.


Organisation Mondiale de la Santé Animale
World Organisation for Animal Health
Organización Mundial de Sanidad Animal
OIE
Aquatic Animal Health Code
2009
Twelfth Edition

Aquatic Animal Health Code

Chapter 1.4.
Aquatic Animal Health Surveillance

(34 pages)

PDF

CHAPTER 1.4.

AQUATIC ANIMAL HEALTH SURVEILLANCE

Article 1.4.1.

Introduction and objectives

1. *Surveillance* activities may be performed to achieve any of the following objectives:

   a. demonstrating the absence of *disease*;

   b. identifying events requiring *notification* as listed in Article 1.1.3. of the *Aquatic Code*;

   c. determining the occurrence or distribution of endemic disease, including changes to their *incidence* or *prevalence* (or its contributing factors), in order to:

      i. provide information for domestic *disease* control programmes,

      ii. provide relevant *disease* occurrence information to be used by trading partners for qualitative and quantitative risk assessment.

   The type of *surveillance* applied depends on the desired outputs needed to support decision-making. *Surveillance* data determine the quality of disease status reports and should satisfy information requirements for accurate *risk analysis* both for *international trade* as well as for national decision-making. *Surveillance* of endemic diseases provides valuable information for day-to-day health management and can act as the foundation for detecting *outbreaks* of exotic disease and demonstrating specific *disease* freedom.

   Surveillance systems described in this chapter should also be used to generate information for decisions on prescribed *disease* prevention and control programmes. However, the actual strategies for prevention and control are beyond the scope of this chapter on *surveillance* recommendations.

   Having a suitable management strategy to respond to *surveillance* data is of utmost importance for the successful implementation of *surveillance* systems.

2. Essential prerequisites to enable a Member to provide information for the evaluation of its animal health status are:

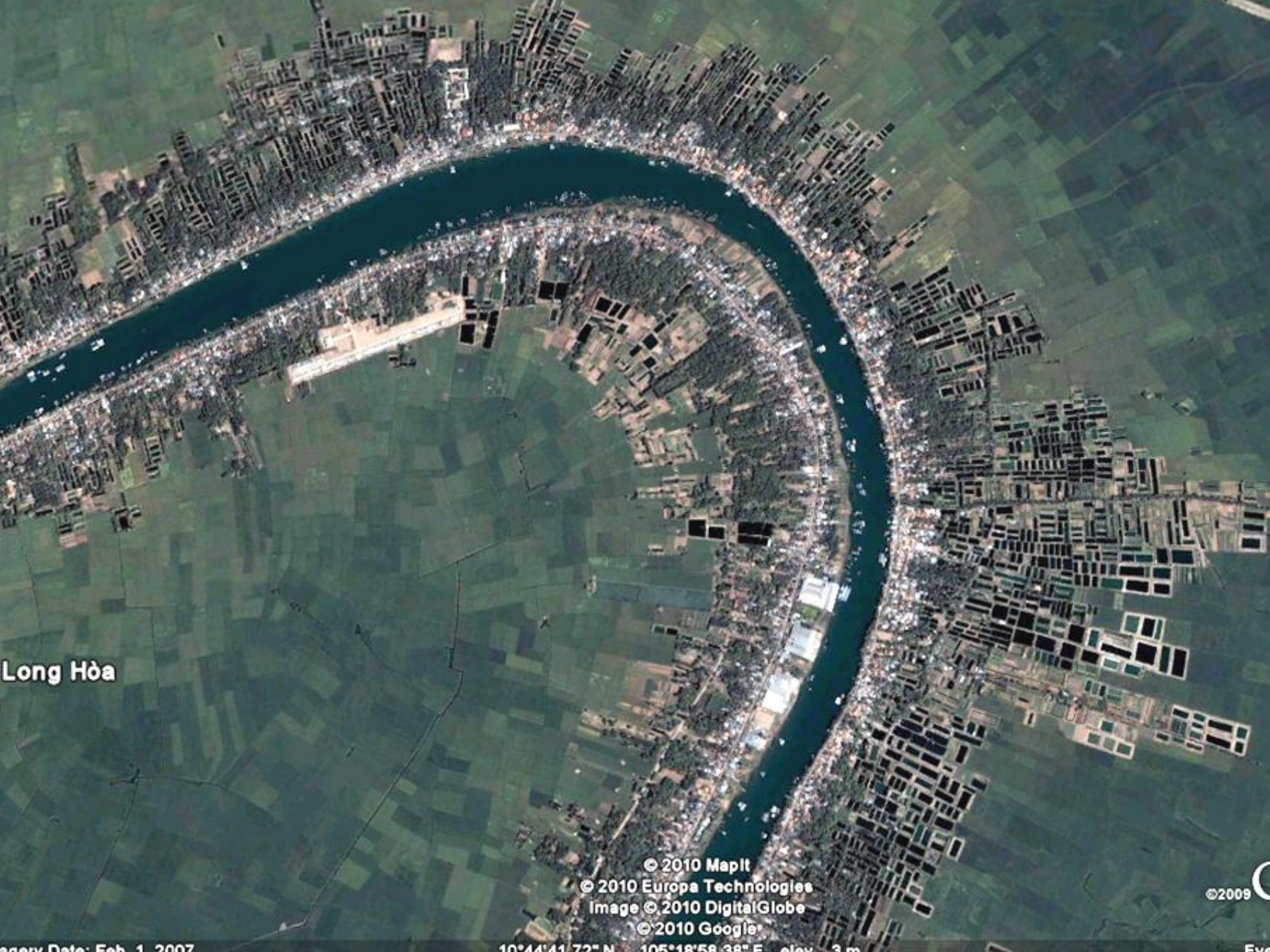
   a. that the particular Member complies with the provisions of Chapter 3.1. of the *Aquatic Code* on the quality and evaluation of the *Competent Authorities*;

Aquatic Code Chapter 1.4. contents:

- Introduction and objectives
- Principles of surveillance
- Critical elements of surveillance
- Population based surveys
- Non-random data sources used in surveillance

Aquatic Code Chapter 1.4. contents:

- Pathways to demonstrate freedom from disease
- Maintenance of disease free status
- Design of surveillance programmes to demonstrate freedom from disease
- Specific requirements for complex non-survey data sources for freedom from disease
- Surveillance for distribution and occurrence of disease
- Examples of surveillance programmes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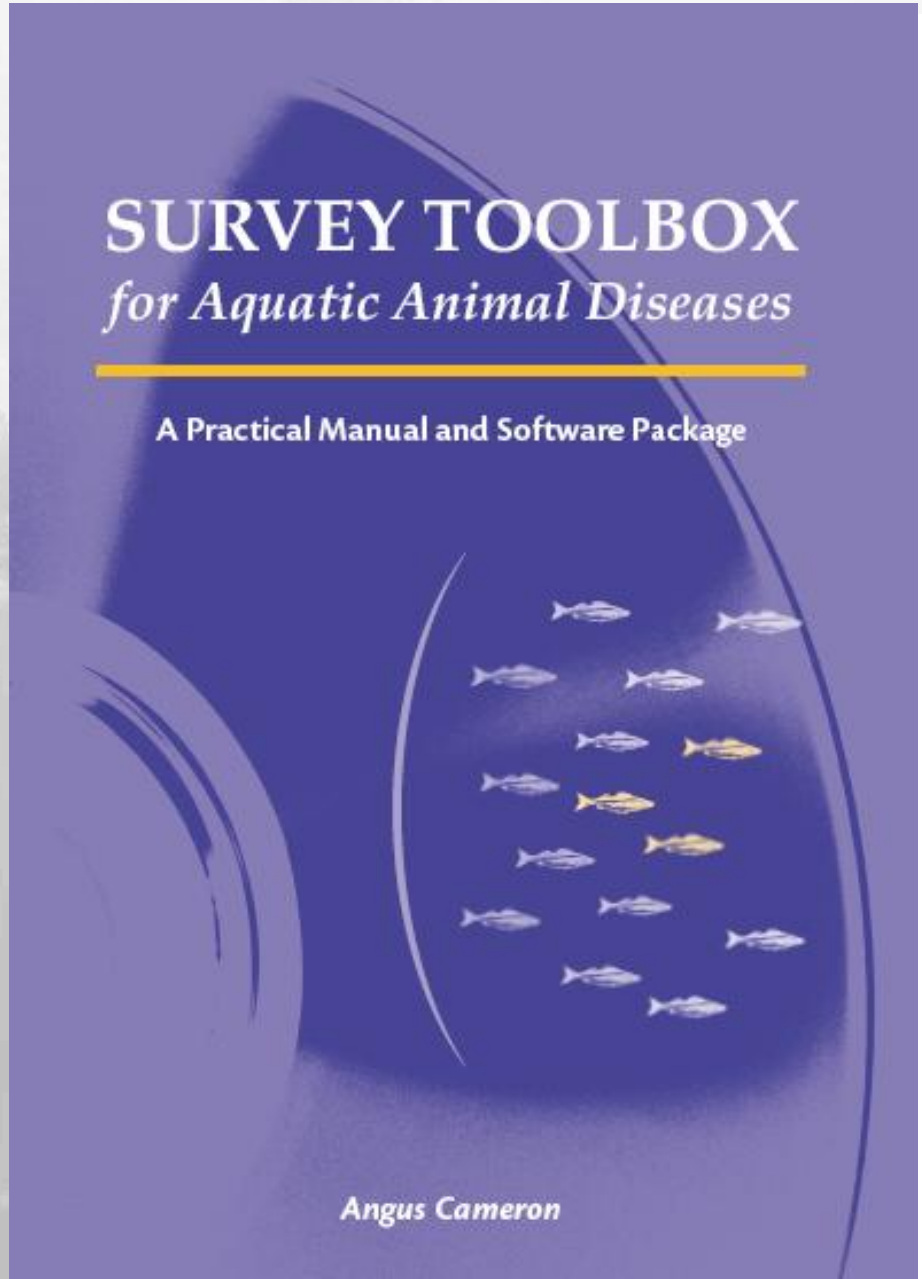
imagesPHILIPPINES

Available literature on Surveillance:

✓ AquatoolBox and Surveillance chapter of AquaVetPlan (Angus Cameron and AusVet, 2002-2004)

✓ More detailed technical guidance has recently been produced by the OIE *Ad hoc* Group on Aquatic Animal Health Surveillance



Principles for the Design and Conduct of Surveys to show Presence or Absence of Infectious Disease in Aquatic Animals

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SUMMARY

This document provides standards and guidelines for implementing surveys for the purpose of demonstrating freedom from aquatic animal diseases.

Due to the wide variety of species cultured, the pathogens and management systems, the guiding principle applied in this document is that surveillance systems should be designed to meet the needs of a specific situation. No one surveillance system with a prescribed sampling strategy and sample size can address the range of situations experienced in aquaculture. Instead, guidelines are provided as to standard of proof required to demonstrate freedom of aquatic animals from infectious diseases, and the issues that must be considered in the design of a surveillance system.

Factors that must be taken into account when designing a surveillance system include:

- the definition of the population, including any sub-populations that should be targeted to improve the probability of detecting disease,
- clustering of disease,
- documentation of the methodology used, survey design and data analysis procedures,
- the test or test system being used,
- the design prevalence or minimum expected prevalence in the presence of disease,
- sampling approaches, and
- quality assurance systems.

Three examples describe possible surveillance systems for use when aiming to declare freedom from three different hypothetical infections. They illustrate a number of the principles discussed, and are based on 1) a farm-accreditation scheme for freshwater fish culture, 2) a national survey to demonstrate freedom from disease, and 3) a survey of molluscs using spatial sampling.

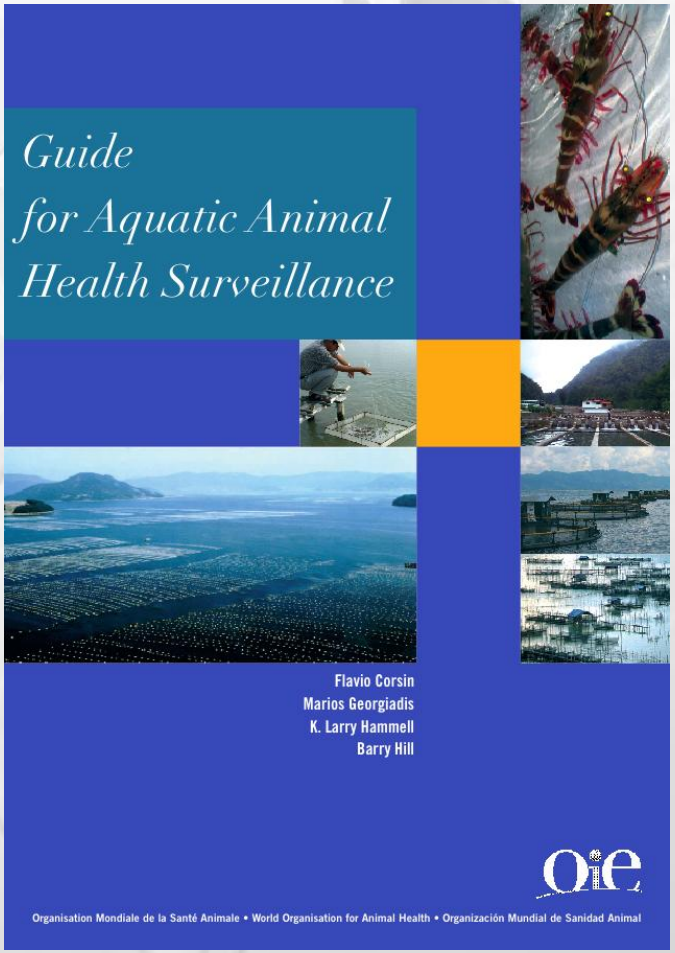
New OIE publication

- Guide for Aquatic Animal Health Surveillance

Prepared by:

Flavio Corsin
Marios Georgiadis
Larry Hammel
Barry Hill

Published December 2009.



Chapter 1.4. in the Aquatic Code contains extensive technical information and in future this may be replaced by just the general principles of surveillance, now that detailed guidance is available in the published Guide.

Next step is to develop surveillance guidelines specific to individual diseases

Disease-specific surveillance model chapters for the Aquatic Code will be developed by the *Ad hoc* Group with OIE Reference Laboratory experts since 2010. Three listed diseases were selected as examples: WSD, VHS, and Bonamia

Extract from last Aquatic Code Commission report:
Dr Hill informed the Commission that the experts involved were still working on drafting the texts on sampling for the three chapters, and that two of the chapters (were close to completion.

After which, consideration will need to be given to preparing specific chapters for other listed diseases.

Disease-specific surveillance model chapters

- Viral haemorrhagic septicaemia (fish)
  Niels Olesen + Larry Hammell
- Infection with *Bonamia ostreae* (mollusc)
  Isabelle Arzul + Marios Georgiadis
- White spot disease (crustacean)
  Grace Lo + Flavio Corsin

Requirements for an efficient and effective surveillance

Good knowledge of the listed diseases

- OIE aquatic code and manual
- List all susceptible animals and sources of information (stakeholders)

Good knowledge of the industry

- Identify hazards and risky inputs/imports
- Define sampling points in each facility and the wild

Good sampling techniques

- Refer to the AquaToolBox and/or the Guide for Aquatic Animal Health Surveillance (probability sampling preferred)

Reliable diagnostic techniques

- Access to a diagnostic laboratory (performing ring tests or twinning program with OIE Reference Labs). Aquatic Manual Reference.

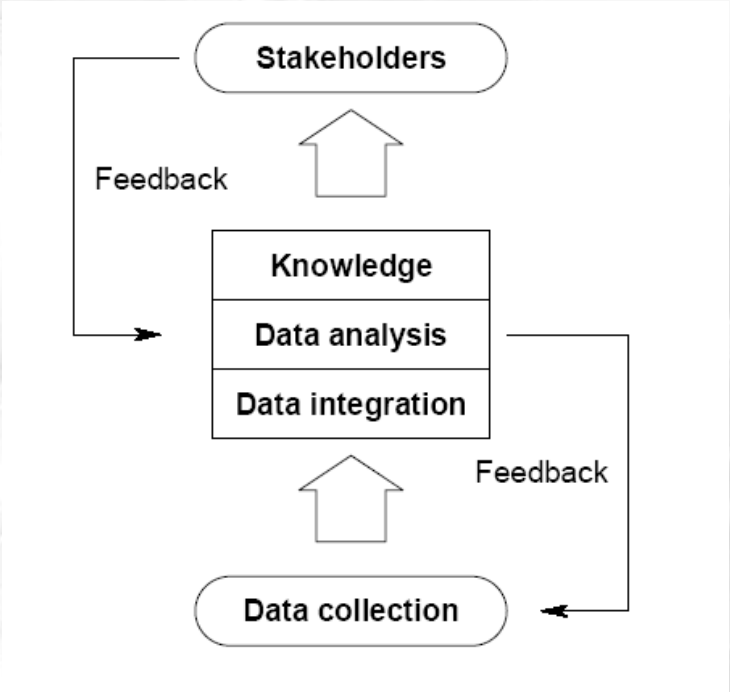
Good communication network

- Develop communication and share information with the private sector and experts: important role of focal points.

Level – Activities	Skills and equipment	Responsibility	Requirements
Level I – Activities Observation of animal and the environment; Clinical examination; Gross pathology	Knowledge of normal (feeding, behaviour, growth of stock, etc); Frequent/regular observation of stock; Regular, consistent record-keeping and maintenance of records - including fundamental environmental information; Knowledge contacts for health diagnostic assistance; Ability to submit and/or preserve representative specimens.	Farm Workers/Managers; Fisheries Extension Officers; Field Veterinarians; Local Fisheries Biologists.	Field keys; Farm record keeping formats; Equipment list; Model clinical data sheets; Pond-side check list; Protocols for preservation and transport of samples.
Level II – Activities Parasitology Bacteriology Mycology Histopathology	Laboratories with basic equipment and personnel trained/experienced in aquatic animal pathology; keep and maintain accurate diagnostic records; Preserve and store specimens; knowledge of/contact with different areas of specialization within Level II Knowledge of who to contact for Level III diagnostic assistance.	Fish biologists; Aquatic Animal Veterinarians; Parasitologists; Mycologists; Bacteriologist; Histopathologists; Technicians.	Model laboratory record-keeping system; Protocols for preservation/transport of samples to Level III; Model laboratory requirements an equipment and consumable lists; Contact information for accessing Level II and Level III specialist expertise; Asia Diagnostic Guide to Aquatic Animal Diseases; OIE Manual of Diagnostic Tests for Aquatic Animals; Regional General Diagnostic Manuals.
Level III – Activities Virology Electron Microscopy Molecular Biology Immunology	Highly equipped laboratory with highly specialized and trained personnel; Keep and maintain accurate diagnostic records; Preserve and store specimens; Maintenance of contact with people responsible for sample submission.	Virologists; Ultrastructural histopathologists; Molecular biologists; Technicians.	Model Laboratory requirements, equipment, consumable lists; Model job descriptions skills for requirements; Contact information for reference laboratories; Protocols for preservation of samples for consultation and validation; OIE Manual of Diagnostic Tests for Aquatic Animals; General molecular and microbiology diagnostic references; Asia Diagnostic Guide to Aquatic Animal Diseases.

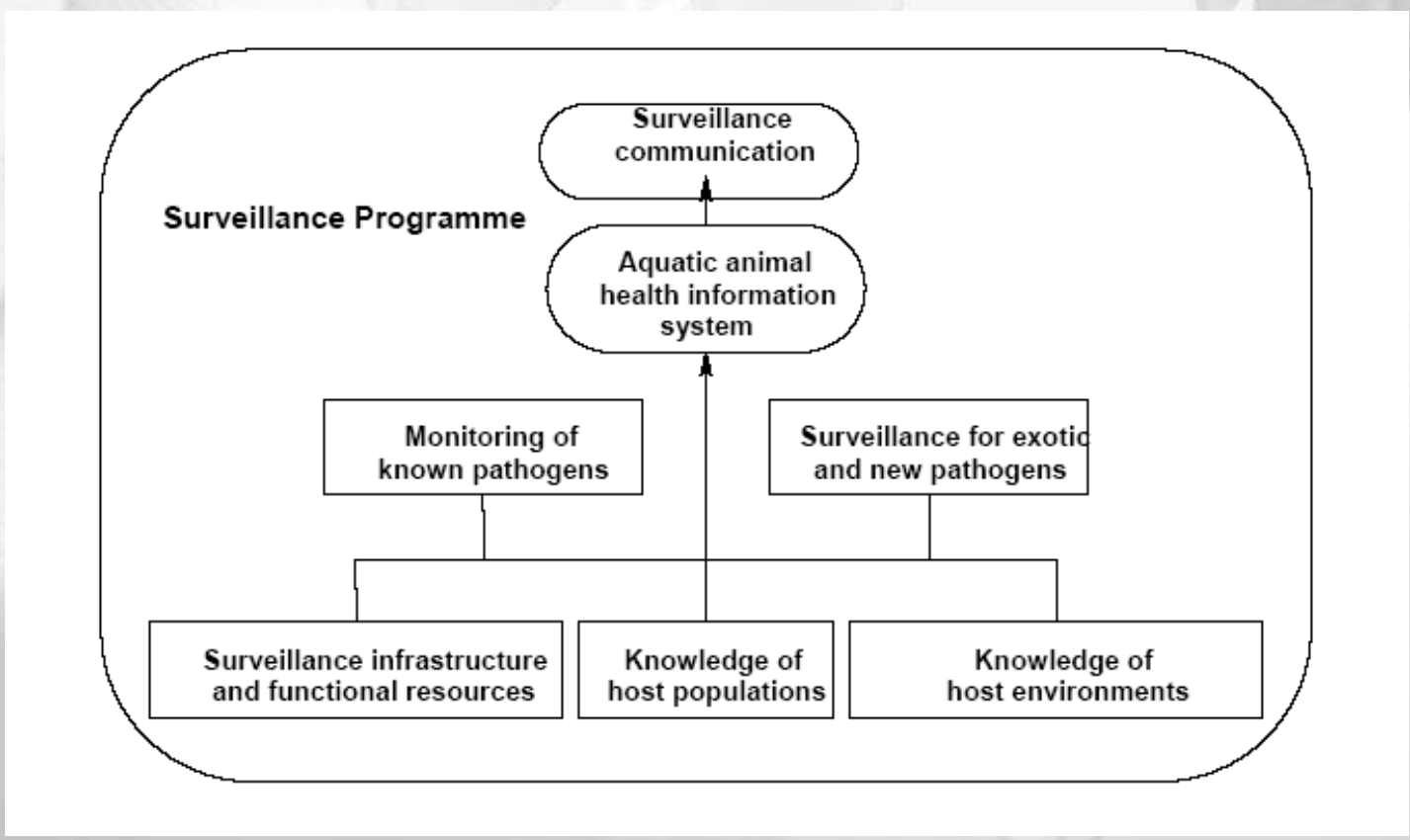
Field information	Laboratory techniques	Experimental techniques
○ history (recurrent losses, abnormal losses, stocking and related husbandry activities) ○ economics (measure of losses due to sub-optimal production performance, or direct mortality) ○ behaviour ○ clinical signs ○ physical examination (autopsy or gross observations) ○ epidemiology (population disease dynamics) ○ response to therapy (mainly finfish, some bacterial crustacean diseases)	○ microbiology ○ tissue smears ○ histopathology ○ serology (immunological assays) (finfish) ○ ultrastructural examinations (TEM, SEM, negative stain) ○ tissue culture (cell-lines for certain finfish diseases only due to the current lack of cell lines for other groups) ○ biomolecular analyses (PCR, ISH, etc.)	○ physiology challenges (stress testing) ○ transmission tests (bioassay infection challenges to assess host susceptibility)

Surveillance requires the active participation of all stakeholders



Involvement of the private sector is a key factor to achieve a functional surveillance (active and passive)

Surveillance goes through a good communication network



Capacity building of all stakeholders

Surveillance requires identification of all hazards and risk assessments

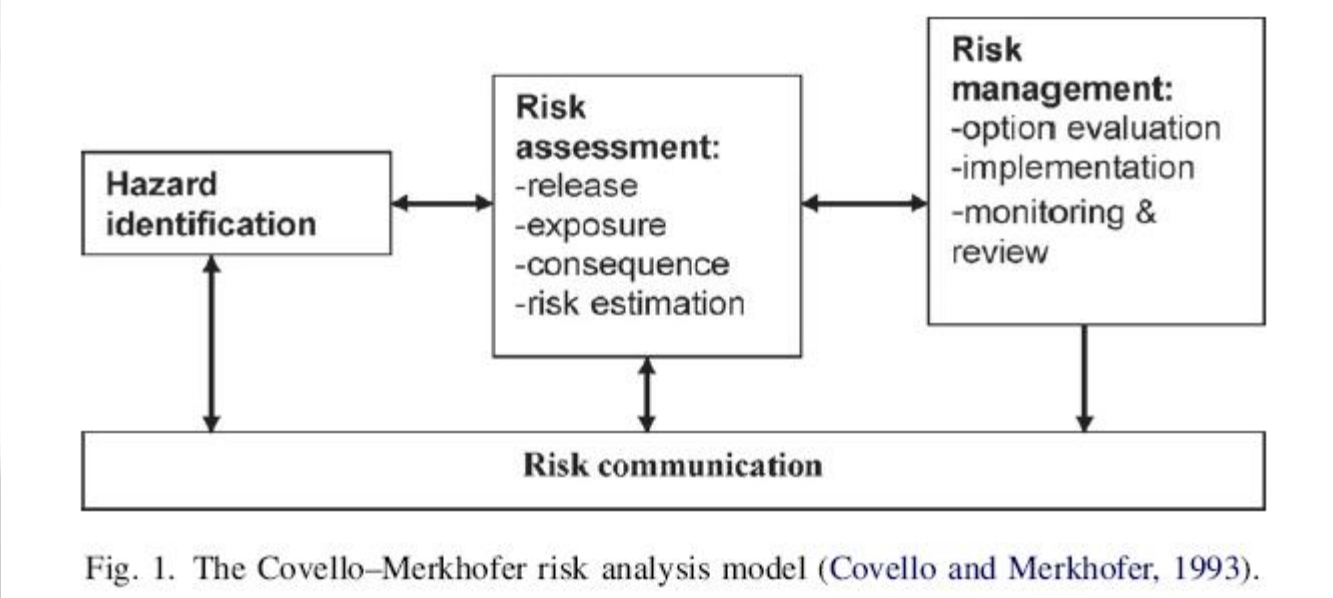


Fig. 1. The Covello–Merkhofer risk analysis model (Covello and Merkhofer, 1993).

This prerequisite conditions decisions on sampling and monitoring/surveillance

Surveillance leads to preventive actions for a safer industry

Import Risk Analysis

- List of suspicious imports
- Evaluation of the risks (refer to the Aquatic Code, chapter 2.2)

Self Declaration of Freedom

- Requires a survey to demonstrate absence (refer to the Aquatic Manual Chapter 2 and Aquatic Code Chapter 1.4.6, in addition to the books already mentioned)

On-Field Risk mitigations of hazards

- Convince the private sector stakeholders to improve their biosecurity.
- Capacity building on what does exist (i.e. certified SPF fry, water filtration and/or disinfection, protection against vectors, etc.).

Predefined procedures for emergencies

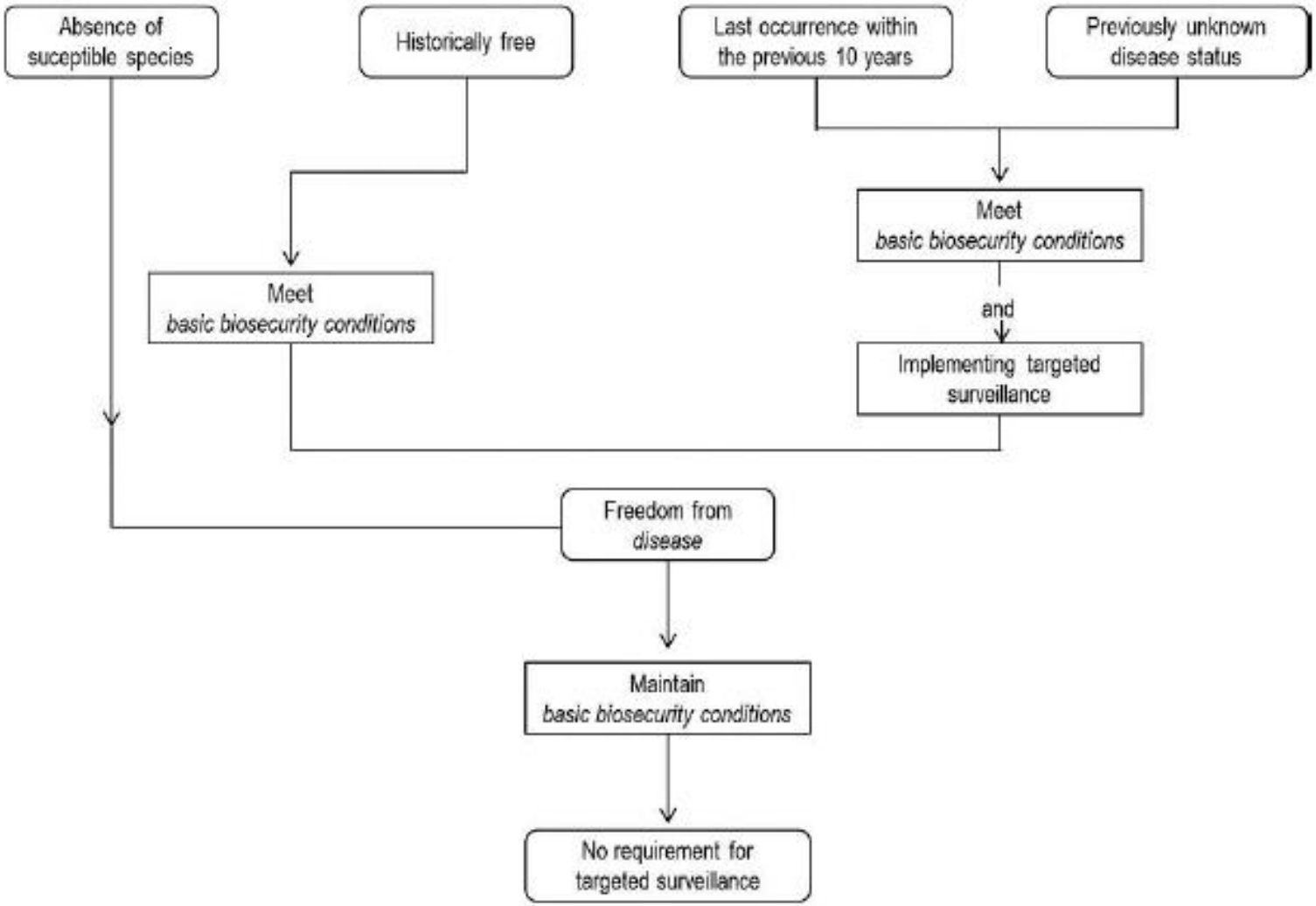
- Develop Standard Operating Procedures for emergency situations
- Field testing for private sector feedback.

Surveillance : recent examples of Import Risk Analysis

Summary of aquatic animal risk analyses for disease spread: approach and scope

Authors	Title
Kahn et al. (1999a)	Import risk analysis on non-viable salmonids and non-salmonids marine finfish
Kahn et al. (1999b)	Import risk analysis on live ornamental finfish
Peeler and Thrush (2004)	Qualitative analysis of the risk of introducing *G. salaris* into the United Kingdom
Edgerton (2002)	Hazard analysis of exotic pathogens of potential threat to European freshwater crayfish
Bondad-Reantaso et al. (2005)	Pathogen and ecological risk analysis for the introduction of blue shrimp, *Litopenaeus stylirostris*, from Brunei Darussalam to Fiji
Peeler et al. (2006)	An assessment of the risk of spreading the fish parasite *G. salaris* to uninfected territories in the European Union with the movement of live Atlantic salmon (*Salmo salar*) from coastal waters
MacDiarmid (1994)	The risk of introducing exotic diseases of fish into New Zealand through the importation of ocean-caught Pacific salmon from Canada
Stone et al. (2001)	Import health risk analysis: salmonids for human consumption
Mortensen (2000)	Scallop introductions and transfers, from an animal health point of view
Bruneau (2001)	A quantitative risk assessment for the introduction of *Myxobolus cerebralis* to Alberta, Canada, through the importation of live salmonids. Risk analysis in aquatic animal health
LaPatra et al. (2001)	Negligible risk associated with the movement of processed rainbow trout, *Oncorhynchus mykiss* (Walbaum), from an infectious haematopoietic necrosis virus (IHNV) endemic area
Høgåsen and Brun (2003)	Risk of inter-river transmission of *G. salaris* by migrating Atlantic salmon smolts, estimated by Monte Carlo simulation
Jansen et al. (2006)	An evaluation of potential routes for spreading *G. salaris*
Paisley et al. (1999)	A Monte Carlo simulation model for assessing the risk of introduction of *G. salaris* to the Tana river, Norway
Peeler et al. (2004)	Qualitative risk assessment of routes of transmission of the exotic fish parasite *G. salaris* between river catchments in England and Wales
Peeler et al. (2005)	The application of risk assessment to the study of vertical transmission of fish pathogens
Munro et al. (2003)	An evaluation of the relative risks of infectious salmon anaemia transmission associated with different salmon harvesting methods in Scotland

Surveillance : Self Declaration of Freedom using a targeted surveillance



Surveillance : identification of hazards at a farm level (inputs and outputs)

Vectors

Water

Larvae (fry, post-larvae)

Facilities & Fomites

Workers & Visitors, vehicles

Recycling Wastes, sludge

Effluent released

Feed & other inputs

Harvested & marketed products

Bayesian Decision Network

Theoretical Risk

Uncertain consequences

Consequences:

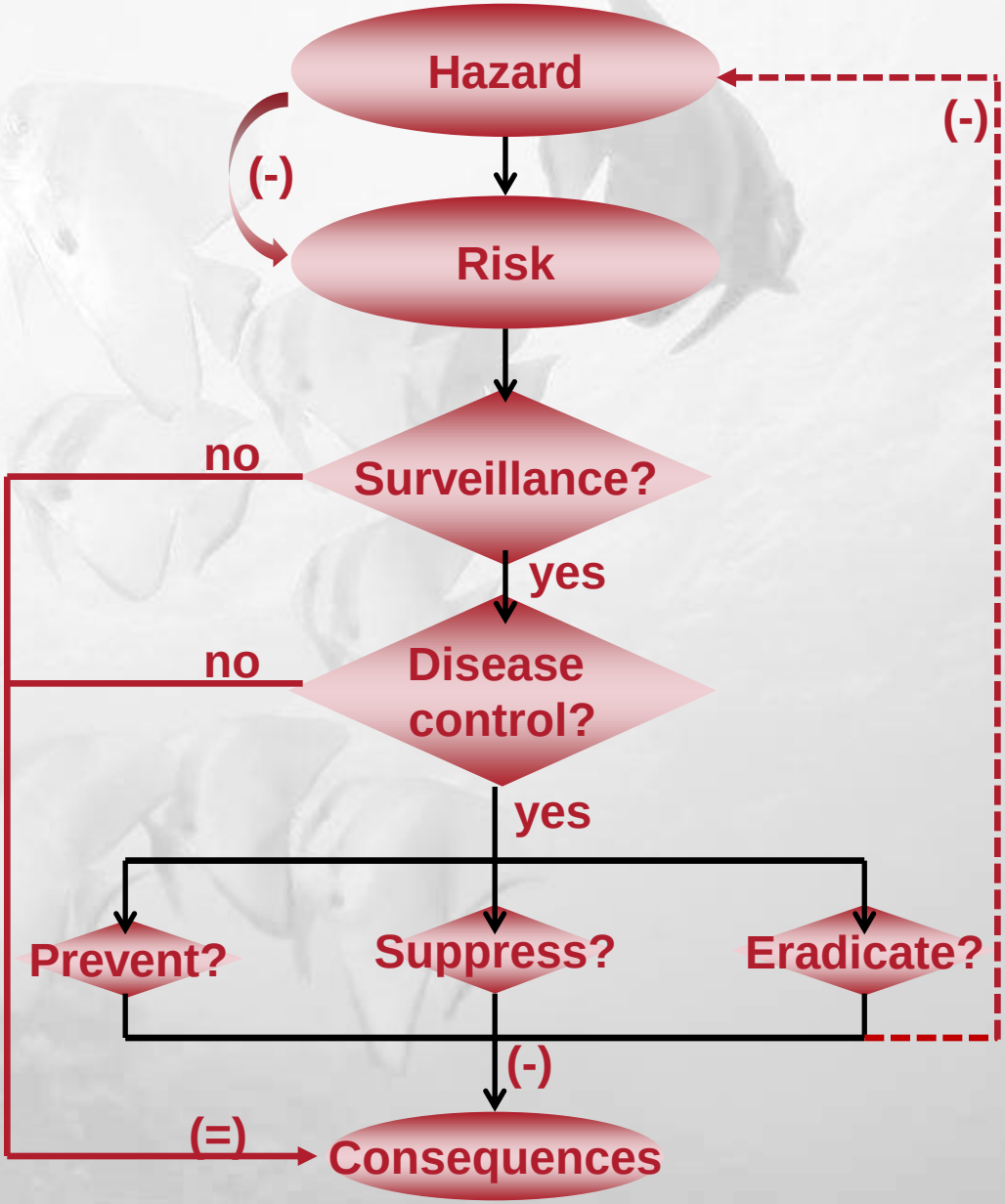
Epidemiological, economic or other

Hazard:

Source of risk

Biosecurity literature:

Surveillance
Disease control



Surveillance : implement basic biosecurity conditions (BMP, Biosecurity SOPs & production strategy)

Water and aquatic vectors

Water Filtration and/or Disinfection

Nucleus Breeding Centre

Multiplication Centres SPF Broodstock

Specific Pathogen Free Larvae (fry, post-larvae) tested through surveillance, vaccinated or Specific Pathogen Resistant

Airborne Vectors

Bird Nets, exclusion devices

Secured

Secured

Secured

Facilities & Fomites

Workers & Visitors

Secured

SOPs

Recirculation-Waste Treatment

Secured

Recycling Wastes, Sludge

Effluent released

Secured

IRA, Feed testing through surveillance

Feed & other inputs

Ensure good and sustainable harvest (survival, size, FCR)

Surveillance as part of a National Strategy for Aquatic Animal Health

Policy, legislation and enforcement	Zoning
Risk analysis	Emergency preparedness
Pathogen list	Research
Information system	Institutional structure
Health certification and quarantine	Human resource development
Surveillance, monitoring and reporting	Regional and international cooperation

All aspects should be addressed for efficiency

Active role of AAH Focal Points central for success

Thank you for your attention

Courtesy of Dr Franck Berthe