



Food and Agriculture  
Organization of the  
United Nations



## FAO/China Intensive Training Course on Tilapia Lake Virus (TiLV)

Sun Yat Sen University, Guangzhou, China

18-24 June 2018

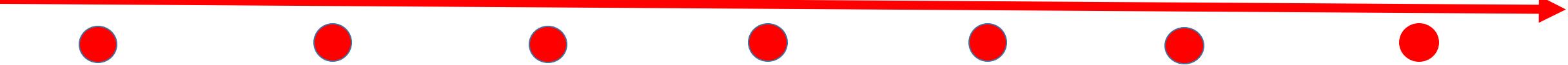
# Session 6: Emergency preparedness and contingency plan

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# Learning objectives and expected outcomes

- to understand and gain further knowledge on a very important element of a National Strategy on Aquatic Animal Health – **Emergency Preparedness and Contingency Plan** (M Reantaso)
- gain knowledge on the **objectives and elements** of emergency preparedness (M Reantaso)
- **Activity:** assess the accuracy of the information collected related to an EPRS audit (M Reantaso);
- understand the important components of a **disease strategy manual** (part of contingency plan) and how they can be applied in a disease investigation scenario (Kathy Tang-Nelson);
- gain experience in an interactive **emergency preparedness simulation exercise** (desk-top and field), their requirements and application (Mona Jansen)
- be able to elaborate on **EPRS of the National Action Plan on TiLV (tomorrow!)**

# Diseases in aquaculture: from largest aquaculture-related epizootics



Disease (observation in the field)	Diagnosis	Reporting /communication (national or OIE)	Containment (vaccine, treatment, husbandry)	Management (cost- effective)	Disease freedom	National and international confidence to the sector
EUS (1970s): fungi	1980s		?			
WSSV (1980s): virus	mid-1990s		?			
KHV (2000s): virus	mid-2000		?			
AHPND (2009): bacteria	2013		?			
TiLV (2009): virus	2014		?			



**Long time lapse: years**

**\$\$\$\$ losses:** production, market = livelihoods, export earnings, food supply  
= socio-economic and environmental impacts

**\$\$\$ spent:** producers/government/academe: biosecurity (policies, prevention, diagnosis, surveillance, containment, training/education, research, trade disputes, etc); compensation; alternatives)

# Chronology of shrimp pathogen emergence in aquaculture

1970s

**BMNV**  
Baculoviral  
midgut gland  
necrosis virus

**MBV**  
Monodon  
baculovirus

1980s

**WSSV**  
White spot  
syndrome virus

**HPV**  
Hepatopancreatic  
parvovirus

**IHHNV**  
Infectious  
hypodermal and  
haematopoietic  
necrosis virus

**BP**  
Baculo penaeid  
virus

**NHP** Necrotizing hepatopancreatitis

1990s

**YHV**  
Yellow head  
virus

**TSV**  
Taura syndrome  
virus

**Vibriosis:** *Vibrio (harveyi, damsela,  
alginolyticus, vulnificus, penaeicida)*

2000

**MoV**  
Mourilyan  
virus

**IMNV**  
Infectious  
myonecrosis virus

**CMNV** Covert  
Mortality Nodavirus

**LSNV**  
Laem-Singh  
Virus

**EMS/AHPND:** a strain of *V.  
parahaemolyticus*

**EHP** *Enterocytozoon  
hepatopenaei*

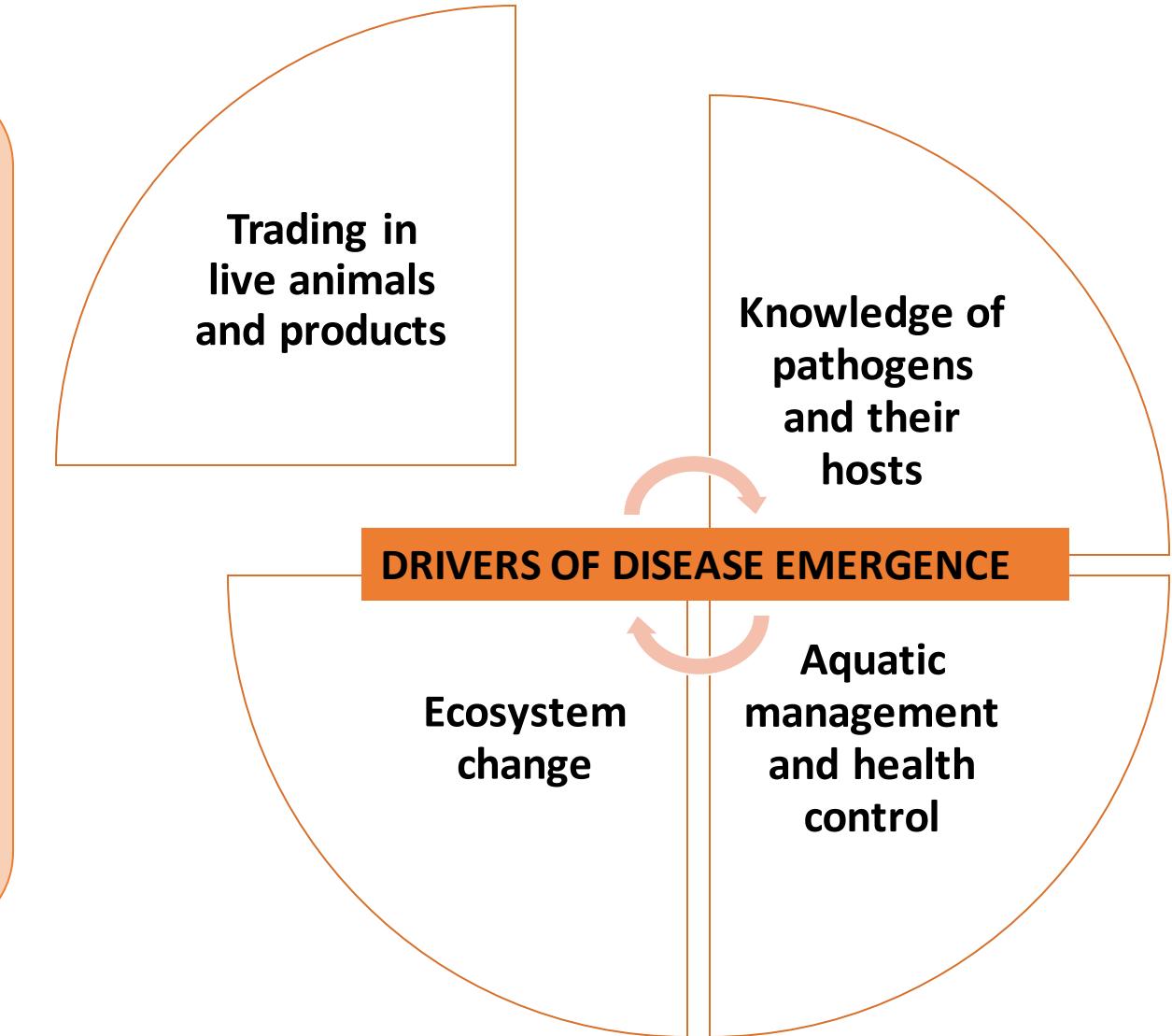
2020?

2030?

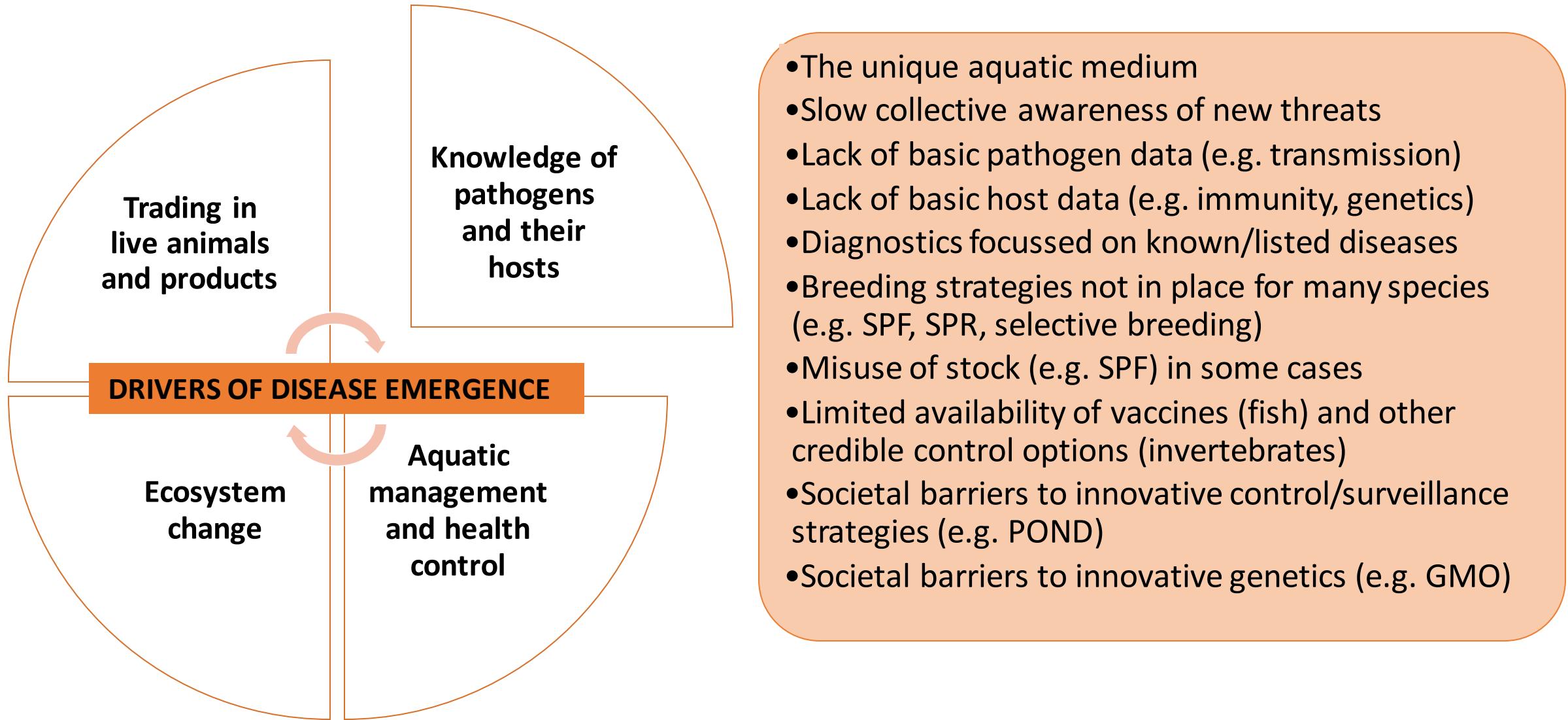
2050?

# Drivers of emergent disease in aquaculture

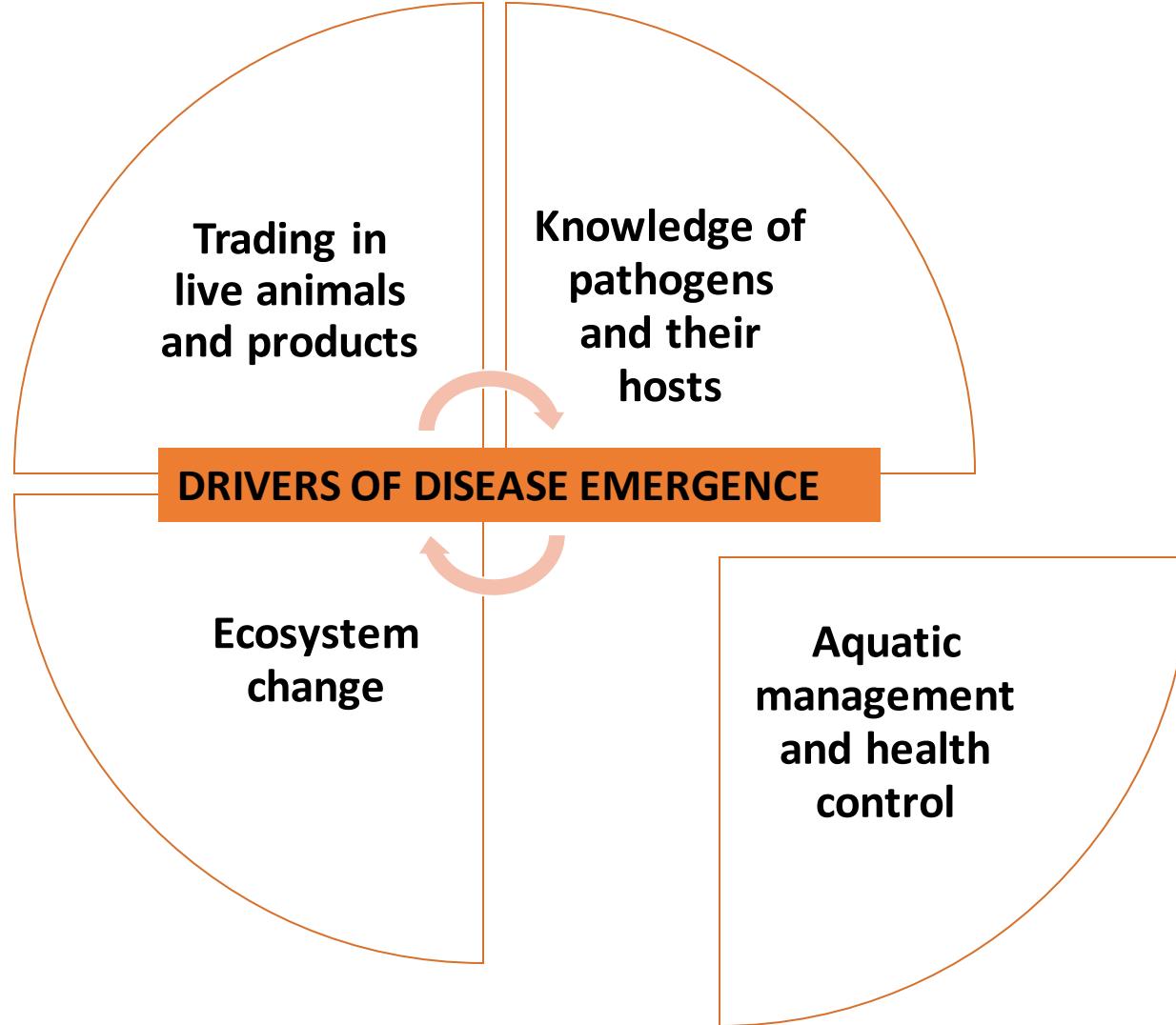
- Highly traded commodity (70% exposed to international trade)
- Hyper-diverse species range (>500) farmed compared to terrestrial systems
- Live animals (larvae, fry, adults) and their products (live, fresh, frozen) traded internationally
- Many species farmed outside of native range
- Invasive animals and pathogens can be traded with primary host
- Ornamental aquaculture trade is large and growing
- Some diversion to unintended usage (e.g. angling baits)



# Drivers of emergent disease in aquaculture



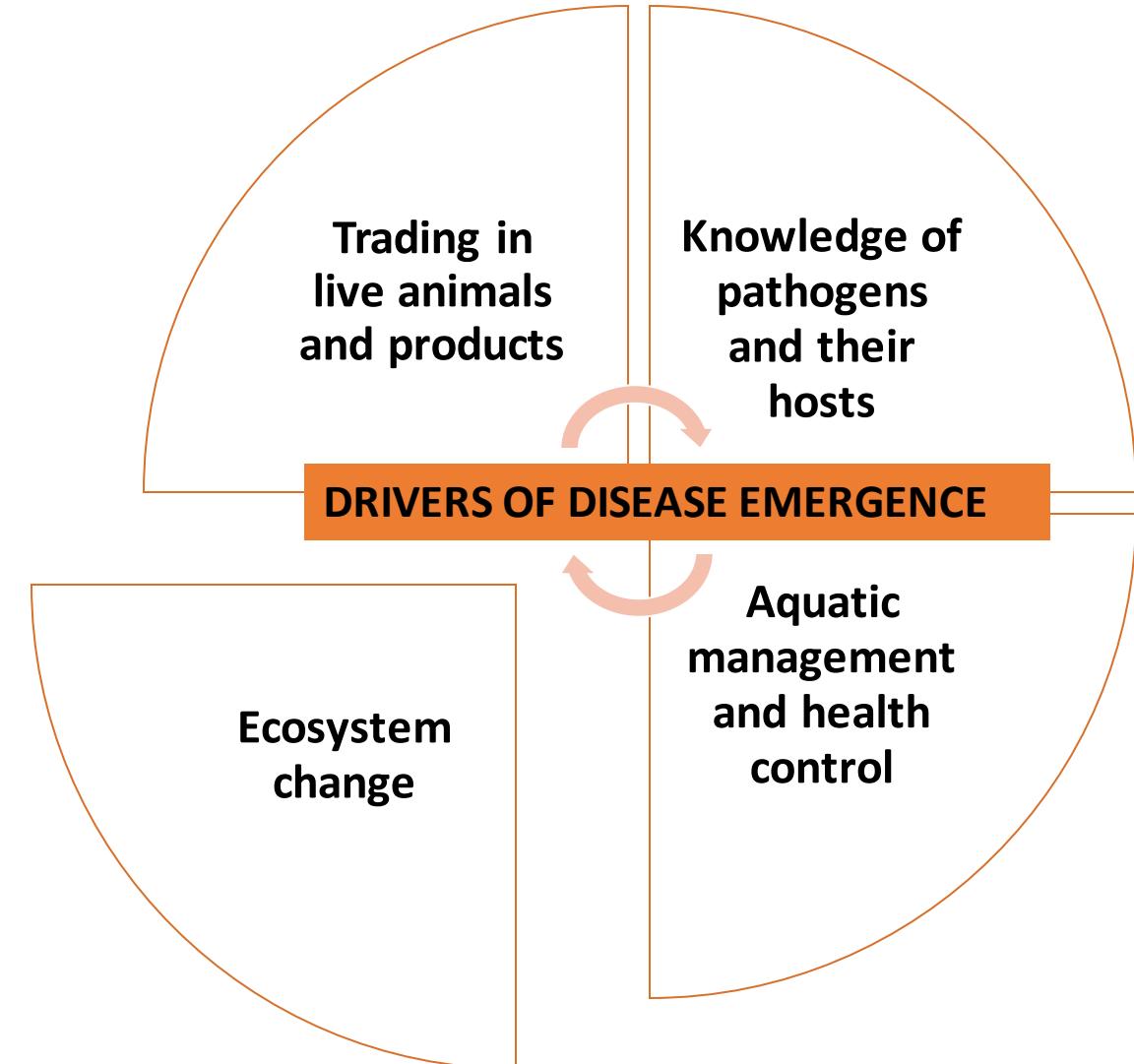
# Drivers of emergent disease in aquaculture



- Multiple institutions involved in AHM. The Competent Authority?
- Inadequate or poorly implemented biosecurity measures/low capacity for emergencies
- Inconsistent or weak implementation of international standards etc
- Perceived low incentive to report on known and emergent diseases (trade)
- Weak regulatory framework and public-private sector partnership working
- Mismatch between research agenda and farmer/commodity sector needs
- Few national pathogen/host inventories

# Drivers of emergent disease in aquaculture

- Physico-chemical conditions in aquaculture are often sub-optimum for host
- Aquatic hosts are cold-blooded (highly responsive to stressors)
- Animals may be farmed outside of native/optimum range
- and, in waters in which they are naïve to native microbial hazards
- Aquatic medium is pathogen rich, diversity changes with environment conditions
- Pathogens evolve and spill-over and spill-back relative to wild populations
- Some hosts (e.g. crustaceans, molluscs) must calcify (susceptible to acid-base changes)



Can we do something?

**Before** the disease or **after**

Prevention

?

Solution

Pro-active

vs

Reactive

<\$\$\$

vs

>\$\$\$\$\$\$

## Preparedness and response to aquatic animal health emergencies in Asia: guidelines



# National Aquatic Animal Health and Biosecurity Strategy



# Emergency preparedness

- ability to **respond effectively** and in a **timely fashion** to disease emergencies (e.g. disease outbreaks, mass mortalities, fish kills).
- capability to deal with emergency disease situations requires:
  - a great deal of **planning and coordination** (including establishing operational, financial and legislative mechanisms) and
  - making available **required resources** (i.e. skilled personnel, essential equipment, advance emergency fund).

# Objectives

- prevent the incursion of exotic pathogens and pests
- put in place a rapid, well-organized and appropriate response to an emergency disease incident
- have a successful management of disease outbreaks

As long as there is importation of live aquatic animals, the possibility of serious disease outbreaks due to **exotic** pathogens will exist.

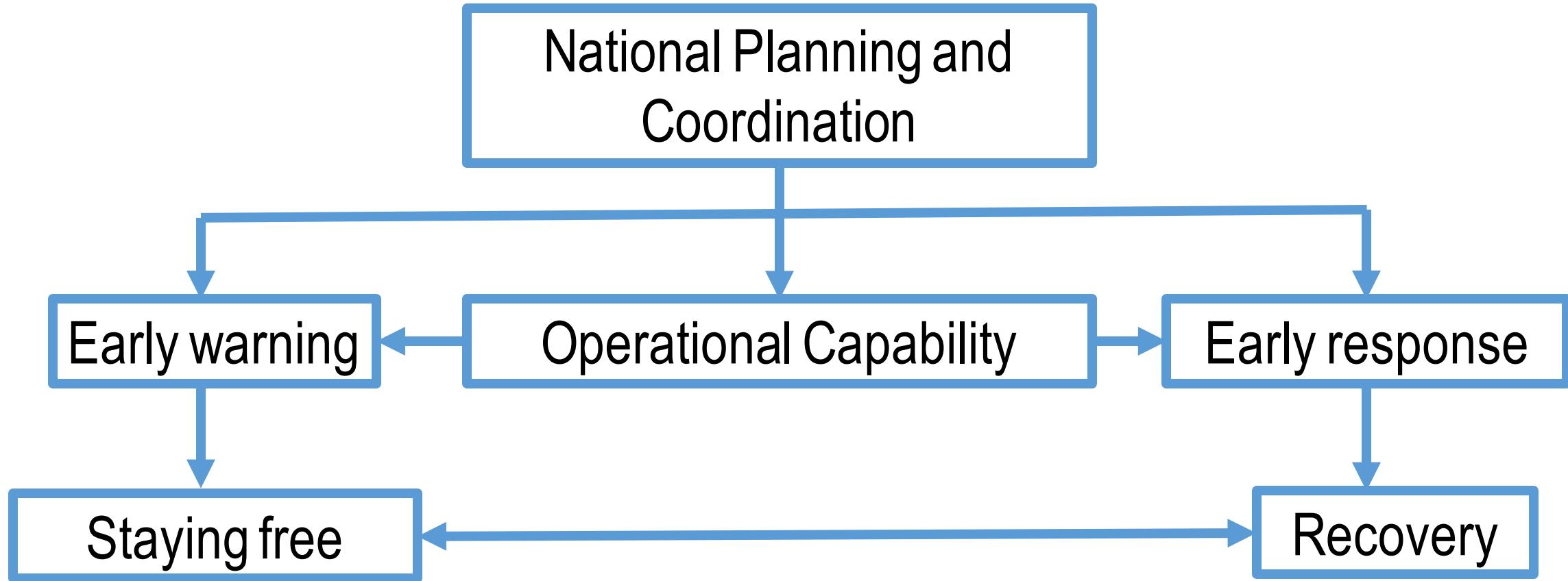
**Endemic** diseases not properly addressed - will continuously affect production

How do you deal with 'unknowns'?

# Elements of emergency response

- National planning and coordination
- Operational capability
  - Responsibility for aquatic animal disease emergencies
  - Aquatic animal disease contingency planning as a component of a National Disaster Plan
  - Legislation and enforcement
- **Early warning**
- **Early detection**
- Risk analysis
- Disease surveillance
- **Early response**
- **Contingency plans**
  - Technical plans: Control Centers Management Manual, Enterprise manual, Destruction manual, Disposal manual, **Disease strategy manuals**, Job descriptions
  - Surge support
  - Operational capability: Response management manuals, Diagnostic resources, Training resources, Awareness and education, **Simulated response exercises**
- **Recovery** from an emergency disease
  - Verification and international acceptance of disease freedom
  - Rehabilitation of farming and fishing communities
- **Staying free**

# Framework for emergency preparedness and response



# Early warning

- **What:** having **advance knowledge** of high-risk diseases likely to threaten national biosecurity before the pathogens actually enter national territory
- **How:** effective early warning depends strongly on the responsible authority having **excellent awareness** of the current disease situation of the country's primary trading partners and on emerging aquatic animal diseases on a world-wide basis.
- **How:** **good communication** essential
  - trading partners
  - disease reports, databases
  - aquatic animal health professionals
  - scientific meetings, workshops, communication media
  - dialogue with stakeholders

NACA  
TiLV Disease  
Advisory

OIE  
TiLV Disease  
Card

FAO GIEWs  
Special Alert

World Fish  
FAQ on TiLV

Scientific  
literature

Social media  
and others

# Early detection

- **What:** detection of an **emerging disease** situation within a country's national territory within the **shortest time frame possible**
- **Purpose:** to ensure detection of **the introduction** of, or **sudden increase in the incidence** of, any disease of aquatic animals that has the potential of developing to epizootic proportions and/or causing serious socio-economic consequences.
- **Scope:** all initiatives that lead to **improved awareness and knowledge** of the *distribution and behavior of disease outbreaks* (and of infection) and that allow **forecasting** of the source and **evolution** of the disease outbreaks and the monitoring of the **effectiveness** of disease control campaigns.



# Key components of a national early detection system

- Broad awareness of characteristic signs of diseases (exotic, endemic, emerging)
- Experienced veterinarians and/or aquatic animal health professionals trained in recognizing and reporting suspicious disease occurrence
- Ability of CA to undertake rapid and effective disease investigation
- Access of CA to expertise and laboratory facilities that are able to diagnose and differentiate exotic, endemic, emerging diseases



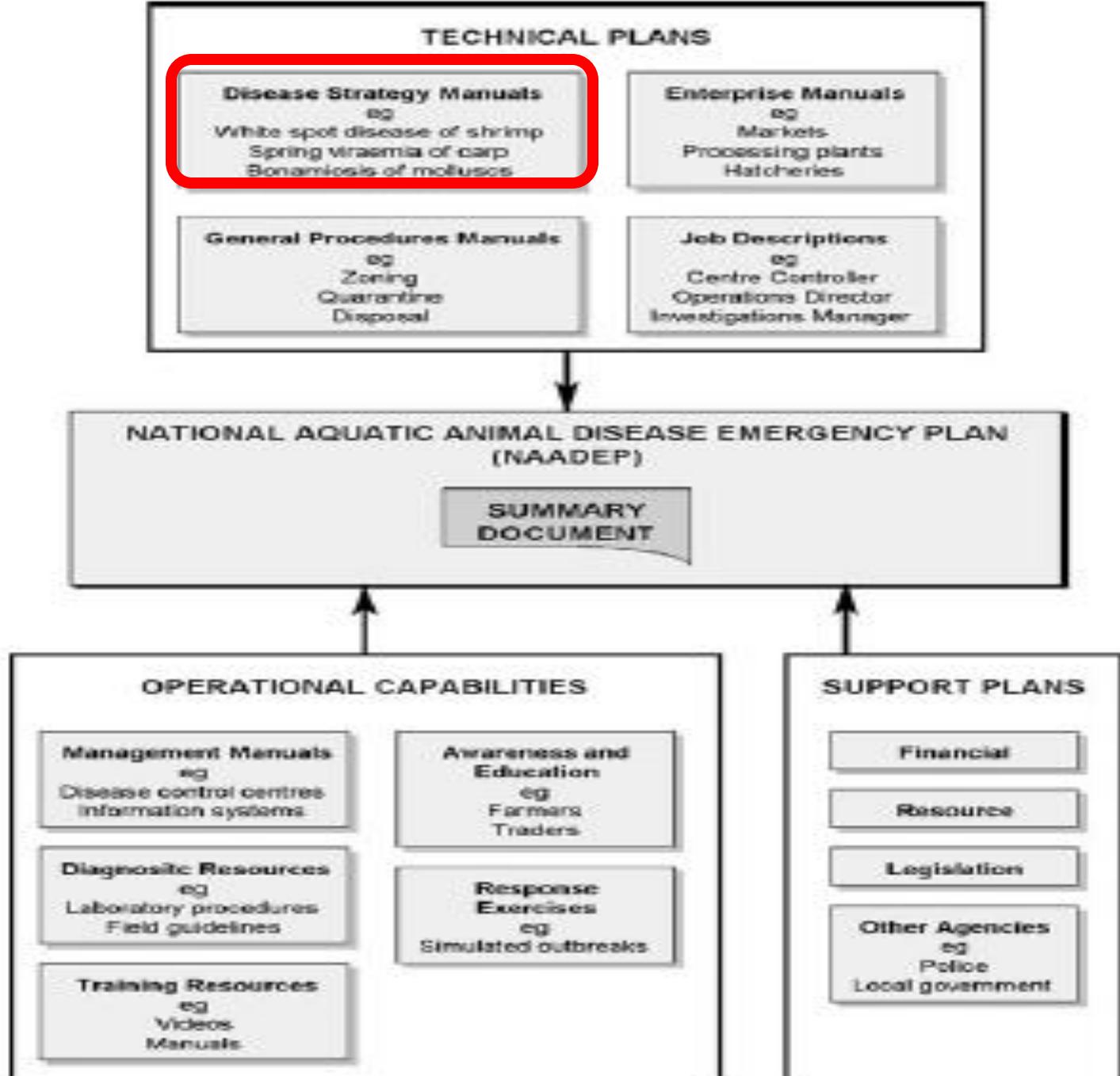
# Early response (1)

- **What:** all actions targeted at rapid and effective containment (and possibly elimination) of an emergency outbreak
- **Why:** prevent it from spreading and becoming an uncontrollable epizootic
- **How:** depends on many factors; disease scenario
- Control options: **eradication**, containment, mitigation
  - **Eradication:** elimination of pathogen from affected population or from the country – including sub-clinical infections - the highest level of response but may not be possible; not always possible!
    - Disease well established prior to initial detection (early detection failed)
    - Intermediate or carrier hosts unknown
    - Source of infection unknown

## Early response (2)

- Control options: eradication, **containment, mitigation**
  - **Containment:** containing the disease at specific zones; controls in place at infected zones in order to prevent the spread to uninfected populations
  - **Mitigation:** reducing the impacts (occurrence and severity) of the pathogen/disease through control measures at farm level or affected population
    - Stocks in infected zone
    - Vaccines, treatments, husbandry

# Components of National Contingency Plan



## National Aquatic Animal Disease Emergency Plan

- Technical plans
- Operational Capabilities
- Support Plans

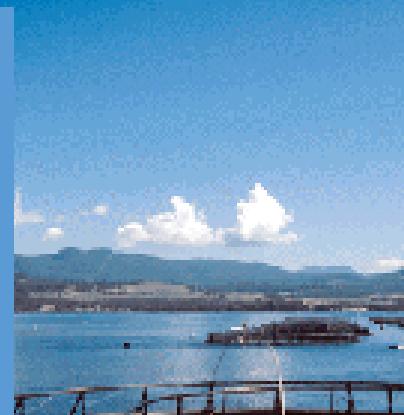
# Aquaculture is a very dynamic sector – site/location specific (no cut and paste)

+/- 500 species; systems, environment, management, small-scale producers, science

Aquatic animals require more attention in order to monitor their health

- not readily visible except in tank holding conditions
- live in complex and dynamic environment
- feed consumption and mortalities are hidden under water

- Diseases not caused by a single event
- End result of a series of linked events involving the interactions between the host, the environment and the presence of a pathogen (Snieszko, 1974).



CISIPA 2017 21Nov2017 Lima Peru

Range of diseases are also varied

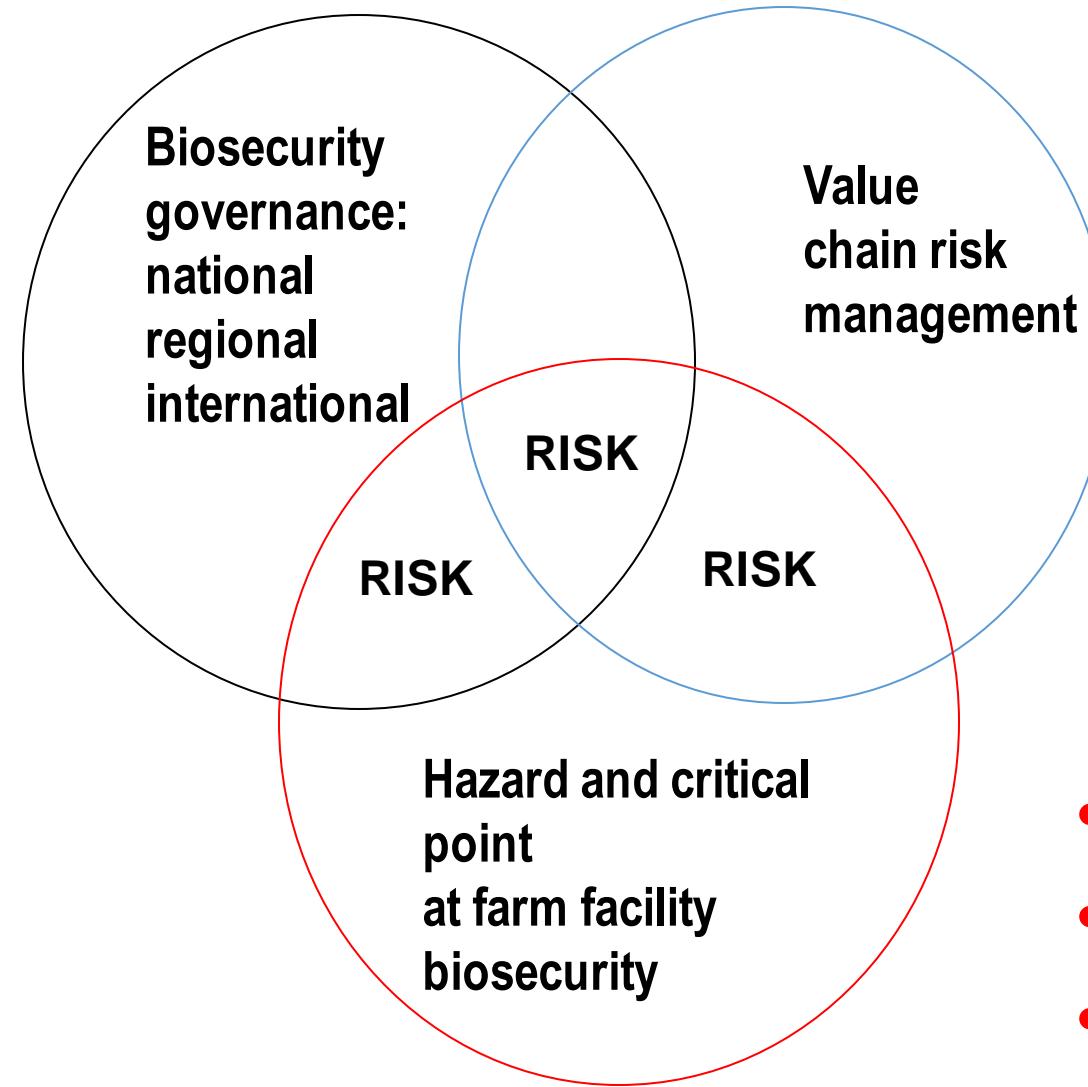
- some disease with low or unknown specificity
- many with non-specific symptoms

Complexity of aquatic systems makes distinction between health, sub-optimal performance and disease obscure

Spread of disease from either cultured fish to wild fish or vice-versa

- presence of pathogen in both fish and water source;
- presence of susceptible host;
- viability, in terms of number and longevity, of pathogen in the environment;
- viable infection route.

- enabling environment
- policies, legislation and enforcement
- AAH services
- extension services
- compliance: GAP CoC, trading standards (OIE)
- certification schemes
- fisheries/veterinary authorities



**Manage the risks at all levels of the aquaculture chain**

- risky areas in the value chain
  - supplier of inputs and products
  - trading practices

- hatchery
- nursery
- grow-out
- processing plants
- markets
- wild



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GATES foundation



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National Institute of Fisheries Science



Food and Agriculture  
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REPUBLIC OF SOUTH AFRICA



Veterinærinstituttet  
National Veterinary Institute



MERCK  
Animal Health



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ASSOCIAÇÃO BRASILEIRA DE CRIADORES DE CAMARÃO

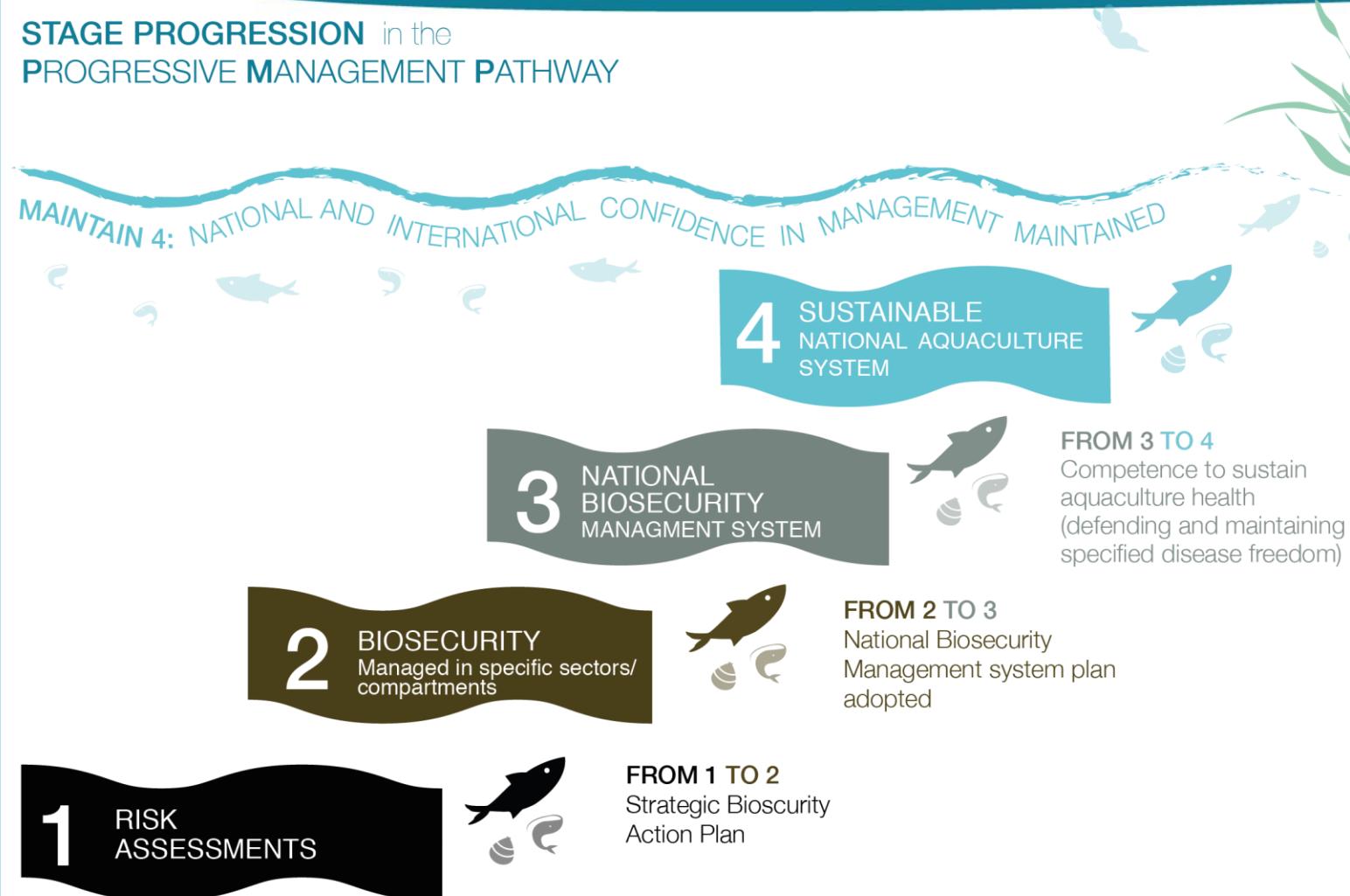
AFRICAN UNION  
INTERAFRICAN BUREAU  
FOR ANIMAL RESOURCES



**FAO/MSU/WB Stakeholder Consultation on  
Progressive Management Pathway (PMP) to Improve Aquaculture Biosecurity  
World Bank Headquarters, Washington, D.C. 10-12 April 2018**

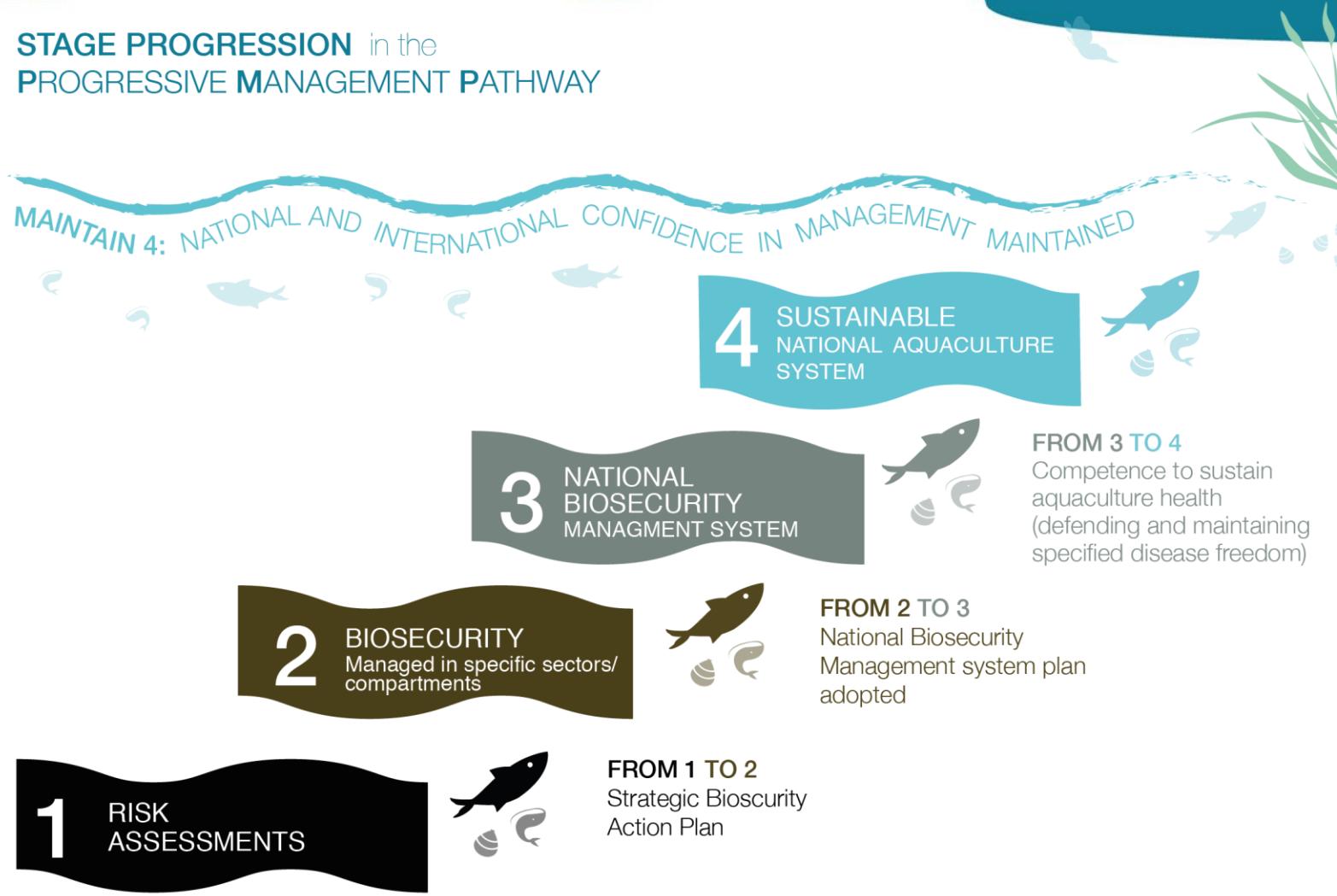
# PMP | The Progressive Management Pathway for Aquatic Biosecurity to support Sustainable and Resilient Aquaculture

Stages can be considered as an elevator – you get on at your floor (including basement!) and stop at the floor which has the needs for your aquaculture industry – but everyone is in the same biosecure building, which will help global communication & share experiences as everyone's aquatic biosecurity progresses...



# PMP | The Progressive Management Pathway for Aquatic Biosecurity to support Sustainable and Resilient Aquaculture

## STAGE PROGRESSION in the PROGRESSIVE MANAGEMENT PATHWAY



Development of PMP implementation plans should be developed between industry stakeholders and governance authorities to ensure buy-in, best-fit for country, but a template that provides a degree of consistency between participating countries or regions.

# PMP | The Progressive Management Pathway for Aquatic Biosecurity to support Sustainable and Resilient Aquaculture

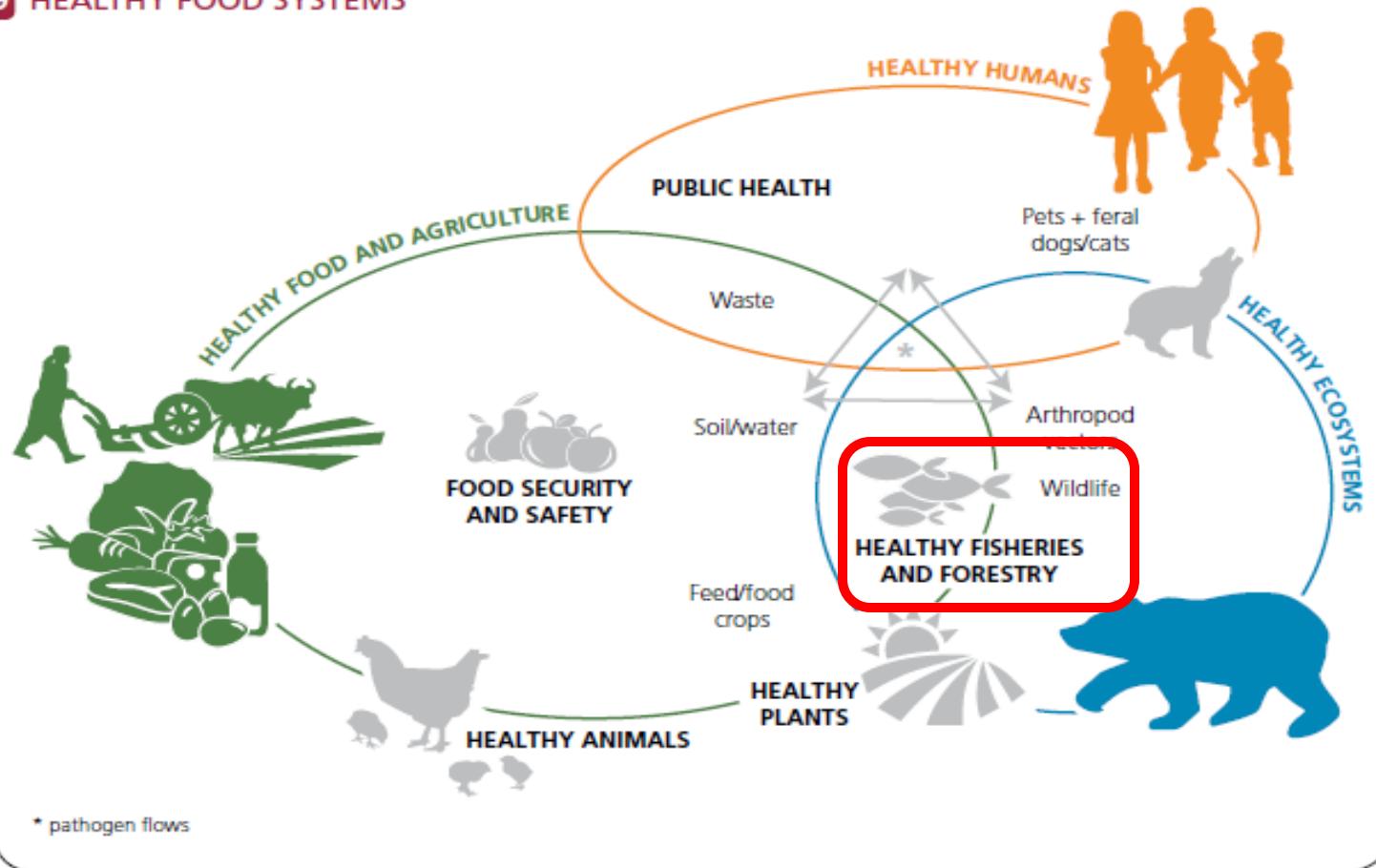
PMP provides an opportunity to help countries assess which stage they are at, research resource materials that can help, and provide confidence for a self-assessment start for biosecurity improvement towards a system that would be useful for outside assessment (PVS – for further improvement for veterinary services or aquatic animal competent authority for the country), and from there, if necessary, be prepared for 3<sup>rd</sup> party/trade partner audit.

## STAGE PROGRESSION in the PROGRESSIVE MANAGEMENT PATHWAY

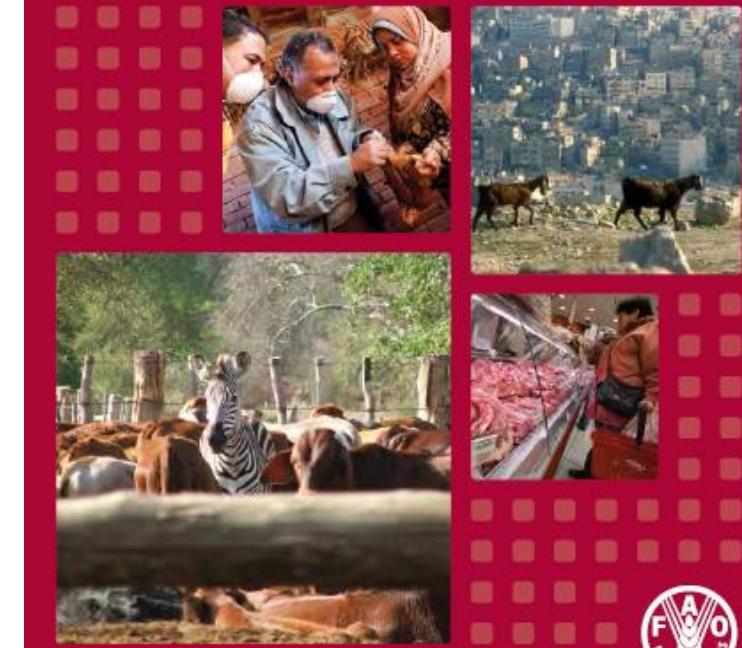


# One Health Platform

39 HEALTHY FOOD SYSTEMS



**World Livestock 2013**  
Changing disease landscapes



## Healthy people, healthy environment, healthy animals

# Emergency preparedness and response (EPRS) audit

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# EPRS audit

- SECTION 1. General administration (17 questions)
- SECTION 2. Aquatic EPR System Elements (29 questions)
- SECTION 3. Operational Support Systems (7 questions)
- SECTION 4. Other information

Understanding  
gives  
us  
hope!

# EPRS audit

- **SECTION 1. General administration (17 questions): scope of responsibility and administrative structure**
  - General
  - Communication
  - Risk analysis
  - Operational capacity/capability
  - Contingency plans
  - Personnel skills
  - Resource allocation
  - Legislation
  - Systems review and development

# EPRS audit

- **SECTION 2. Aquatic EPR System Elements (29 questions): priority elements of OIE**
  - Early warning
  - Early detection
  - Early response
- **SECTION 3. Operational Support Systems (7 questions): broader support system**
  - Legislation
  - Information management system
  - Communication system
  - Resources
- **SECTION 4. Other information**

# Activity

- Session 6 supporting paper
- Review the response to the audit
- Prepare a slide or two to be included in the National Action Plans on TiLV to be presented tomorrow

# Inspiration

