National Approaches to Aquatic Animal Health Emergencies and Response

Dr. Marc A. Le Groumellec
Consultant
Madagascar
National Strategies on Aquatic Animal Health

- Serves as framework for the national level implementation of technical guidelines
- Contains the action plans of governments at short, medium and long term to implement the technical guidelines using the concept of ‘phased implementation based on national needs’
- At different stages of development
Impact of Aquatic Animal Diseases (AAD)

- **National estimates**
  - US$ 17.5 M WSSV in India in 1994;
  - US$ 650 M for YHD in Thailand in 1994

- **Global estimate:** US$ 20 B shrimp diseases

In 2004, EU aquaculture was worth more than 2.5 billion Euros, but financial losses due to disease were estimated at 20% of the production value (equivalent to 500 millions Euros).

- **Annual losses due to ISA**
  - Norway: US$ 11 M;
  - Canada: US$ 14 M

Bondad-Reantaso *et al.*, 2005; Stirling Aquaculture, 1998; Bostock, 2002
AADs and economic investments

Disease control programs
- USA: US$ 8.3 M ISA ; US$ 11.7 SVC
- Canada: US$ 34 M; China: US$ 73 M
- Norway: US$ 3.98 M

Research

National strategies on aquatic animal health
- Australia: US$ 2.09 M over 4 years of development and initial implementations
- USA: US$ 375 000.00 development

Aquatic animal health market
- Market size: worth US$ 938 M (biologica, antibiotics, antiparasitics, nutraceuticals)
- R&D investment: worth US$ 48 M
## Aquaculture profiling

<table>
<thead>
<tr>
<th>Developed Countries</th>
<th>Developing countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Few species</td>
<td>Many species</td>
</tr>
<tr>
<td>Optimized feed</td>
<td>Trash fish</td>
</tr>
<tr>
<td>Full scientific basis</td>
<td>Some scientific basis</td>
</tr>
<tr>
<td>Established technology</td>
<td>Traditional technology</td>
</tr>
<tr>
<td>History of disease investigation</td>
<td>Disease investigations are new</td>
</tr>
<tr>
<td>Closed cycles</td>
<td>Wild broodstock and fingerlings</td>
</tr>
<tr>
<td>Prevention: vaccination</td>
<td>Treatment: antibiotics</td>
</tr>
<tr>
<td>Corporate and well-organized</td>
<td>Small-holders, semi-organized</td>
</tr>
</tbody>
</table>
Fish production in Norway

Source: FAO 2000 90/2
Aquaculture in Malaysia

Source: FAO 2000 90/2
**VARIACIONES DE VOLUMEN Y PRECIO POLARIZAN LA PRODUCCIÓN**

Países asiáticos con altos volúmenes y enfocados en especies de bajo valor

**Distribución de principales países acuícolas según producción y valor por kilogramo (2005)**

(1) Calculado según valoración FAO de producción y volúmenes de cosecha de acuicultura en 2005
Fuente: FAO, análisis BCG
Increase in the number of species cultured as risk to aquaculture

<table>
<thead>
<tr>
<th>Region</th>
<th>1970</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>Asia (excluding China)</td>
<td>55</td>
<td>107</td>
</tr>
<tr>
<td>Oceania</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Europe</td>
<td>19</td>
<td>60</td>
</tr>
<tr>
<td>Africa</td>
<td>5</td>
<td>43</td>
</tr>
<tr>
<td>Latin America &amp; the Caribbean</td>
<td>8</td>
<td>46</td>
</tr>
<tr>
<td>North America</td>
<td>9</td>
<td>19</td>
</tr>
</tbody>
</table>

Subasinghe (2003)
Biosecurity and aquaculture

In aquaculture, biosecurity is a collective term that refers to the concept of applying appropriate measures to reduce the probability of a biological organism or agent spreading to an individual, population, or ecosystem, and to mitigate the adverse impact that may result (Arthur et al. 2004).

This analysis is done in a way that incorporates the best scientific information available in a defendable manner.

WTO SPS Agreement emphasizes the need to apply risk analysis as a basis for taking any SPS measures beyond existing standards.
Important treaties and agreements related to international trade in fish and fish products

<table>
<thead>
<tr>
<th>Binding</th>
<th>Non-binding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agreement on the Application of Sanitary and Phytosanitary Measures</td>
<td>ICES Code of Practice on the Introduction and Transfers of Marine Organisms</td>
</tr>
<tr>
<td>(SPS Agreement)</td>
<td></td>
</tr>
<tr>
<td>Aquatic Animal Health Code (OIE)</td>
<td></td>
</tr>
<tr>
<td>Convention on Biological Diversity and the Cartagena Protocol on Biosafety</td>
<td>EIFAC Codes of Practice and Procedures for Introductions and Transfers of Marine and Freshwater Organisms</td>
</tr>
<tr>
<td>(UNEP)</td>
<td></td>
</tr>
<tr>
<td>Convention on International Trade in Endangered Species (CITES)</td>
<td>Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals in Asia (TGBCIS)</td>
</tr>
<tr>
<td>European Union (EU) related legislation and directives</td>
<td>FAO Code of Conduct for the Responsible Fisheries (CCRF)</td>
</tr>
</tbody>
</table>
Examples of voluntary guidelines

- CCRF Aquaculture Development
- FAO CCRF Guidelines on Health Management for Responsible Movement of Live Aquatic Animals
- FAO/NACA Asia Regional Technical Guidelines
## Biosecurity and National Strategies

<table>
<thead>
<tr>
<th>Policy, legislation and enforcement</th>
<th>Zoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk analysis</td>
<td>Emergency preparedness</td>
</tr>
<tr>
<td>Pathogen list</td>
<td>Research</td>
</tr>
<tr>
<td>Information system</td>
<td>Institutional structure</td>
</tr>
<tr>
<td>Health certification and quarantine</td>
<td>Human resource development</td>
</tr>
<tr>
<td>Surveillance, monitoring and reporting</td>
<td>Regional and international cooperation</td>
</tr>
</tbody>
</table>
Examples of National Strategy

- Australia
- Canada
- USA
- Myanmar
- India
- Thailand
- Nepal
- Viet Nam
- Philippines
- Cambodia
- Laos
- Latvia
- Bosnia/Herzegovina

- Vets and non vets…
Australia: ‘AQUAPLAN’ contains a five year strategic plan for aquatic animal health that was prepared through close consultation between government and industry

- initiatives ranging from border controls and import certification, enhanced veterinary education, capacity to manage exotic animal disease incursions

- Remaining free from several major aquatic diseases which has given the country a comparative advantage, both in terms of production and trade
Australia's National Strategic Plan for Aquatic Animal Health

Aquaplan
2005-2010

Control Centres Manual

July 2005
What is requested for addressing AAH emergencies with an adequate response?

- A functional Early Detection System (refer to Surveillance presentation). Involvement of AAH Focal Points.
- Communication network to inform ASAP Competent Authorities, OIE Headquarters, other stakeholders.
- Predefined SOPs for handling the outbreak (contingency planning, including emergency harvests, destruction and waste disposal).
- Predefined SOPs for improving biosecurity in other facilities susceptible to this infection (certified SPF fry, vaccination, vectors exclusion devices, water disinfection, etc.).
- Defining containment zones. Restriction of animal transports only between already certified compartments.
- Monitoring through a reinforced surveillance program
Chronology of events in AAH emergencies and adapted response

Early Detection from:
- Farmer observations of mortalities or clinical signs
- Active surveillance sampling
- Triggered by suspicion of OIE listed disease, or national list or emerging disease

Immediate Information of Competent Authority (CA):
- Official sampling (CVO)
- Diagnostic confirmation through National Reference Laboratory
- Shipment to OIE Reference Laboratory
Early detection and gross signs: abnormal swimming, tail rot, shell discoloration, black gills. Hypertrophied lymphoid organ or hepatopancreas, hemolymph aspect and clotting time, etc.

Sampling for lab diagnostics (Histology, Molecular Biology, Bacteriology).

Can be an OIE listed Disease, a National listed Disease or an Emerging Disease.
Disease early diagnosis in fish

Observe the fish for external signs

- Reduction in appetite
- Clinical signs
  - Abnormal swimming
  - Exophthalmia
  - Hemorrhages on body
  - Skin lesions

Tilapia
Sea bass
Pomfret
Disease diagnosis in lab for fish

- Observe the fish for internal signs
  - Nodules/ granulomas
  - Enlarged spleen

- Sampling for lab test
  - Virology: PCR, cell culture, EM
  - Bacteriology: agar plate, impression smear
  - Parasitology: microscopic examination
  - Fungus: agar plate, microscopic examination
  - Histopathology
Disease diagnosis in lab for shrimp

Histology:
• Histopathology
• In Situ Hybridization
• TEM

Molecular Biology:
• PCR - RT-PCR
• ELISA
Farmers
Fish Health Specialist
Government Field VO
Public
State (local) Diagnostic Laboratory
Other Labs
AAHL
CVO / CA
Local Disease Control Centre
Industry Stakeholders
OIE Delegate & Headquarters

Adapted from AquaVetPlan
Chronology of events in AAH emergencies and adapted response

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Immediate action of CA and Local Disease Control Centre:
- Implement Contingency planning (Aquatic Code, chapter 4.4)
- Destruction, disposal and fallowing (Aquatic Code, chapter 4.5) if necessary. Decontamination later on.
- Disease Monitoring in the facility and around

Official Case Confirmation:
- Country official notification to Members through OIE WAHIS
- OIE Headquarters ensuring large communication

Return to previous sanitary status when possible
Emergency harvests
Destruction and disposal
Fallowing Aquaculture Farms
Chronology of events in AAH emergencies and adapted response

If the Disease is already established and becomes endemic:

CA taking preventive actions in other facilities handling susceptible animals

- Improve biosecurity procedures in facilities handling susceptible species if required
- Defining certified disease free compartments (zones) and control animal transports
- National surveys to estimate the diffusion of the Disease and define zoning
- Improve skills of stakeholders regarding this disease, including private sector, diagnostic laboratories (capacity building).
Farm level health management

Dealing with day-to-day situations in farms, pond/farm health management is of prime importance in preventing, controlling and even eradicating serious diseases.
Farm level health management

Inequities in aquatic animal medicine and/or husbandry education and inaccurate information dissemination are core issues.

Dead fish are thrown into the open waters.

Courtesy Prof. M. Shariff
The role of farmers

Empowering farmers to manage disease and other risks as the key to success under reducing public funds
Examples of preventive measures: security and biosecurity
Examples of preventive measures:

100% indoor production cycle
Pathogen exclusion from water through filtration

Technologies available for low water flows (hatcheries, Nucleus Breeding Centers, in-door recirculated growout).
Pathogen exclusion from water through filtration

Drumfilters with a 100 µm mesh to automatically remove vectors from the water intake canal (Indonesia)

Technologies available for semi-intensive or intensive grow-outs.
Bird scaring or exclusion devices

Broodstock rearing facility QDPI&F
BIARC

Predator netting over 4 grow-out ponds
List of potential vectors / hosts

High diversity of vectors looking very similar, although they carry different pathogens
Pathogen exclusion through water and soil sterilization (physical or chemical)

Apart from UV light, strong oxidants could be used, but producers should use them with precaution to not induce environmental impacts.

Some piscicides are used in earth ponds after filling, and some pesticides to kill crustaceans in the bottom. These practices should be abandoned, because they damage the environment.
Large areas of greenhouse covered ponds
Health Certification Programs

It is imperative that activities such as health monitoring, diagnosis, quarantine, reporting, communication, emergency planning and response, be undertaken at the farm and farm cluster levels.

Ongoing efforts at certification of service providers

FHS/AFS
NACA AFS/FHS
A model of compartment for the aquaculture industry

A possible future organization involving veterinarians for more efficient biosecurity practices in aquaculture
Responsible use of antibiotics

March 18, 2012
Vietnam puzzled
50 Percent of Exports Have Been Found to Contain Antibiotic Residues...
Disease control and prevention: vaccination

- 1 person can inject 1,000 fish in one hour
- 4 injectors working 8 hours a day can vaccinate 32,000 fish per day
Take home message

- With regards to fish health, aquaculture development and increase in international trade continuously bring new challenges.

- Aquatic Animal Diseases remain a major limiting factor to sustainability of the sector.

- Biosecurity and Risk analysis are the main pillars of a National Strategy on AAH.

- International and regional guidelines are continuously reviewed and improved.
Take home message

- National strategies enable ad hoc compliance to these standards with due respect for national priorities, objectives and means.
- Increased cooperation between fisheries and veterinary authorities are necessary to support national plans.
- The global aquaculture development calls for innovative responses in health management.
- Empowering farmers to manage disease and other risks is seen as the key to success under reducing public funds.
Certification is certainly one critical issue, currently, because of its multiple and significant implications (compartments).

Whole-of-government approach to aquatic animal health. Embracing aquatic animal health as part of the “one-health” approach.

Whatever can go wrong, will go wrong – in any given situation, if you give them a chance... (Murphy’s law)
Conclusion

✓ Aquatic Animal Health Focal Points have a crucial role to play in Early Detection and Emergency Preparedness.

✓ Preparation for emergencies can be based on literature. But it is necessary to adapt it to local aquaculture techniques to check applicability.

✓ Emergencies SOPs must not stay “on paper”, but be financially manageable and immediately applicable for efficiency.

✓ Prevention is always better and cheaper than implementing contingency plans, less costly and painful.
Thank you for your attention

Courtesy of Dr Franck Berthe