



# FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



## Aquaculture biosecurity

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## AQUATIC FOOD SYSTEMS FOR PEOPLE AND PLANETARY HEALTH

- Aquatic foods are **essential** for ***Nourishing Nations and Transforming Food Systems.***
- **Fisheries and aquaculture** can play a greater role in delivering healthy diets and more sustainable, equitable and resilient food systems around the world (**Blue foods assessment**).
- Our challenge is to transform aquatic food systems to do better for humans (**safe/healthy food**), animals (**no/less disease**) and the environment (**clean**) within planetary boundaries. **ONE HEALTH**



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## AQUACULTURE GROWTH AND FUTURE CHALLENGES

- Global demand for aquatic foods will roughly **double by 2050** - aquaculture is predicted to meet most of this demand **complementing capture fisheries.**
- Aquatic foods were found to **rank more highly than terrestrial animal-source foods** in terms of their nutritional benefits and potential for sustainability gains.
- Aquatic food systems facing the highest risk from **climate change and disease** are also typically located in those **regions (LMIC) where people rely on them most** and **where they are least equipped to respond and adapt** to climate hazards and disease risks.





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## Major trends in farming of aquatic foods

- Increasing intensification
- Continued diversification of species
- Continued diversification of systems
- Increasing influence of markets, trade and consumption (food safety)
- Enhanced regulation and better governance



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## Trends from a biosecurity perspective

- Increasing intensification
  - more disease emergencies
- Continued diversification of species
  - more movement of live aquatic animals
  - Introduction and spread of pathogens
- Continued diversification of systems
  - Spread of pathogens to wider geographical areas
- Influence of markets, trade and consumption
  - Trade restrictions on food safety grounds (e.g. antibiotics, malachite green)
  - Trade restrictions on account of pathogens in live animals and aquatic products (e.g. emergency harvested shrimp)
- Enhanced regulation and better governance
  - Compliance to International (OIE) standards and guidelines
  - Health certification and quarantine, import risk analysis, disease reporting





## Transboundary Nature of AA Diseases

- International trade 
- Movement of people 
- **Risk** of bringing pathogens, pests, infectious diseases, food safety concerns, on the rise  
- We can't avoid trade or people movement





## Aquatic Diseases of Concern

- World Animal Health Organization (OIE) Listed Diseases of global concern
- National listed Diseases of national concern
- Regional listed Diseases of regional concern (regional approach – SADC?)





## International Standards

- Codex Alimentarius Commission (FAO/WHO)
  - Food safety
- World Organization for Animal Health (OIE)
  - Animal (including aquatic animal) life and health
  - Aquatic Code and Aquatic Manual
- International Plant Protection Convention (IPPC)
  - Plant life and health
- WHO International human health regulations (IHR)
- **We need NOT set any standards but operationalize strategies to implement the standards**





## AA disease emergencies on the Increase

- Increased prevalence of known endemic diseases (e.g. WSD, EUS)
- Outbreak of a known exotic disease (e.g. TiLV)
- Emergence of unknown diseases
- Global direct annual loss estimated over 10 billion USD





## AAH emergencies in the context of WTO-SPS Agreement

- Obligation to tell (exporting country)
  - OIE emergency notification within 24 hours
- Right to know (importing country)
- Trade facilitation not restriction is the goal
- Sanitary measures can be applied only if the disease (pathogen) is absent in the importing country or is subject to an official control program





## SPS Agreement (WTO, 1995): Basic Aim

- To maintain the sovereign right of any government to provide the level of health protection it deems appropriate (ALOP)
- .....but to ensure that these sovereign rights are not misused for protectionist purposes
- .....and do not result in unnecessary barriers to international trade.



## National Aquatic Animal Health Strategy

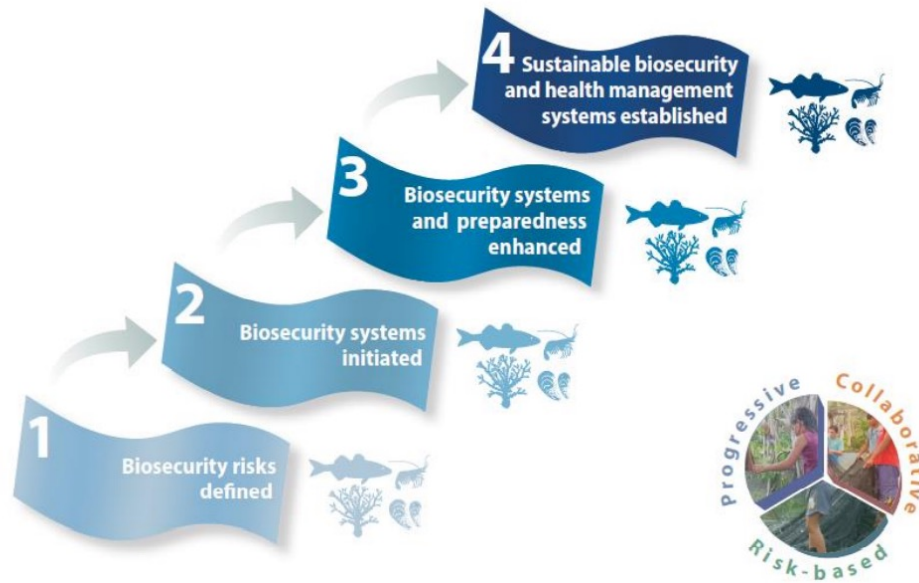
- Simple and Practical
- Suit the needs of the country
- Strong emphasis on concepts of risk analysis and biosecurity
- Should make use of the existing resources effectively
  - Networking
  - Promoting cooperation
  - Giving ownership to all concerned



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## FAO – Progressive Management Pathway for improving aquaculture biosecurity (PMP/AB)



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## Key Elements of National strategies (FAO Technical Guidelines and PMP/AB)

- List of Pathogens to be considered
- Disease diagnosis
- Disease surveillance, monitoring and reporting
- Contingency planning
- Health certification and quarantine measure
- Disease zoning
- Risk analysis
- Responsible and prudent use of Antibiotics
- National strategies and policy frameworks
- Capacity building

Need to Develop practical mechanisms at the country level to implement some strategies



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## UNDERSTANDING RESPONSIBLE AQUACULTURE

- **Practices** and **behavior** that are in conformity with national and international standards and requirements
- Practices that ensure sustainability of the sector
- Practices that ensure environment protection and integrity
- Practices that enable social equity and respect ethical values and standards
- Practices that consider human food safety concerns seriously
- Aquaculture should try to **meet the above norms** and at the same time be **economically viable and profitable** to the farmers and other stakeholders





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## KEY MESSAGE

- We need Science based practices that can meet principles of responsible aquaculture
  - farm level biosecurity
  - better management practices



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## FARM LEVEL BIOSECURITY

- Establishment and implementation of a **system or procedures** to prevent the introduction of pathogens into a farming facility (e.g. ponds, tanks, farm, etc) from outside the facility or into a section of the facility from another section in the same facility
- Biosecurity is a **common-sense method of prevention** to avoid contact between farmed animals and their pathogens (e.g. bacteria, parasites, fungi, viruses)
- Most of the time it consists of various, simple, sometimes **zero-cost measures** that will keep pathogens away from farmed fish and keep fish away from pathogens.





## UNDERLYING PRINCIPLES

- Ensuring fool proof biosecurity is very difficult for small farmers
- Preventing **entry** of pathogens
  - Coming through various routes – water, stocked material, people, equipment, feed, birds, carriers
- If they enter- preventing disease **outbreak** in the facility
  - Better husbandry, good feeding, good water quality, farmed animals less stressed,
- If outbreak occurs – preventing it **spreading** to other units in the facility and to outside of the facility
  - Better handling of mortality events, reporting and information sharing, better disposal of dead fish, disinfection protocols





## BENEFITS OF BIOSECURITY

- Allows facility owners to minimize the risk of the following
  - the occurrence of a disease outbreak
  - high fish mortality
  - high financial losses from the loss of fish
  - a setback caused by the disruption of production
  - high operation costs to clean up the facility after an outbreak
  - loss of clients, who will no longer trust the disease status of the facility





## BETTER MANAGEMENT PRACTICES

- BMPs are management practices
- BMPs are **not** a standard for certification
- BMPs when adopted by small scale farmers will
  - minimize risks
  - improve production efficiency
  - reduce costs of production
  - maximize economic returns.
- BMPs also provide a **PATH** towards
  - compliance to environmental, food safety and market requirements
  - participation in certification programs





## DEVELOPING BMP

- Identification of **risk factors** to the long term sustainability by using population based risk analysis approaches
- Development of management interventions to address the identified risk factors
- Validation of management interventions through demonstrations and field testing
- Scientifically validated interventions contextualized to farming systems and commodities referred to as BMPs





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## COMMON BMP

1. Good facility preparation
2. Good quality seed/brood stock selection
3. Stocking and rearing practices
4. Water quality management
5. Feed management
6. Health monitoring/Biosecurity
7. Disease management
8. Responsible use of treatments and chemicals
9. Better Harvest and post-harvest Practices
10. Record maintenance/Traceability
11. Environmental awareness
12. Food safety awareness



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## BENEFITS OF BMP

- Increased production
- Reduced disease incidence
- Reduced FCR and increased efficiency of resource use (feed, seed, energy, finance in particular)
- Reduced pollution
- Reduced chemical and antibiotic use

Farm level biosecurity measures and BMPs can be promoted effectively through organization of farmers into farmer groups/clusters (CLUSTER MANAGEMENT).





## EVIDENCE

- There is evidence to show that it is possible to bring change in the **behavior**, **attitude** and **practice** of small farmers by demonstrating cost-benefits of simple/practical farm level biosecurity measures and better management practices





## USING TOOLS

- Basic **biosecurity audit check-lists** can be very easily used for self-assessment of biosecurity risks and gaps for any given facility. The findings can form the basis for decision making on cost-effective biosecurity plans and investments (WorldFish Biosecurity check list: <https://hdl.handle.net/20.500.12348/4985>)
- Simple **epidemiological tools** can be used to gather information from farming systems on behaviour and practice of farmers, production practices, production outcomes, mortality events, soci-economics, etc. Epidemiological analysis of data can help to identify trends, association, risk factors, etc which can further inform development of interventions in the form of better management practices and farm level biosecurity plans. (Aquatic Animal Health Package of Practices: Fish epidemiology and health economics: <https://hdl.handle.net/20.500.12348/4900>)



## EXAMPLE 1: SHARING OF STAFF & EQUIPMENT

Biosecurity – share equipment/staff	Overall Totals				N	Percent of Total
	Unusual Farm Mortality					
	Yes		No			
	n	%	n	%		
No	23	7.99	265	92.01	288	72.18
Yes - 1 farm	3	9.09	30	90.91	33	8.27
Yes - 2 farms or more	13	16.67	65	83.33	78	19.55

Sharing of equipment – Farms that did not share equipment/staff with other farms had lower unusual mortality (7.99%) compared to farms that did (9.09% and 16.67%)

### RECOMMENDATIONS

#### FOR PREVENTION OF INTRAFARM CROSS CONTAMINATION:

- ▶ Storage racks and disinfection for equipment in every section
- ▶ Placement of equipment above floor for sanitary purposes
- ▶ Scheduled cleaning of equipment and tanks/ponds
- ▶ Scheduled maintenance of equipment to prevent breakdowns/contaminations between facilities

#### FOR PREVENTION OF INTERFARM CROSS CONTAMINATION:

- ▶ Specified direction of worker movement within the farm, entry and exit points
- ▶ Disinfection stations for vehicles, equipment (nets, buckets) and protective wear (boots) at every section and entry point
- ▶ Hand washing stations at each section
- ▶ Only authorized staff allowed in sensitive areas

## EXAMPLE 2: BIOSECURITY BETWEEN PRODUCTION CYCLES: DRYING OF PONDS

Biosecurity Between Production Cycles – drying ponds	Overall Totals					Percent of Total
	Unusual Farm Mortality					
	Yes		No		N	
	n	%	n	%		
Yes	10	6.21	151	93.79	161	40.35
No	29	12.18	209	87.82	238	59.65

Drying of ponds between cycles – Farms that dried ponds between productions had less unusual mortality (6.21%) compared to farms that didn't (12.18% unusual mortality)

### RECOMMENDATIONS:

- Drying and liming of ponds between every production cycle

## EXAMPLE 3: INTRODUCTION OF NEW FISH AFTER MAIN STOCKING

Biosecurity – Introduction of new fish after main stocking	Overall Totals				N	Percent of Total
	Unusual Farm Mortality					
	Yes		No			
	n	%	n	%		
Yes	7	38.89	11	61.11	18	4.51
No	32	8.40	349	91.60	381	95.49

Introduction of new fish after main stocking – Farms that added fish to the stock after the main stocking event **reported higher unusual mortality (38.89%)** than farms that did not (only 8.4% unusual mortality)

### RECOMMENDATIONS:

- ▶ Separate each stock of fish in different holding facilities (each batch in a different tank/pond) after arrival
- ▶ If necessary to introduce new stocks after main stocking, fish should be treated, quarantined and observed until determined as healthy for introduction into the current stock



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## WAY FORWARD

- Aquatic animal diseases and one health issues (e.g. AMR) is a **product of actions of various actors and elements** involved in the food systems and beyond.
- **Collective action under a one health framework** is necessary to promote responsible and sustainable aquatic food systems.



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