



Food and Agriculture
Organization of the
United Nations



GBADs Seminar 25.11.21

Health economics and GBAD in LIFDC aquaculture countries

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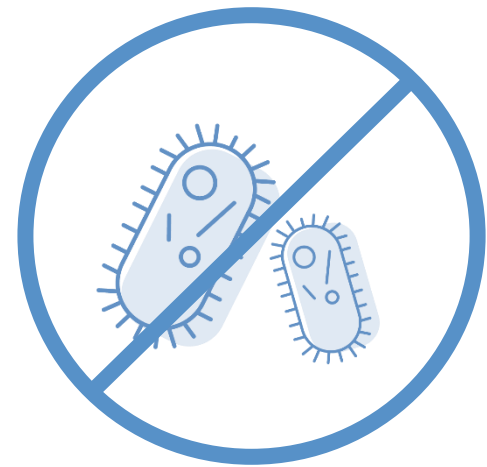
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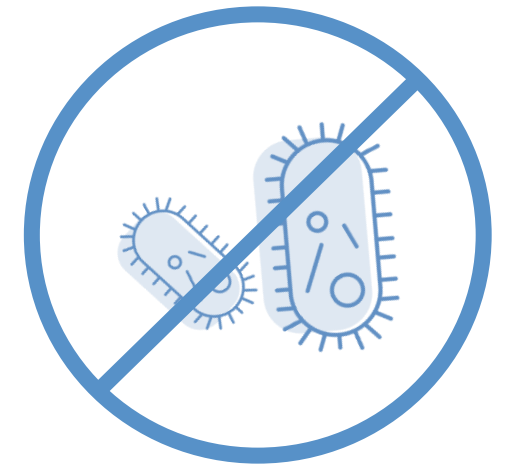
Aquaculture health economics



Disease
Prevention

Governance

Innovation

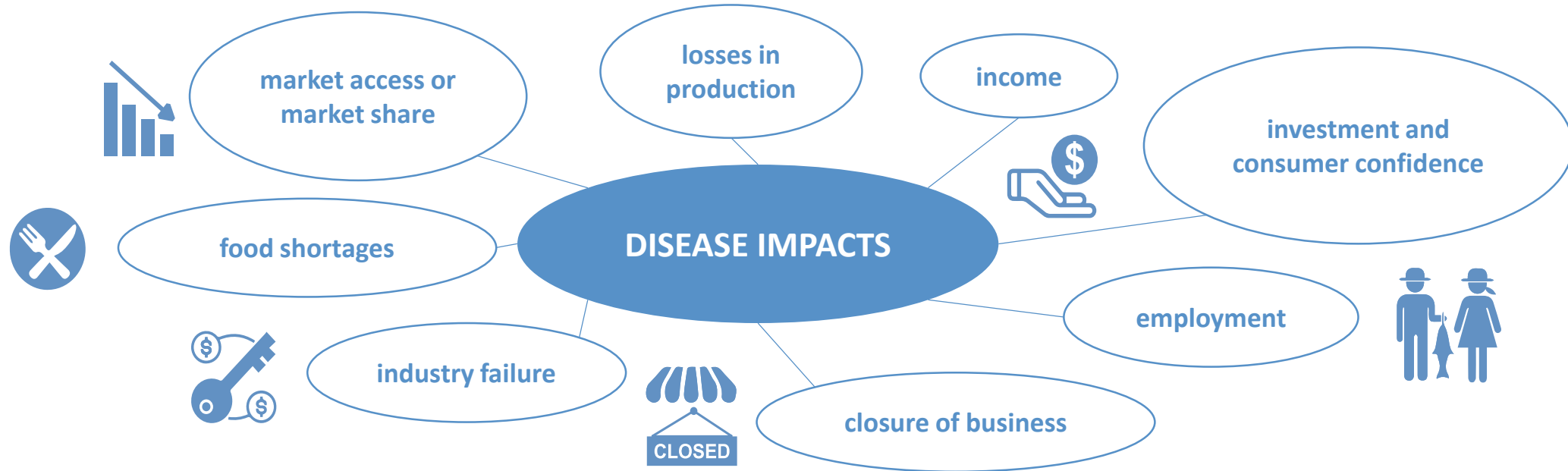


A systematic way of assessing the **economic and social impacts** of aquatic animal diseases provides a better picture of their **adverse impacts and economic consequences**.

Understanding the **economic impact of disease** is essential for calculating **opportunity costs and potential savings of biosecurity and preventive measures**.



Aquaculture health economics



Even in the absence of systematic methods for assessing disease impacts, many entities are now providing some estimates for losses.

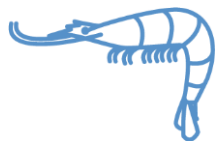
LOSSES TO DISEASES

1987-1994
Shrimp, various Pathogens
USD 3.019 million

2010-2017
Shrimp, AHPND
USD 12 billion



Aquatic disease losses; historical data



Examples of socio-economic and other impacts of diseases in shrimp aquaculture in selected Asian and Latin American countries

1992	1993	1994-1995	1996	1999
<p>Thailand Disease: Yellowhead Disease (YHD)</p> <p>Losses and other impacts: USD 30.6 M</p>	<p>People's Republic of China Disease: Various Shrimp diseases</p> <p>Losses and other impacts: USD 420 M</p> <p>60% Decline in production from 210,000 tonnes to 87,000 tonnes</p>	<p>India Disease: Yellowhead Disease (YHD) and White Spot Disease (WSD)</p> <p>Losses and other impacts: Production loss of 10,000 – 12,000 tonnes</p> <p>USD 17.6 M (1994) USD 25 M (1995)</p>	<p>Costa Rica Disease: Taura syndrome virus (TSV)</p> <p>Losses and other impacts: Reduction in survival rate of cultured shrimp from 65% to 15%.</p>	<p>Ecuador Disease: White Spot Disease (WSD)</p> <p>Losses and other impacts: US\$ 280.5 M equivalent to 63,000 tonnes</p> <p>Closing of hatchery operations</p> <p>Laying off of 26,000 people</p> <p>68% reduction in sales and production of feed mills and packing plants</p>



Aquatic disease losses; historical data



Examples of socio-economic and other impacts of diseases in finfish aquaculture in selected Asian countries

1932	1989	1994 - 1998	1998-1999	1999 - 2000
<p>Indonesia Disease: White spot disease (<i>Ichthyophthirius</i>) in Java barb, kissing gourami, common carp and giant gourami)</p> <p>Losses and other impacts: 10,000 Dutch guilders,</p>	<p>Malaysia Disease: Diseases of cage-cultured grouper, snapper and seabass</p> <p>Losses and other impacts: USD 1.3 M in potential income (combined loss estimates of private sector and government farms)</p>	<p>Japan Disease: Marine fish diseases</p> <p>Losses and other impacts: USD 114.4 M</p>	<p>Thailand Disease: <i>Alitropus typus</i></p> <p>Losses and other impacts: USD 234–468 per cage culture of tilapia</p>	<p>Indonesia Disease: Suspected Koi herpes virus (KHV)</p> <p>Losses and other impacts: 50 Billion Rs. in one area alone during the first three months of outbreak</p>



Aquatic disease losses; historical data



Some examples of economic impacts of diseases on representative molluscan species

1959	1993 -1997	2000	2002	2003
<p>United States Disease: <i>Haplosporidium nelsoni</i> (MSX) in Eastern oyster</p> <p>Losses and other impacts: Over 90% of oysters grown in Chesapeake Bay was affected</p>	<p>West and south coast of the Korean Peninsula Disease: <i>Perkinsus</i> sp. in Manila clam, <i>Ruditapes philippinarum</i></p> <p>Losses and other impacts: Decrease in clam landings since to one fifth of total landings</p>	<p>Australia Disease: <i>Marteilia sydneyi</i> (<i>marteiliosis</i> or QX disease) in Rock oyster (<i>Saccostrea glomerulata</i>)</p> <p>Losses and other impacts: Over 90% prevalence of the single most important pathogen in Rock Oyster</p> <p>USD 30 M</p>	<p>Japan Disease: <i>Marteilioides chungmuensis</i> in Pacific Oyster (<i>C. gigas</i>)</p> <p>Losses and other impacts: 60% Prevalence during harvest period</p>	<p>Taiwan Province of China Disease: Unidentified virus in Abalone (<i>Haliotis diversicolor</i>)</p> <p>Losses and other impacts: TWD 400 M (USD 11.5M) to the domestic abalone industry</p>

Aquaculture health economics: historical data

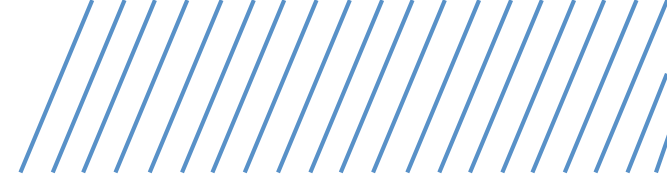
Examples of economic investments in aquatic animal health programmes

NOK 60 M (USD 77.1 M)
**Norwegian Food
 Safety Authority (NFSA)**
 Norway
 Aquatic Animal Health Strategy
 Source: Prof T Hastein

THB 55 M (USD 1.426 M)
**Aquatic Animal Research Institute (AAHRI),
 also an OIE Reference Laboratory for
 Epizootic Ulcerative Syndrome (EUS),
 Thailand**
 Research Institute or Reference Laboratory
 on Aquatic Animal Health
 Source: Dr S Chinabut

USD 8.3 M
**Disease control programmes
 to combat infectious salmon anemia**
 United States
 Disease Control
 Source: Dr Jill Roland

Estimated aquatic animal health market and research and development investment in 2004	Segment	Market Size (USD M)	Research and Development Investment (USD M)
	Biologicals	68.6	10.3
	Antibiotics	274.4	8.2
	Antiparasitics	29.4	2.1
	Hygiene	137.2	6.9
	Nutraceuticals	431.2	21.69
	Others	29.2	1.2



Aquaculture health economics

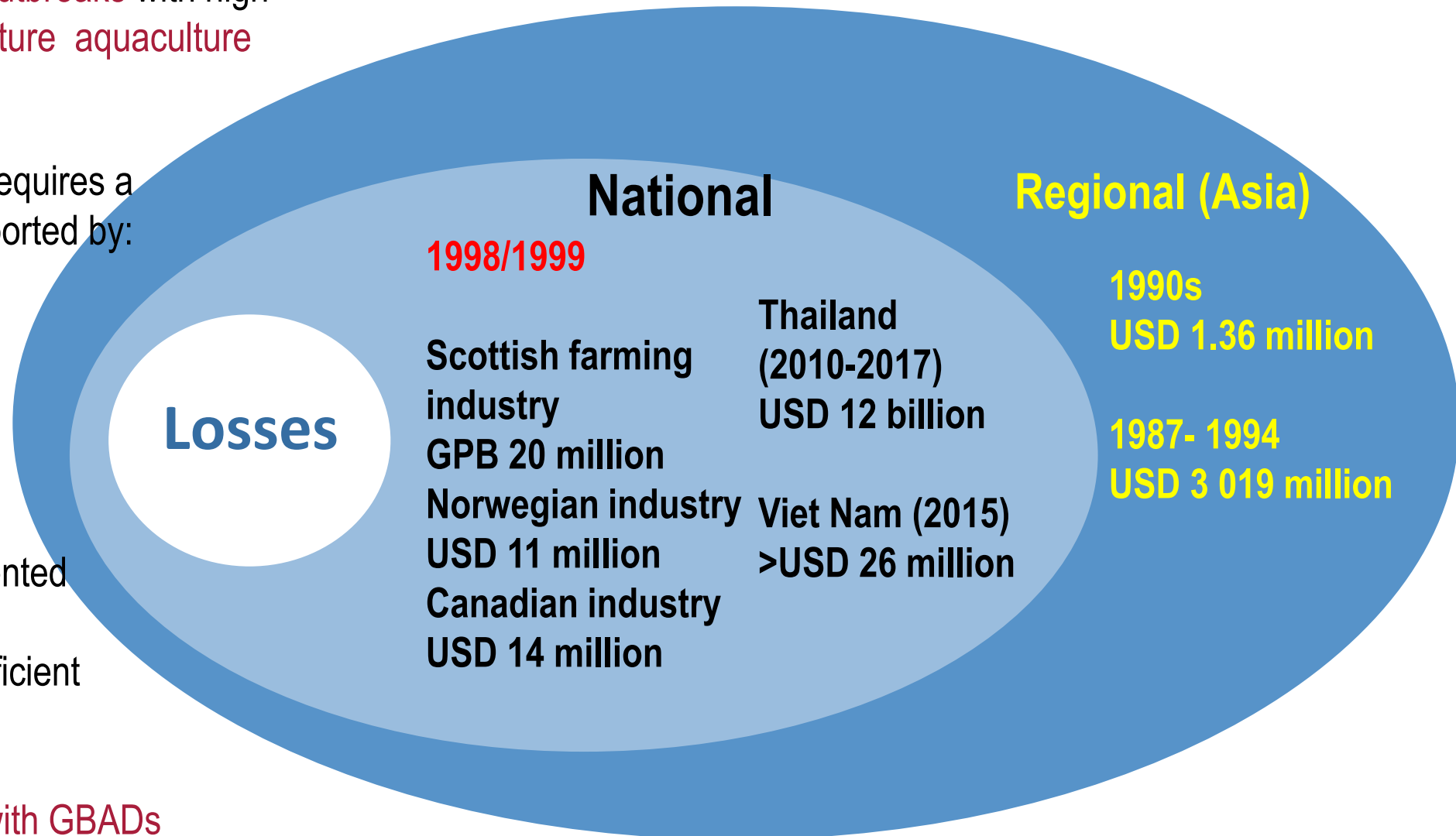
Numerous **unmanaged disease outbreaks** with high economic losses reflect an **immature aquaculture industry**

A **maturing aquaculture industry** requires a focus on disease prevention supported by:

- Improved **governance**
- Understanding **disease impacts** (burdens and investments)

The **current approach** to disease challenges needs to be supplemented with an **economic dimension** for improved responses and more efficient resource allocation

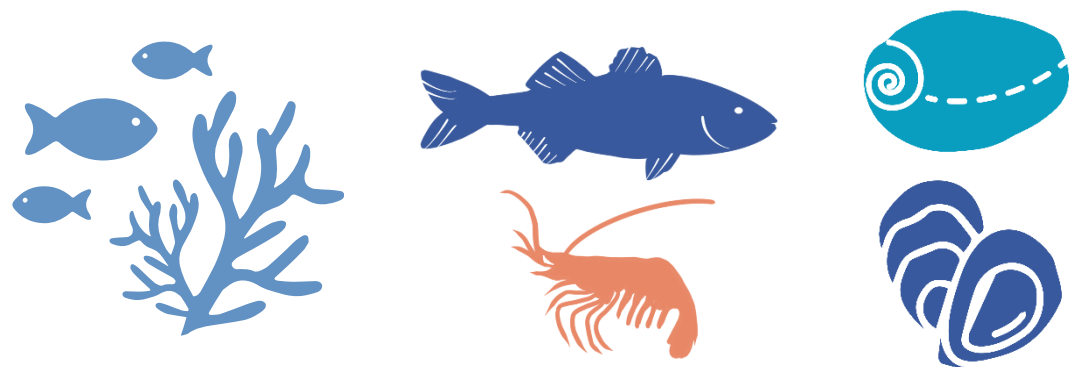
Big opportunity for engagement with GBADs



Aquaculture health economics

A look at the experience of the **People's Republic of China**, the world's biggest aquaculture producer:

2017, losses in aquaculture due to disease-related were approximately **USD 5.3 billion**.



It involved **62 cultured species** and **96 diseases**.

Losses due to variety of diseases

Tilapia: USD 450 million

***Penaeus vannamei*: USD 1.6 billion**

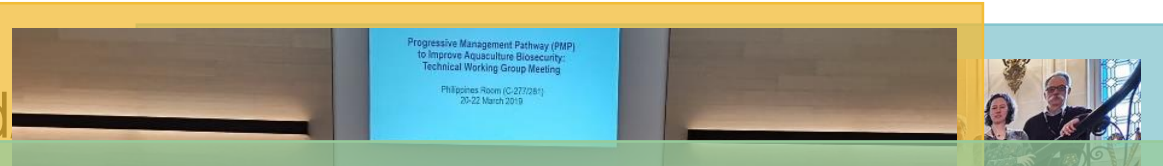
Oysters: USD 540 million

Sea cucumber: USD 460 million

Seaweed: USD 190 million

Timeline of PMP/AB Multistakeholder consultations

OIE HQ, Paris, France
FAO/MSU/WB/Norad



140 delegates, 70 countries including EU



2018 APRIL

FAO/MSU/WB
First Multistakeholder
Consultation
World Bank HQ, Washington DC, USA



FAO HQ, Rome, Italy



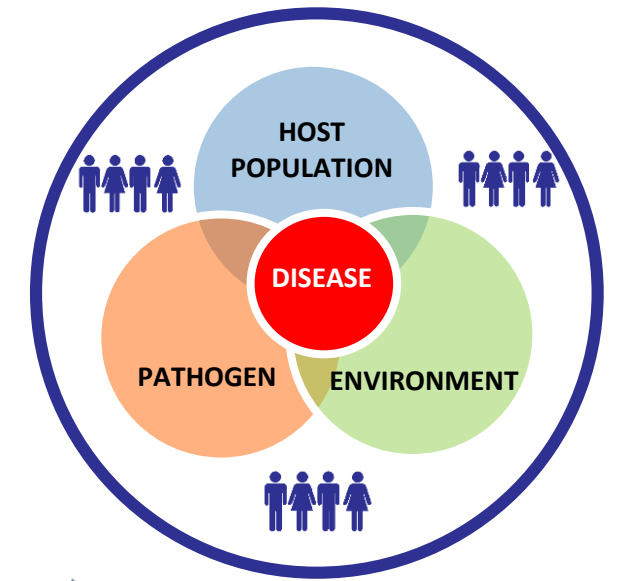
Trondheim, Norway

Session

PMP/AB: Economic dimensions

The PMP/AB is expected to result in sustainable:

- **reduction of burden of disease;**
- improvement of health at farm and national levels;
- minimization of global spread of diseases;
- **optimization of socio-economic benefits from aquaculture;**
- **attraction of investment opportunities into aquaculture;** and
- achievement of One Health goals.



PMP/AB key indicators and activities

STAGE 1: Biosecurity risks defined and strategy developed

Value chain stakeholder mapping

Risk analysis: threats and critical control points identified

ENABLING ENVIRONMENT

National strategy on AAH/AB, Competent Authority identified, draft pathogen list, **public-private PMP/AB taskforce**, legislative review, **aquatic health training**, **national laboratory**

Biosecurity strategies revised and enhanced, e.g. strong port/border controls, rapid detection and response





PMP/AB key indicators and activities

STAGE 2: Biosecurity systems initiated

Biosecurity measures implemented

Monitor/assess effectiveness (audits & certification)

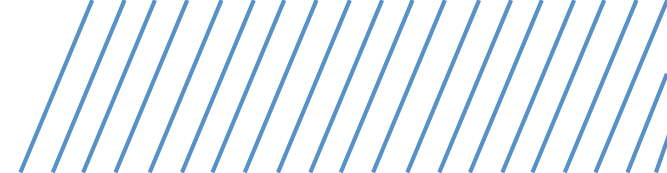
Surveillance of endemic pathogens

ENABLING ENVIRONMENT

Lab capacity to support surveillance, disease reporting, AAHIS, legislation, national pathogen list adopted

Commitment from public and private stakeholders to safeguard progress including investors





PMP/AB key indicators and activities

STAGE 3: Biosecurity systems and preparedness enhanced

Revised strategies and policies implemented

Efficient, effective outbreak management

Existing, exotic and emerging pathogens under continuous surveillance

Disease incidence and impact reduced

ENABLING ENVIRONMENT

Cost-benefit analysis, multi-agency taskforce, legislation for full implementation of strategies and enforcement of policies, lab capacity: rapid detection, emergency preparedness and response audit

Commitment from public and private stakeholders to safeguard progress including investors





PMP/AB key indicators and activities

STAGE 4: Sustainable biosecurity and health management systems established

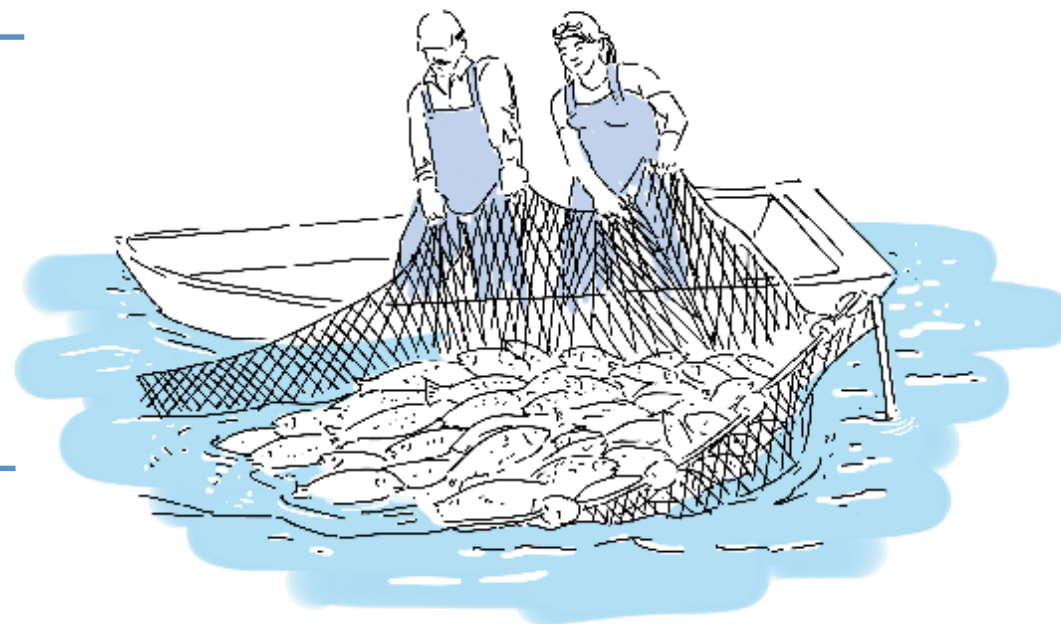
Activities sustained & evidence-based improvement

ENABLING ENVIRONMENT

Legislation reviewed and updated, zones compartments recognized by OIE (if applicable), **support other countries in biosecurity development**

Robust socio-economic situation for all (including small-scale producers, food security)

National and international stakeholders have confidence in the national aquaculture and ecosystem health, safe trade and transparency





FAO's
Aquaculture Biosecurity Programme
(endorsed during COFI/SCA 10)

Disease prevention at farm level
Including prevention of AMR

Implementing PMP/AB, enhancing interpretation and implementation of international standards and strengthening the One Health approach

Expanding understanding of aquaculture health economics (burdens and investments, opportunity cost)

Enhancing emergency preparedness

Supporting pillars 1-4 with several cross-cutting issues (capacity building, disease intelligence, surveillance etc.)

Para 40 of the Report of COFI/SCA10: The Sub-Committee recognized the importance of developing an assessment tool on aquaculture health economics and emergency preparedness, aligning with the initiatives of Global Burden of Animal Diseases. This tool could support decision makers (at policy, production and service provider levels) in ensuring effective resource allocation and creating an environment for increased investment opportunities



GBAD and Low-Income Food Deficit Country Aquaculture

Low-income food deficit countries (LIFDC) are determined by **three criteria:**

CRITERIA 1

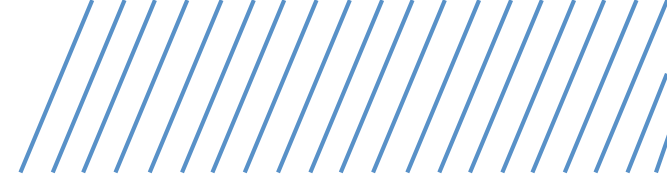
A country should have a per capita Gross National Income (GNI) below the “historical” ceiling used by the World Bank to determine eligibility for assistance by the International Development Association (IDA)

CRITERIA 2

The net food trade position (i.e. gross exports minus gross imports) of a country averaged over the last three years for which statistics are available, in this case 2017, 2018 and 2019.

CRITERIA 3

The self-exclusion criterion is applied if a country meeting the above two criteria specifically requests to be excluded from the LIFDC category.



47 FOOD DEFICIT COUNTRIES

TOP AQUACULTURE PRODUCERS FROM LIFDC'S

AFRICA: Benin; Burkina Faso; Burundi; Cameroon; Central African Republic; Chad; Comoros; Congo; Côte d'Ivoire; Democratic Republic of the Congo; Eritrea; Ethiopia; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Lesotho; Liberia; Madagascar; Malawi; Mali; Mauritania; Mozambique; Niger; Rwanda; Sao Tome and Principe; Senegal; Sierra Leone, Somalia, South Sudan; Sudan; Togo; Uganda; United Republic of Tanzania; and Zimbabwe



ASIA: Afghanistan; Bangladesh; Democratic People's Republic of Korea; Kyrgyzstan; Nepal; Syrian Arab Republic; Tajikistan; Uzbekistan; and Yemen.

AMERICAS:
Haiti and
Nicaragua

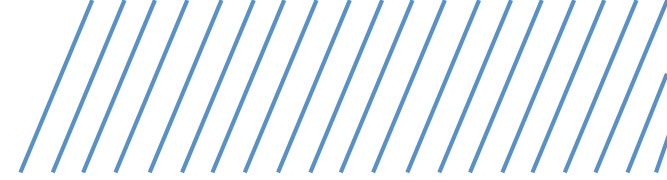




Data source:

1. FAO. 2021. Fishery and Aquaculture Statistics. Global aquaculture production 1950-2019 (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2021. www.fao.org/fishery/statistics/software/fishstatj/en
2. United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, Online Edition. Rev. 1.

Top 20 aquaculture producers from LIFDC with major species	Quantity (Tonnes, live weight) (2019)	Value (USD 1000) (2019)	Population (Thousands) (2019)
Bangladesh (Carp, barbels and other cyprinids)	2 488 600.00	6 049 669.84	163 046
Democratic People's Republic of Korea (Brown seaweeds)	679 560.00	168 652.50	25 666
Uganda (Tilapias and other cichlids)	102 942.70	241 462.52	44 270
Uzbekistan (Carp, barbels and other cyprinids)	81 717.00	187 639.00	32 982
Nepal (Carps, barbels and other cyprinids)	71 252.00	182 119.88	28 609
Ghana (Tilapias and other cichlids)	52 360.00	189 705.85	30 418
Nicaragua (Shrimps, prawns)	29 500.00	81 107.50	6 546
Kenya (Tilapias and other cichlids)	18 950.00	64 164.00	52 574
United Republic of Tanzania (Tilapias and other cichlids)	18 013.40	62 715.84	58 005
Madagascar (Red seaweeds)	14 100.41	46 598.57	26 969
Zimbabwe (Tilapias and other cichlids)	12 495.27	37 752.61	14 645
Sudan (Tilapias and other cichlids)	10 050.00	12 519.92	42 813
Malawi (Tilapias and other cichlids)	8 262.00	37 652.46	18 629
Afghanistan (Carps, barbels and other cyprinids)	8 000.00	18 729.59	38 042
Mali (Tilapias and other cichlids)	6 985.00	22 839.22	19 658
Benin (Miscellaneous freshwater fishes)	5 742.45	13 206.68	11 801
Côte d'Ivoire (Tilapias and other cichlids)	4 500.00	15 422.14	25 717
Rwanda (Tilapias and other cichlids)	3 850.00	12 399.06	12 627
Democratic Republic of the Congo (Tilapias and other cichlids)	3 300.00	11 560.00	86 791
Kyrgyzstan (Carps, barbels and other cyprinids)	2 675.00	8 010.00	6 416



47 FOOD DEFICIT COUNTRIES

AFRICA: Benin; Burkina Faso; Burundi; Cameroon; Central African Republic; Chad; Comoros; Congo; Côte d'Ivoire; Democratic Republic of the Congo; Eritrea; Ethiopia; Gambia; **Ghana (#14)**; Guinea; Guinea-Bissau; **Kenya (23)**; Lesotho Liberia; Madagascar; Malawi; Mali; Mauritiana; Mozambique; Niger; Rwanda; Sao Tome and Principe; Senegal; Sierra Leone, Somalia, South Sudan; Sudan; Togo; **Uganda #10)**; **United Republic of Tanzania #22)**; and **Zimbabwe (#24)**



ASIA: Afghanistan;
Bangladesh (#4);
Democratic People's
Republic of Korea;
Kyrgyzstan; Nepal; Syrian
Arab Republic; Tajikistan;
Uzbekistan; and Yemen.

AMERICAS:
Haiti and Nicaragua



47 FOOD DEFICIT COUNTRIES

AFRICA: Benin; Burkina Faso; Burundi; Cameroon; Central African Republic; Chad; Comoros; Congo; Côte d'Ivoire; Democratic Republic of the Congo; Eritrea; Ethiopia; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Lesotho; Liberia; Madagascar; Malawi; Mali; Mauritania; Mozambique; Niger; Rwanda; Sao Tome and Principe; Senegal; Sierra Leone, Somalia, South Sudan; Sudan; Togo; Uganda; United Republic of Tanzania; and Zimbabwe



ASIA: Afghanistan; **Bangladesh (#1)**; Democratic People's Republic of Korea; Kyrgyzstan; **Nepal (#15)**; Syrian Arab Republic; Tajikistan; **Uzbekistan (#14)**; and Yemen.

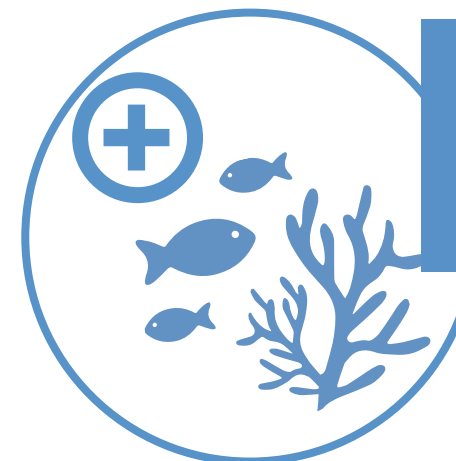
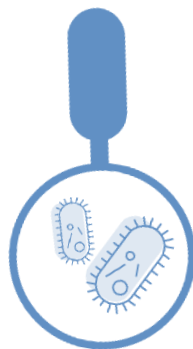
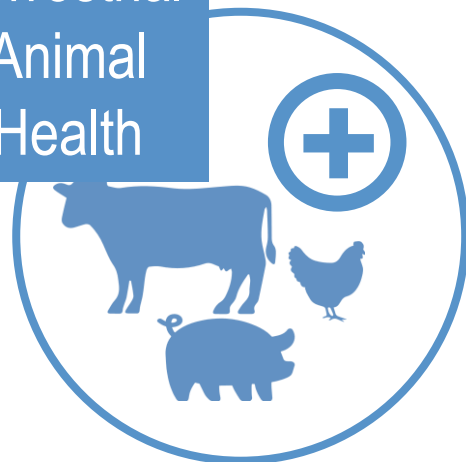
AMERICAS:
Haiti and
Nicaragua

Aquaculture health economics

Animal diseases have always heavily influenced human health, production, welfare and international trade.

New disciplines such as **animal health economics**, **veterinary public health** and **preventive veterinary medicine** were developed to mitigate animal disease impacts.

Terrestrial
Animal
Health



Aquatic
Species
Health



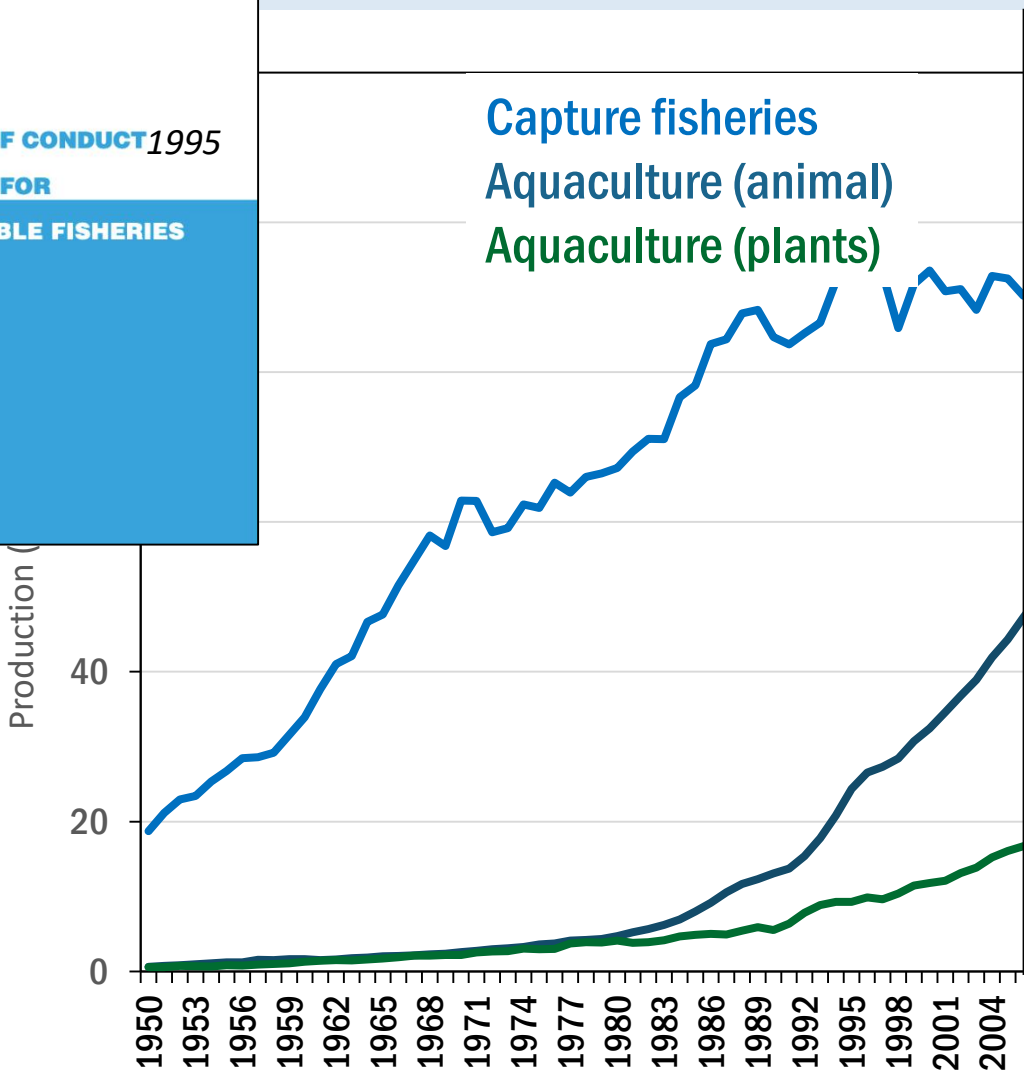
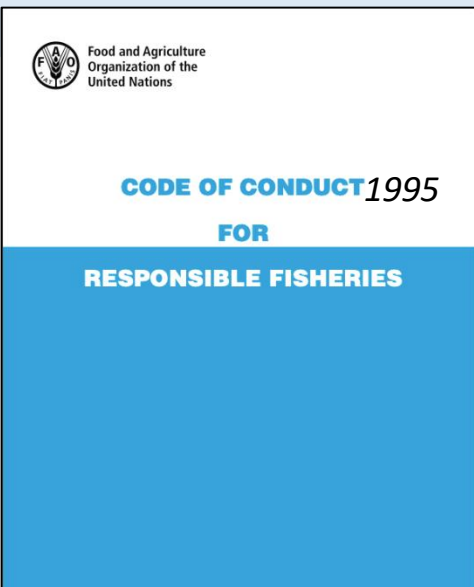
Human Health,
Production and Welfare

The **aquatic sector** can learn much from both the terrestrial and human health sectors, and it is now timely to include **aquaculture health** issues in the ongoing **Global Burden of Animal Disease (GBAD)**.



1995

2019



- Role of sector in combatting poverty, and feeding the world
- Increases recognition of aquatic systems in food systems strategies
- Focus on socio-ecological outcomes like sustainable production, equity and resilient livelihoods
- Notes Fisheries Management is non-negotiable path
- Reiterates critical role for sustainable aquaculture
- Focus on livelihoods, gender, vulnerable groups

1 Sustainable expansion satisfies global demand for aquatic food and distributes benefits equitably

2 Effective management of all fisheries delivers healthy stocks and secures livelihoods

3 Upgraded value chains ensure social, economic and environmental viability of aquatic food systems





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Thank you for your attention!

Audun Lem

Deputy Director

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