BIVALVE MOLLUSCS, PRODUCTION, TRADE AND FOOD SAFETY CONSIDERATIONS

Bangladesh bivalve mollusc familiarisation and training, September 2022

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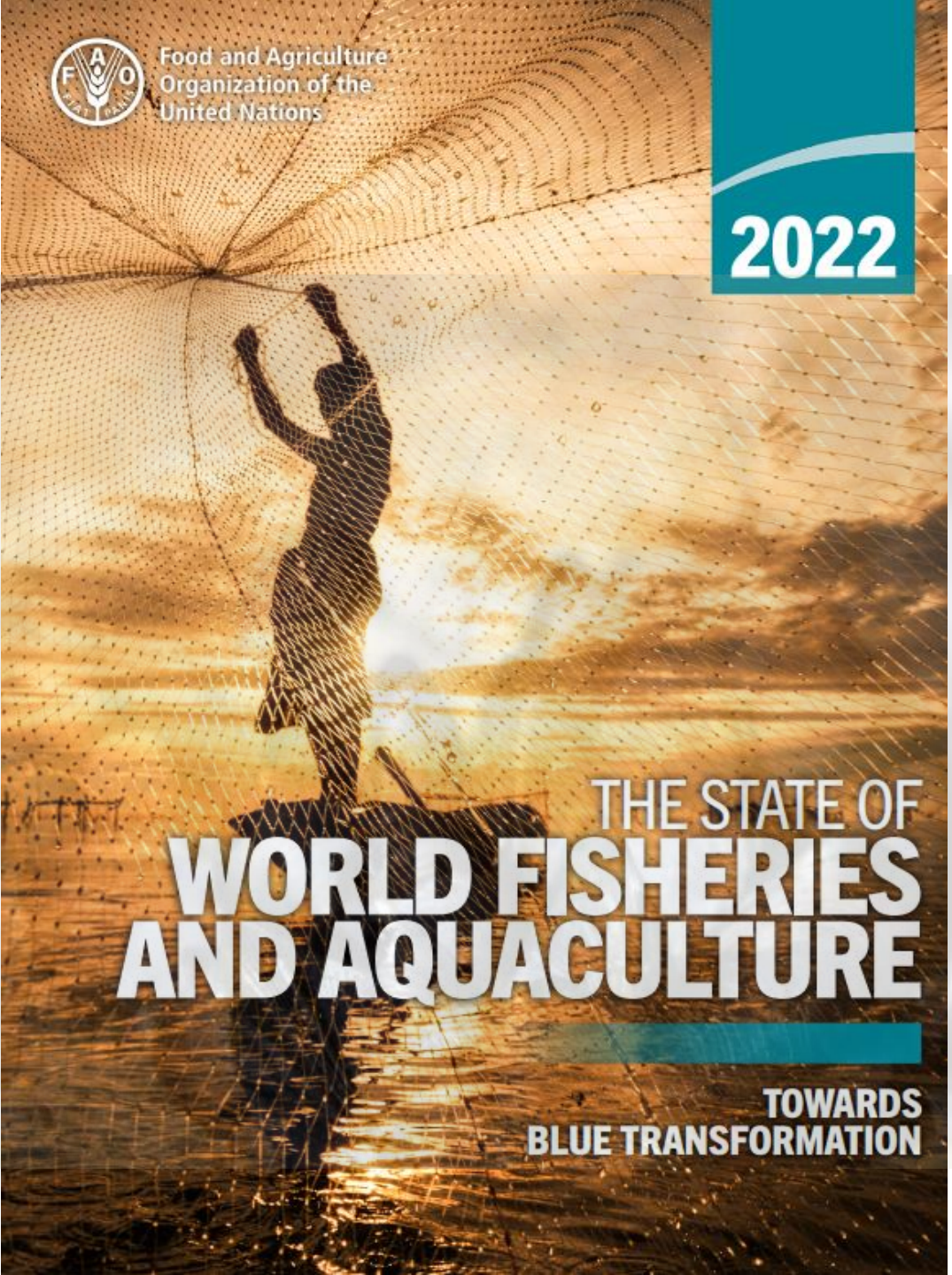

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CONTENT

- Bivalve molluscs as a sustainable foodstuff
- Global importance of bivalve molluscs
- Food safety considerations
- Sanitary and phytosanitary (SPS) considerations and global trade

WHAT DO WE MEAN BY BIVALVE SHELLFISH?

- Animals in the phylum, Mollusca
- Class, Bivalvia
- Two shells (bi – valve), shells made of calcium carbonate, connected with a hinge
- Aquatic salt, brackish and freshwater, numerous species
- Almost all are filter feeders, very efficient sieves – typical adult oyster filters 150 litres of water per day
- Concentrating surrounding water by 100 times



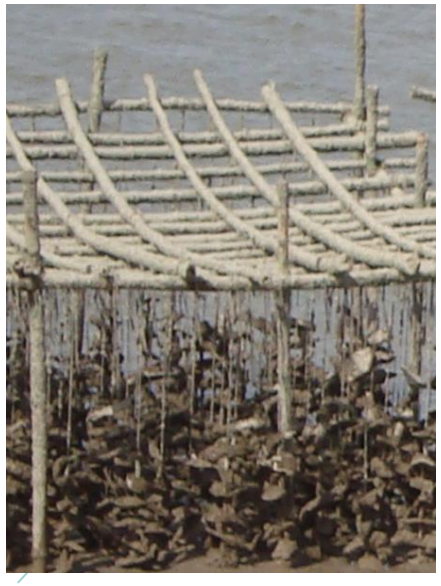






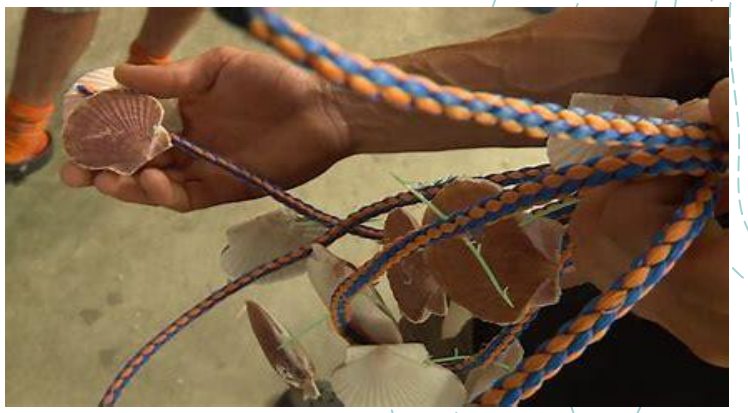
BIVALVE SHELLFISH – TYPES OF CULTIVATION

Huge range of cultivation methods both inshore and offshore





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BIVALVE MOLLUSCS AS A SUSTAINABLE FOODSTUFF

Extractive, **unfed**

Low industry costs

Gender opportunities in **rural communities**

No **antimicrobial** or **chemical** usage

RAISED WITHOUT ANTIBIOTICS

UK Government

BIVALVE MOLLUSCS AS A SUSTAINABLE FOODSTUFF

Relatively **low carbon footprint** compared to other forms of protein production – 340 tonnes CO_2 per tonne beef vs 11 tonnes bivalve protein

Globally an estimated **1.5 million sq km** of coastline suitable for growing **bivalve shellfish**

1% of this area could produce enough **protein for one billion people** – [*Willer & Aldridge,2020 Nature Food]*

Higher **protein** content than many meats and plants

High levels of **omega 3 fatty acids** and **micronutrients** (iron, zinc and magnesium)

Over two billion people worldwide are micronutrient deficient

GLOBAL FISH PRODUCTION – SOME FACTS

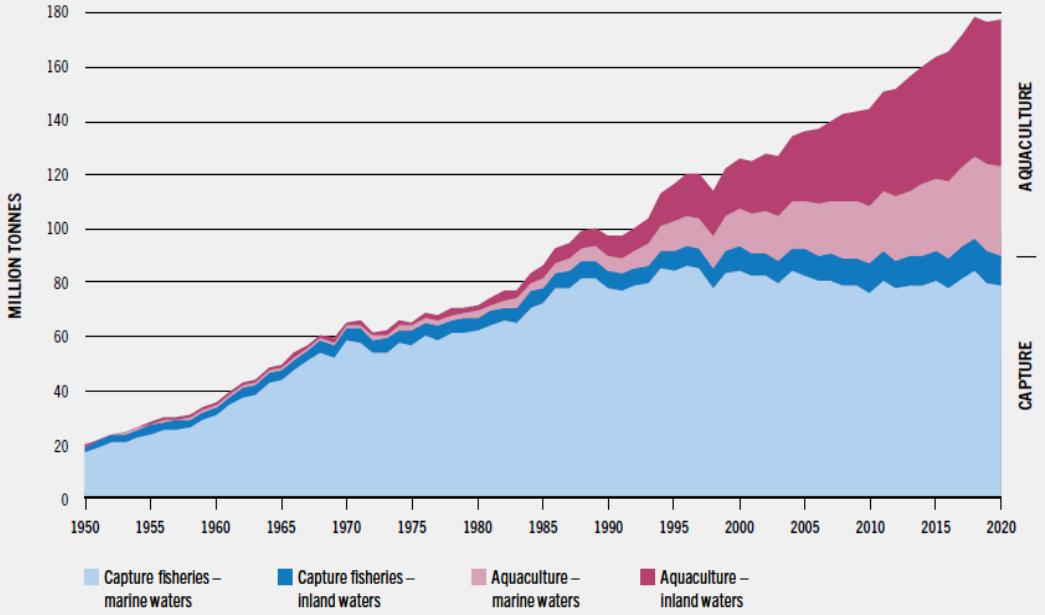
In 2020 global fish production (fisheries and aquaculture) reached **178M tonnes**, circa **50% aquaculture**.

Strong **increasing demand** for aquatic protein with increasing per capita wealth (in some world regions), increased population, availability (aquaculture), improved fisheries management, improved distribution networks and health benefits

Very well-established aquaculture industry in Bangladesh (upward trend from 2005)

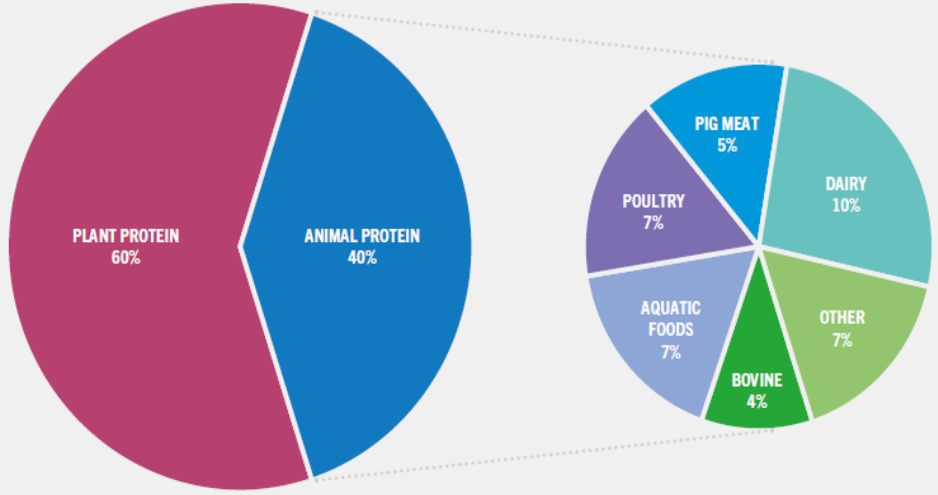
For **3.3 billion** people aquatic protein provides **20%** of **animal protein**, Bangladesh at least 50%

FIGURE 1 WORLD CAPTURE FISHERIES AND AQUACULTURE PRODUCTION



NOTES: Excluding aquatic mammals, crocodiles, alligators, caimans and algae. Data expressed in live weight equivalent.
SOURCE: FAO.

Contribution of plant and animal proteins to global average protein intake (FAO 2022)



RELATIVE GLOBAL IMPORTANCE OF BIVALVE MOLLUSCS – SOME FACTS

Increase in **production** over 50 years -1m tonne in 1950, to over **17m tonnes** in 2020 **(>80% aquaculture)**

Total value of USD 30 billion*

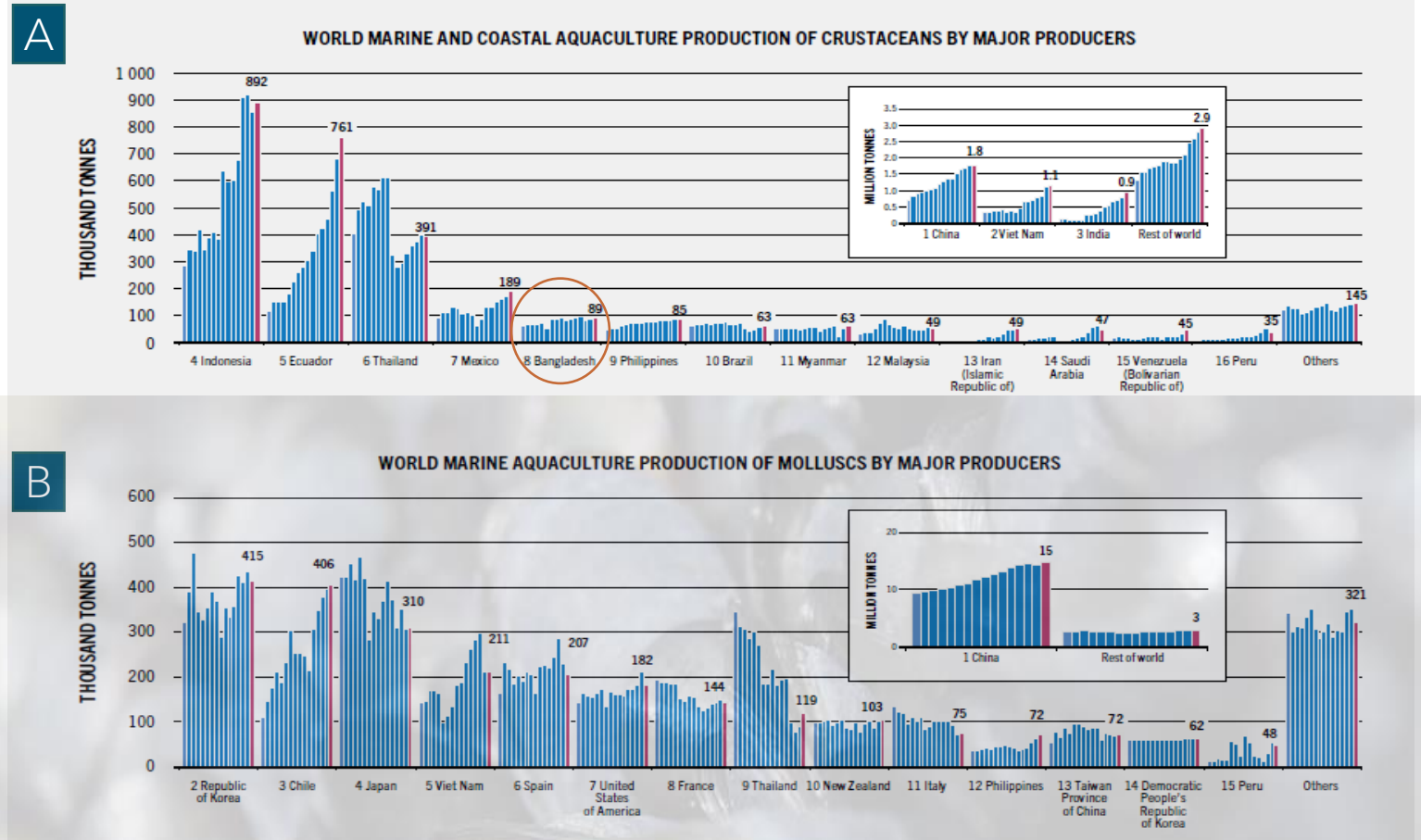
Bivalves are traded in different forms such as fresh, chilled, frozen or canned

Total Export value circa **USD 4.2 billion**

Value of trade in live, fresh or chilled **USD 1.4 billion**

Production dominated by **China** (90% of Asian production), but also Republic of Korea, Chile, Japan, and Vietnam

Aquaculture production crustacea (A) and molluscs (B) 2005 – 2020 (FAO 2022)



* Mainly as foodstuff but also sources of Calcium carbonate, oxide, as animal feed supplements and cosmetics

FOOD SAFETY CONSIDERATIONS

Bivalve molluscs are a **unique foodstuff**, presenting a unique public health risk

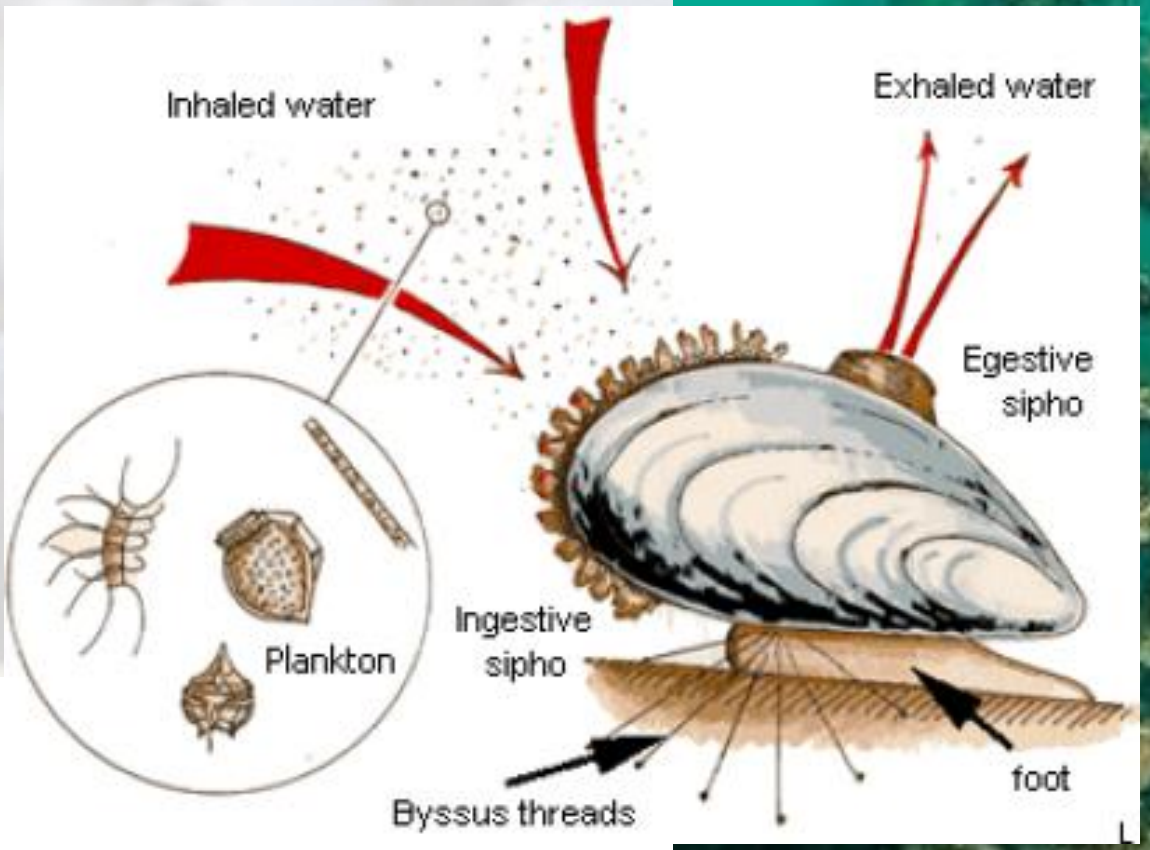
As **filter feeders** – taking on the **characteristics of their environment**

Hazard in the environment = hazard in the bivalve, cleaner the water, the cleaner the product

Frequently **consumed raw or lightly cooked**, without extensive processing

Contamination can occur during **primary production** (accumulating as they grow)

Most **food safety systems** are applied in **primary production** (and at the **end product** stage)



HAZARD IDENTIFICATION AND RISK ANALYSIS– IN PRIMARY PRODUCTION OF BIVALVE MOLLUSCS

HAZARD CATEGORIES

ANTHROPOGENICALLY DERIVED PATHOGENS

E.g., noroviruses, hepatitis A virus, *Salmonella* sp from human or animal faecal waste (HH2)

ENVIRONMENTAL PATHOGENS

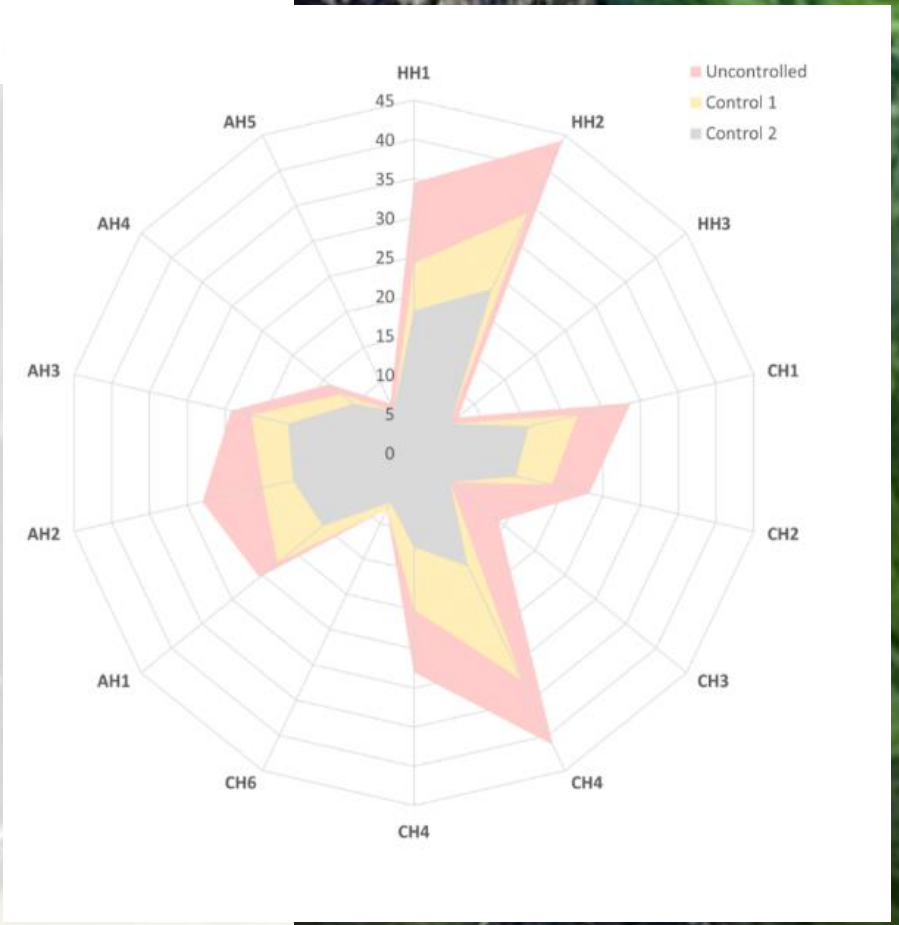
E.g., *Vibrio parahaemolyticus* and *Vibrio vulnificus* common in low salinity, warm waters (HH1)

CHEMICALS

E.g., natural algal biotoxins (CH4), heavy metals (CH1), persistent organic compounds (CH2), veterinary pharmaceuticals (CH5)

ANIMAL PATHOGENS

E.g., WOAH listed viruses (AH1)



WHAT, WHERE, HOW

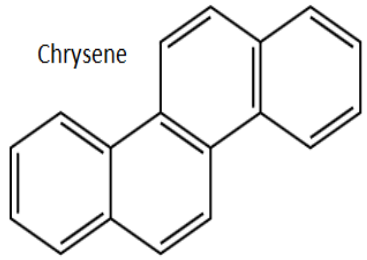
MAJOR RECOGNISED REGULATED RISKS ASSOCIATED WITH BIVALVE MOLLUSCS IN THE EU

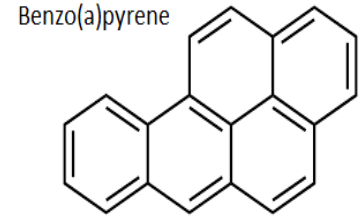
HUMAN (and animal) DERIVED PATHOGENS FROM FAECAL WASTE

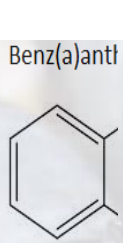
Salmonella spp. other faecally transmitted pathogens (norovirus, hepatitis A virus). Controlled through faecal indicator monitoring, area classification and end product standards

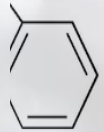
RISKS FROM HARMFUL ALGAL BIOTOXINS

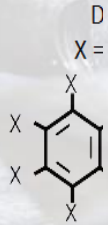
Paralytic shellfish poisoning (saxitoxin), amnesic shellfish poisoning (domoic acid) and diaorectic shellfish poisoning. Controlled through monitoring and harvesting restrictions











RISKS FROM HEAVY METALS AND CHEMICALS

Heavy metals (Lead, Cadmium and Mercury), Persistent Aromatic Hydrocarbons (PAHs) and dioxins. Controlled through harvesting restrictions

SANITARY AND PHYTOSANITARY (SPS) CONSIDERATIONS AND GLOBAL TRADE

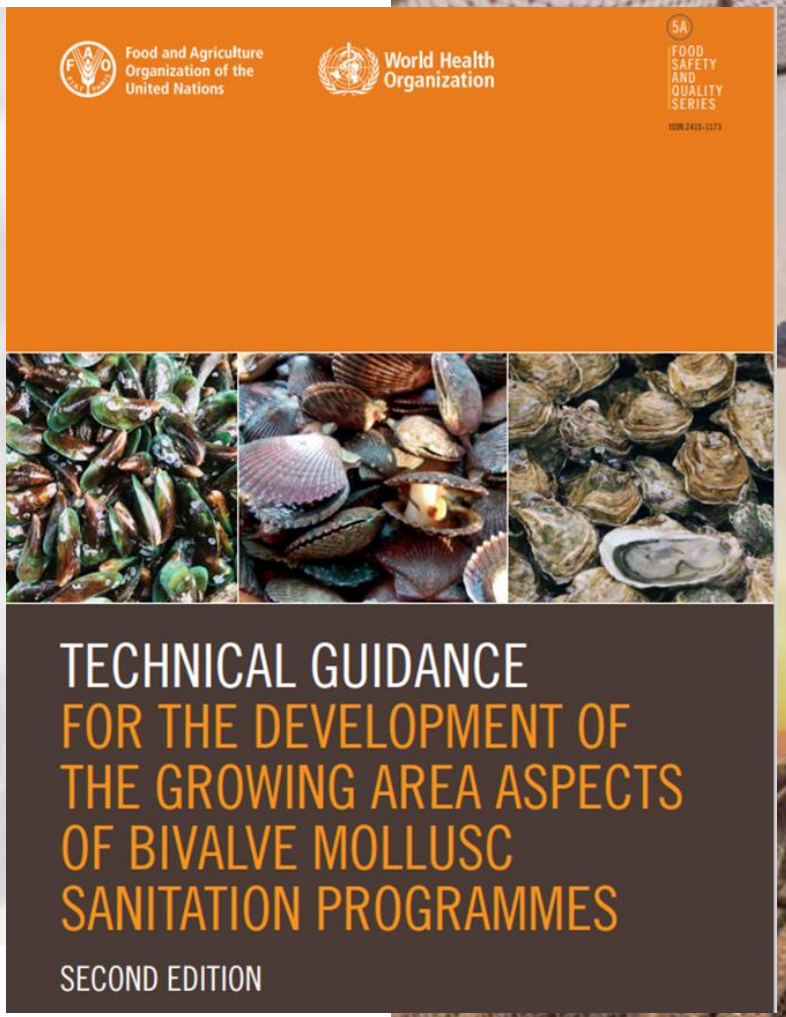
International trade driving growth in the bivalve mollusc **production**

Still only around **3% of bivalve molluscs** are **traded outside** of the **country** of **production**

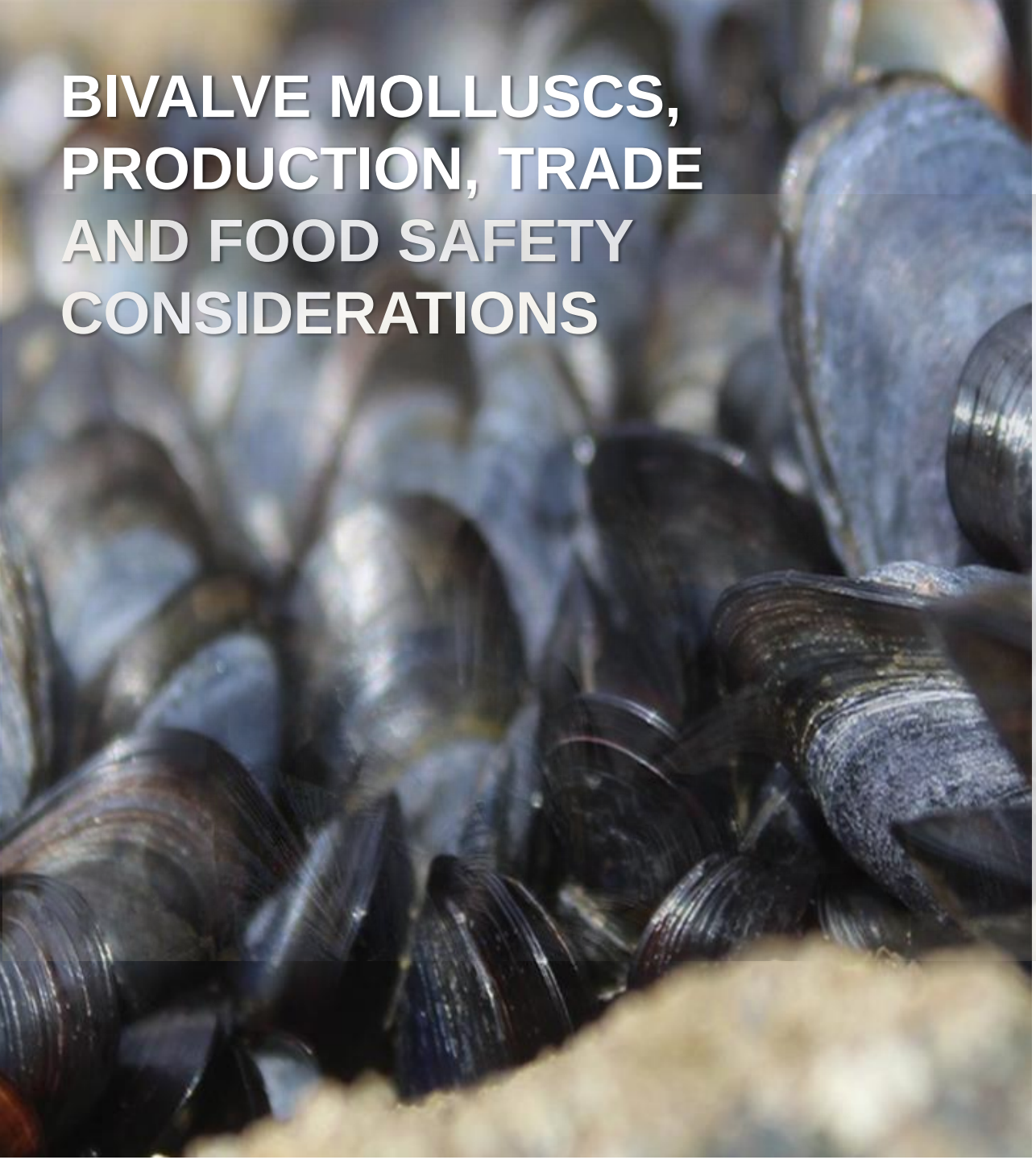
Official Controls are required in both **primary production (monitoring and classification)** and **end-product** for US, EU and other markets*

Complex risks and differing risk management approaches = complex regulatory requirements which can be a disincentive to countries

Only 21 countries (4 in Asia) are approved for export of bivalve molluscs to the EU, compared with 115 (25 in Asia) for fish & fishery products



*http://www.fao.org/in-action/globefish/countries/regulatory-framework-for-bivalve-molluscs/en/



BIVALVE MOLLUSCS, PRODUCTION, TRADE AND FOOD SAFETY CONSIDERATIONS

SUMMARY

- Bivalve molluscs have food security and nutritional benefits
- Significant potential for bivalve production exists globally
- As filter feeders they concentrate hazards (pathogens, contaminants etc) in growing areas, which may not be eliminated during processing (raw product)
- Hazards can be derived from natural and manmade sources
- Typically controls are applied in primary production and to end products
- **Economic and societal benefits**, but **clean environments** are preferred for cultivation and extensive **official control programmes** are required

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