Aquaculture in Asia as an integral part of global seafood production systems: the interface of aquaculture, capture fisheries and conservation

"Green and Smart Development of Cage Aquaculture in Asia"

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CAA8 Keynote, Nha Trang University 16th July 2026

Murdoch University

Acknowledgement of Country

We acknowledge that Murdoch University is situated on the lands of the Whadjuk and Binjareb Noongar people.

We pay our respect to their enduring and dynamic culture and the leadership of Noongar elders past and present.

The boodjar (country) on which Murdoch University is located has for thousands of years, been a place of learning. We at Murdoch University are proud to continue this long tradition.

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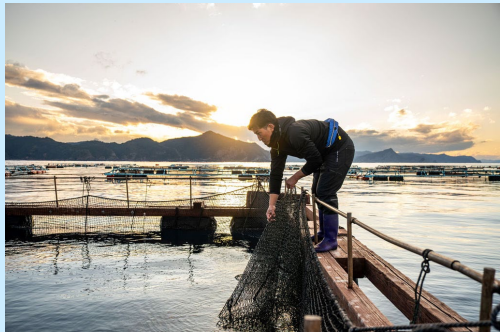
Free your think

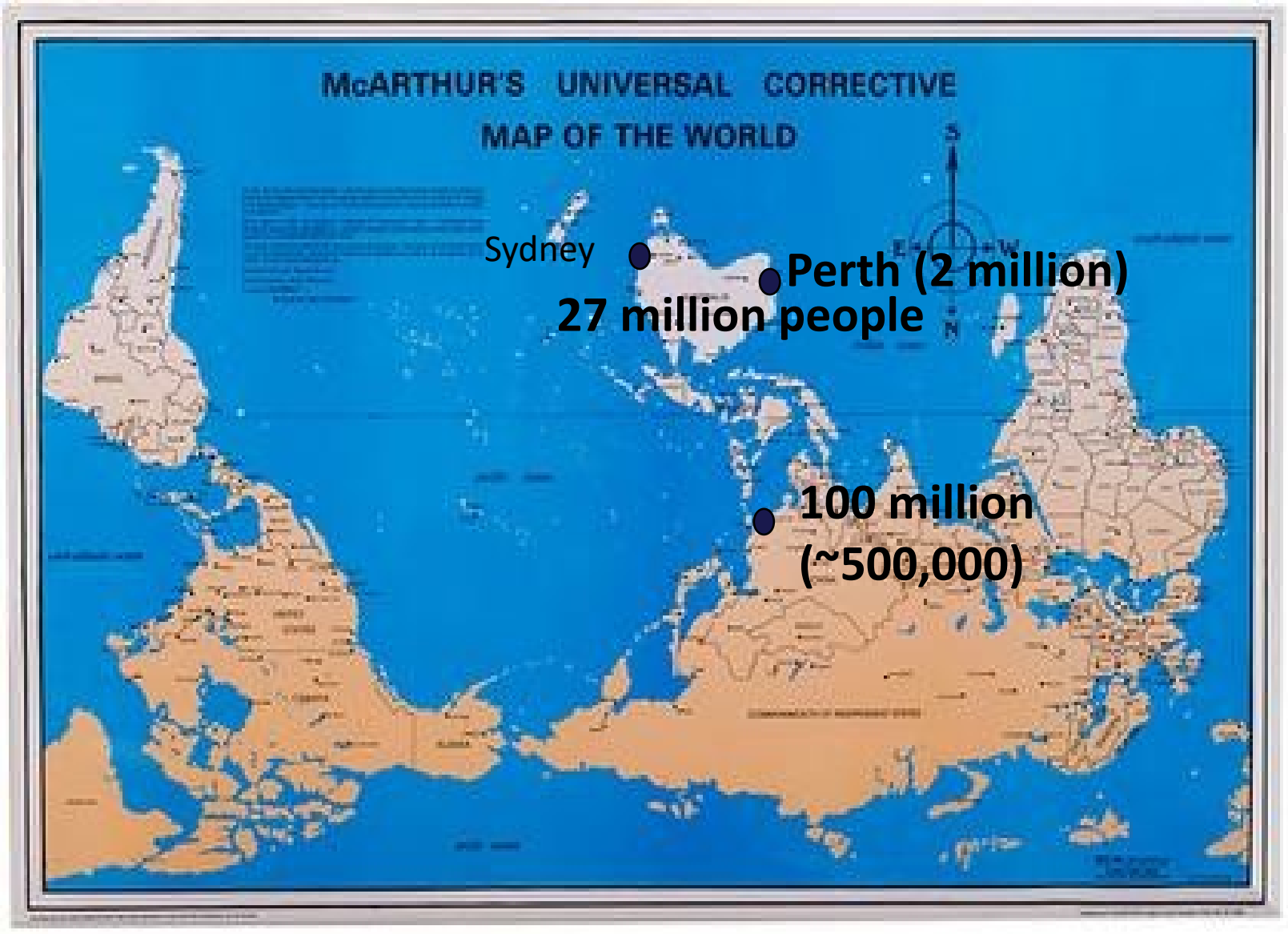
Outline

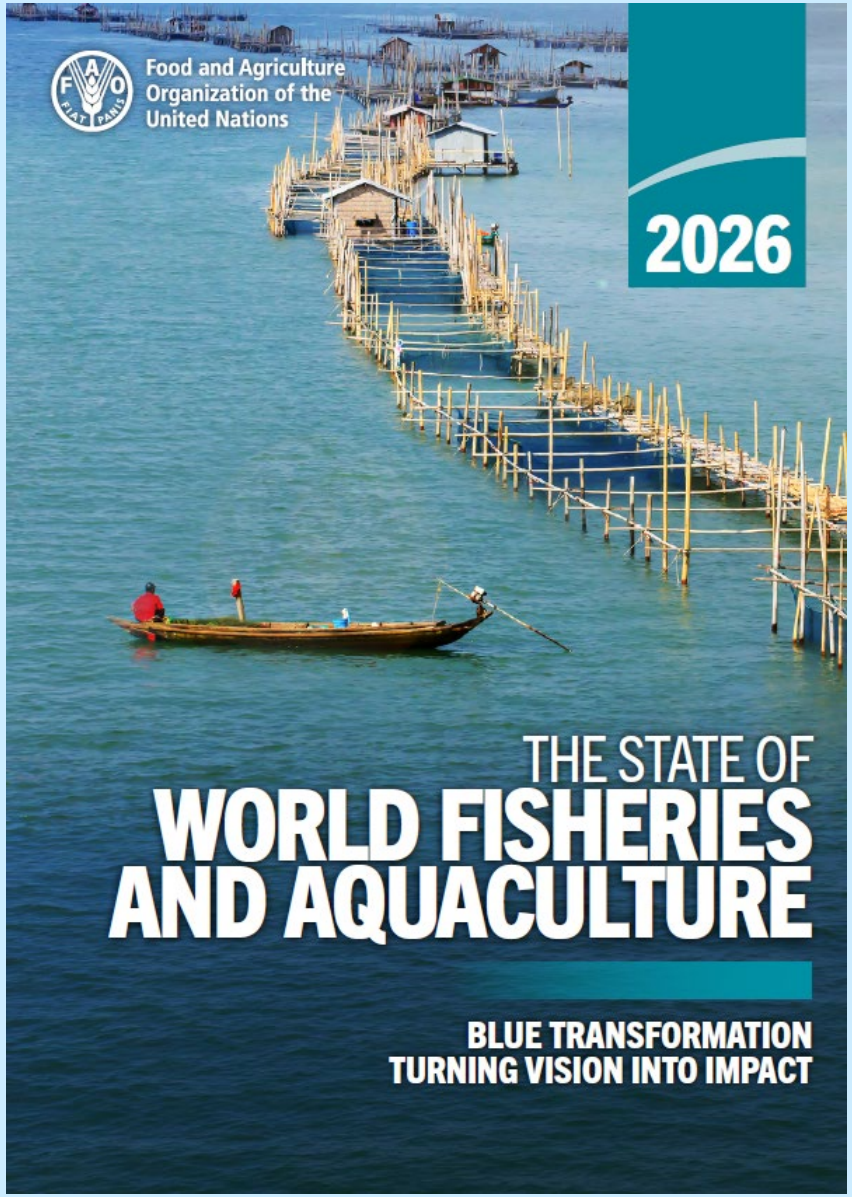
1. Global fisheries and aquaculture
   - The importance of Asia
2. The Asian Fisheries Society – history of CAA meetings
3. Australian fisheries and aquaculture
4. Aquaculture as a system (socio-ecological systems)
5. Future directions for green and smart development

The Message:
Partnerships and Collaboration are critical for Green and Smart development



An Australian perspective
(a land down under)





FAO 2026 (statistics till 2024)

- Part 1 – World Review – current status
- Part 2 – Blue transformation: Turning vision into impact
- Part 3 – Contemporary issues and outlook

Part 2: Blue Transformation

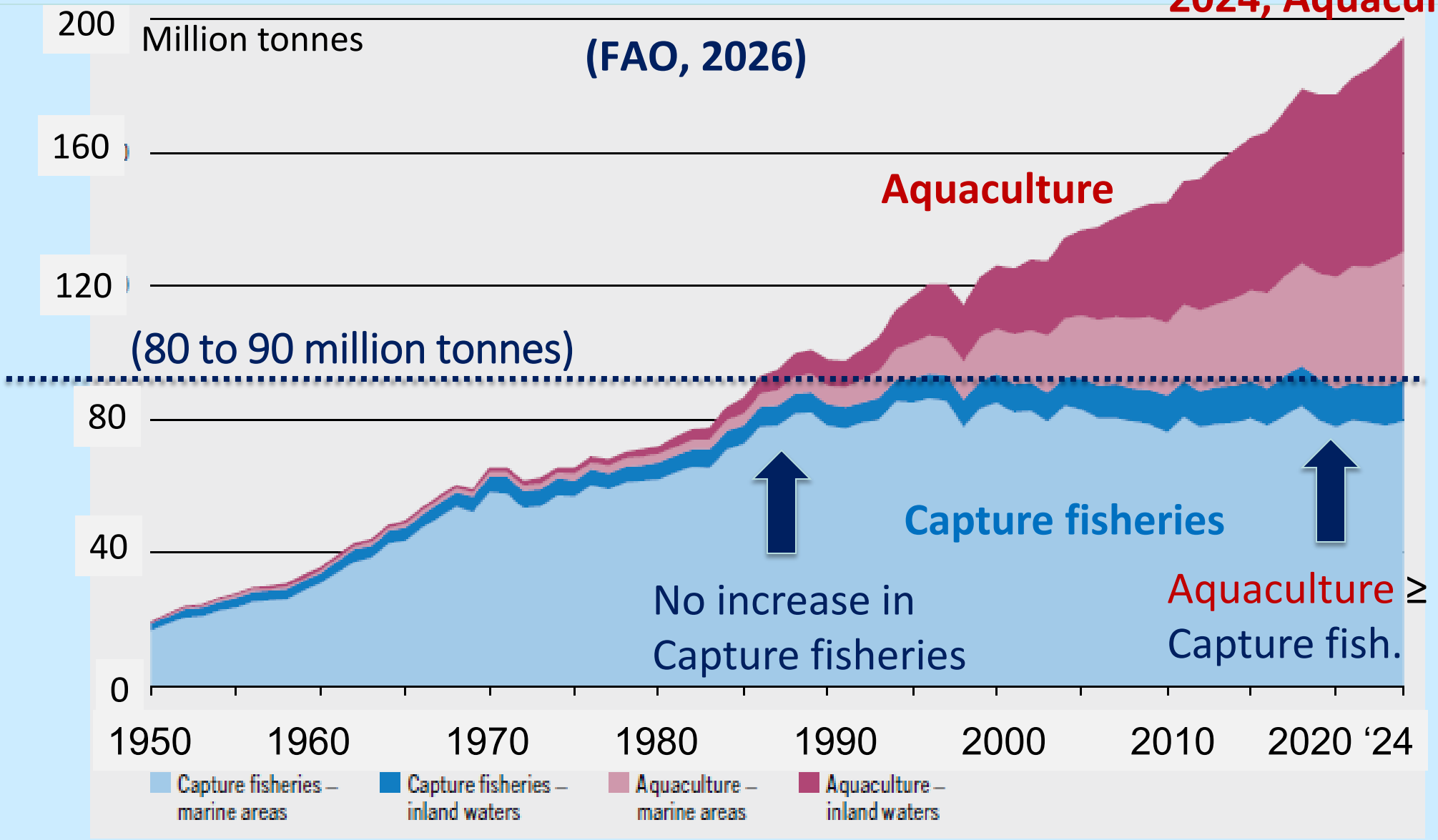
- **Advancing Blue transformation**
- **Towards sustainable aquaculture development**
- Towards effective manage
- **Towards efficient, inclusiv environmentally responsi aquatic food value chains**

Part 3: Issues & Outlook

- **From commitments to action**
- Multilateral fisheries management
- **Climate projects for adaptation**
- **A 10 year outlook for fisheries and aquaculture**

World Fisheries and Aquaculture production of aquatic animals

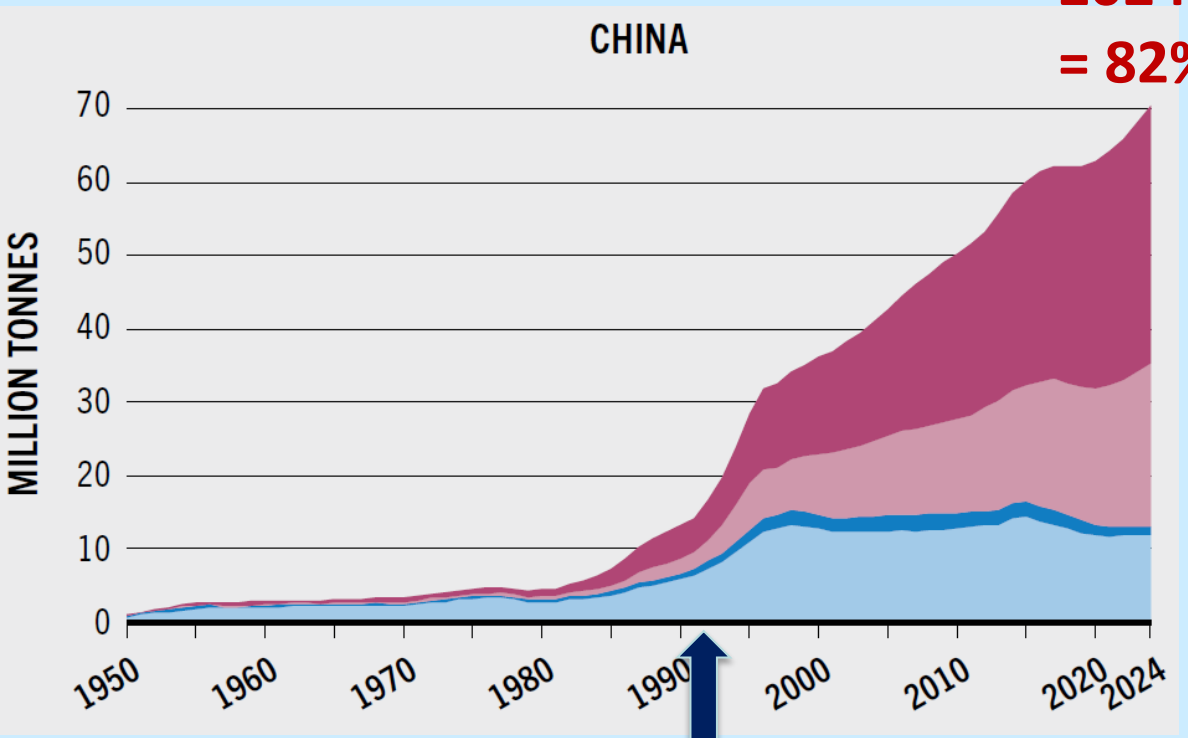
2024, Aquaculture = 54%



Fisheries and aquaculture in Asia and China

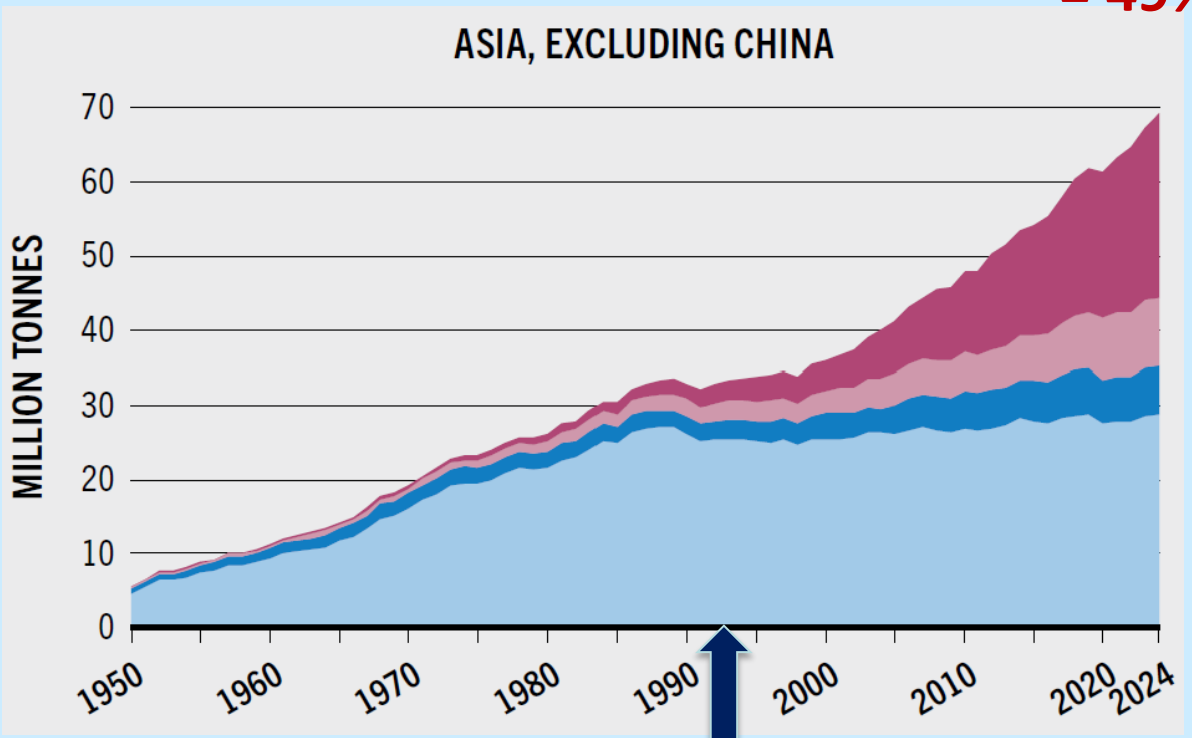
Aquatic animal production

(FAO, 2026)



2024 = 82%

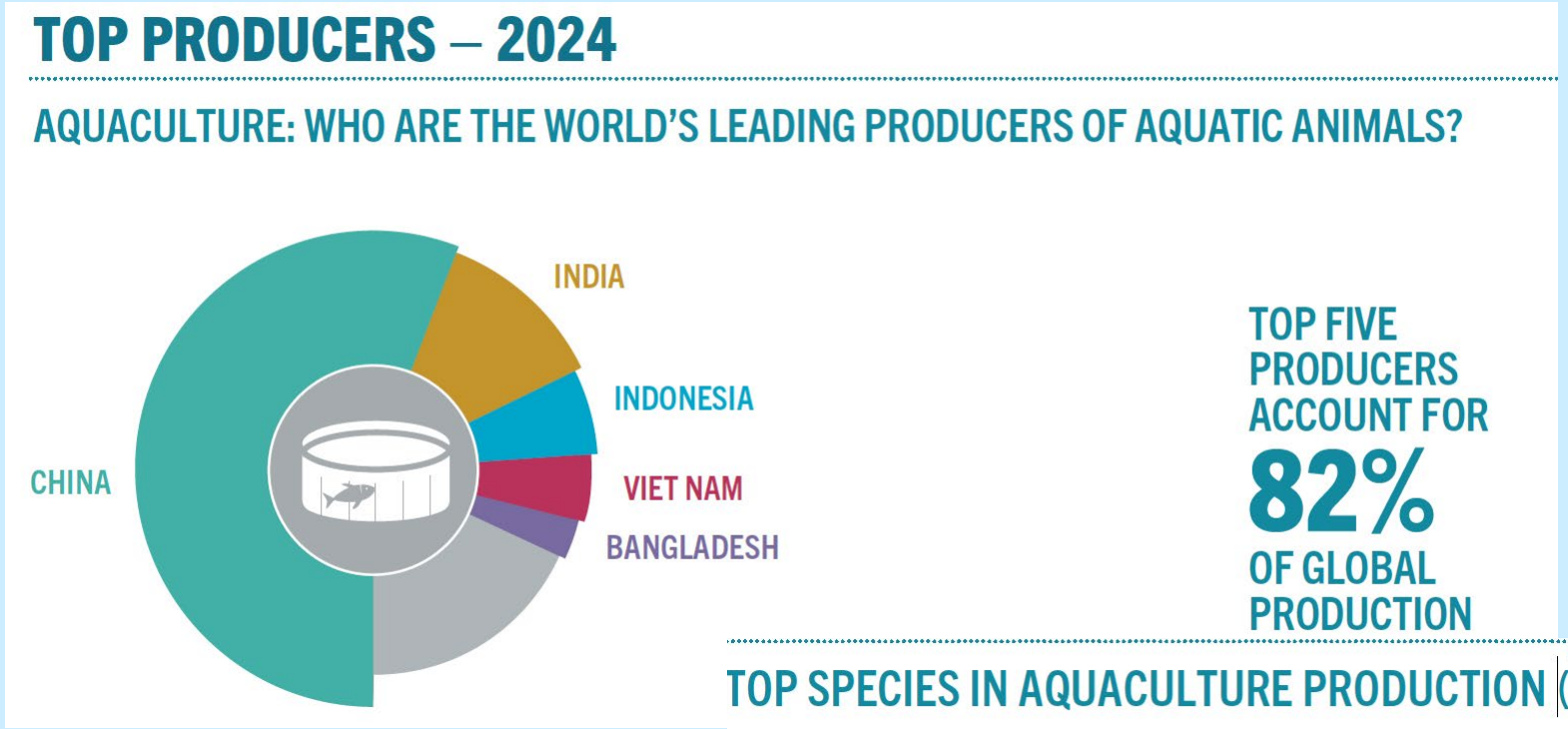
Aquaculture ≥ 50% 1992



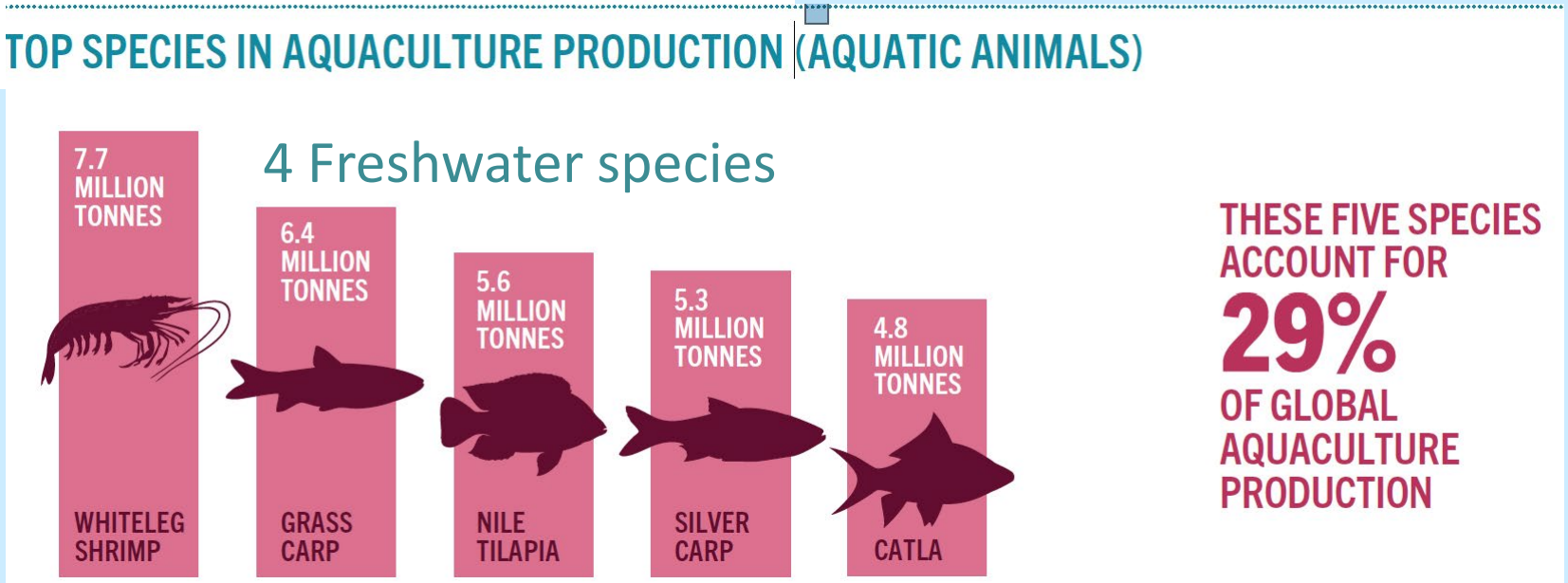
2024 = 49%

Aquaculture ~15% In 1992

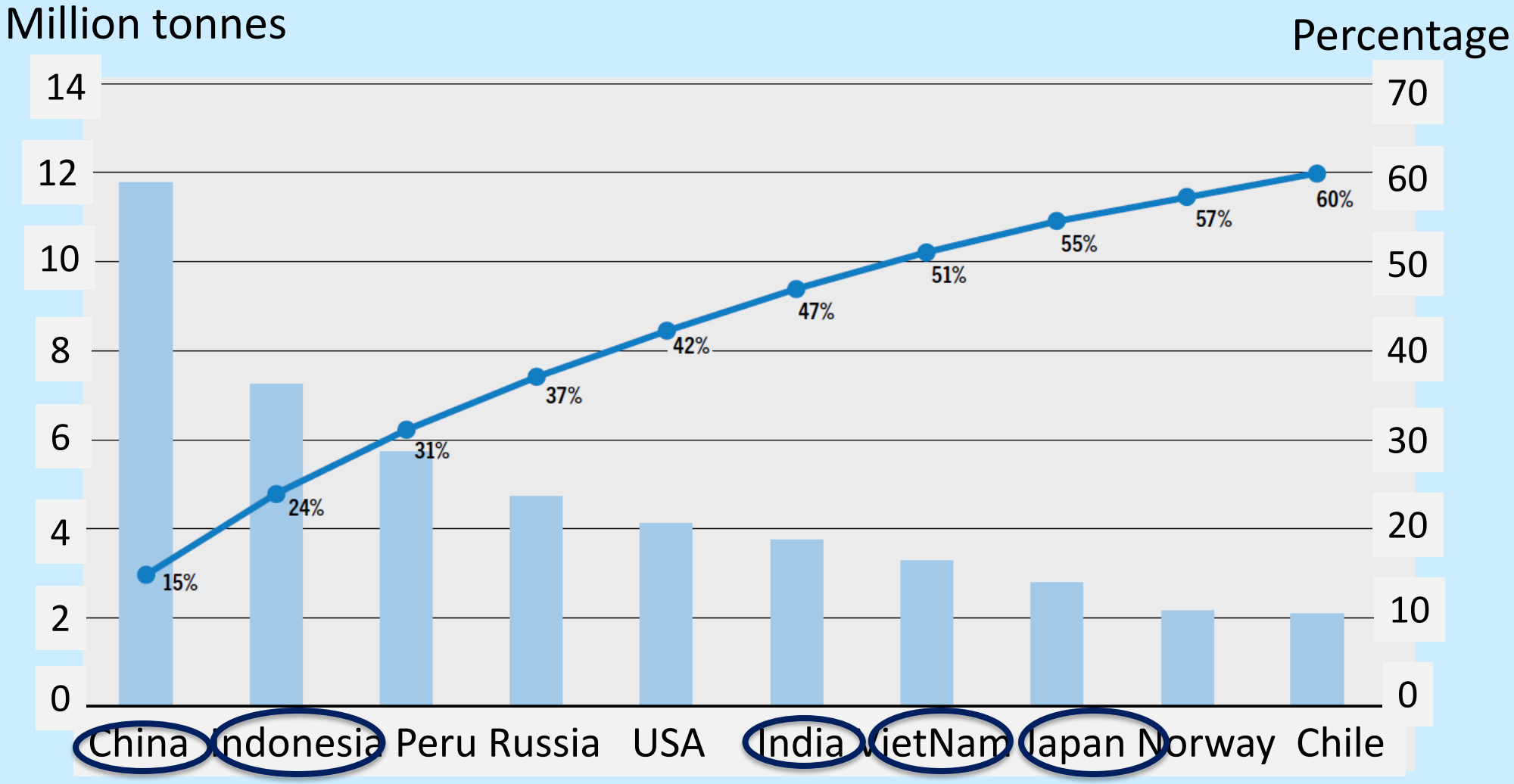
Aquaculture – all systems



1. Freshwater Aquaculture is very significant – carps, tilapias, …
2. Many species contribute to the remaining 71% of production – diversity of species are produced



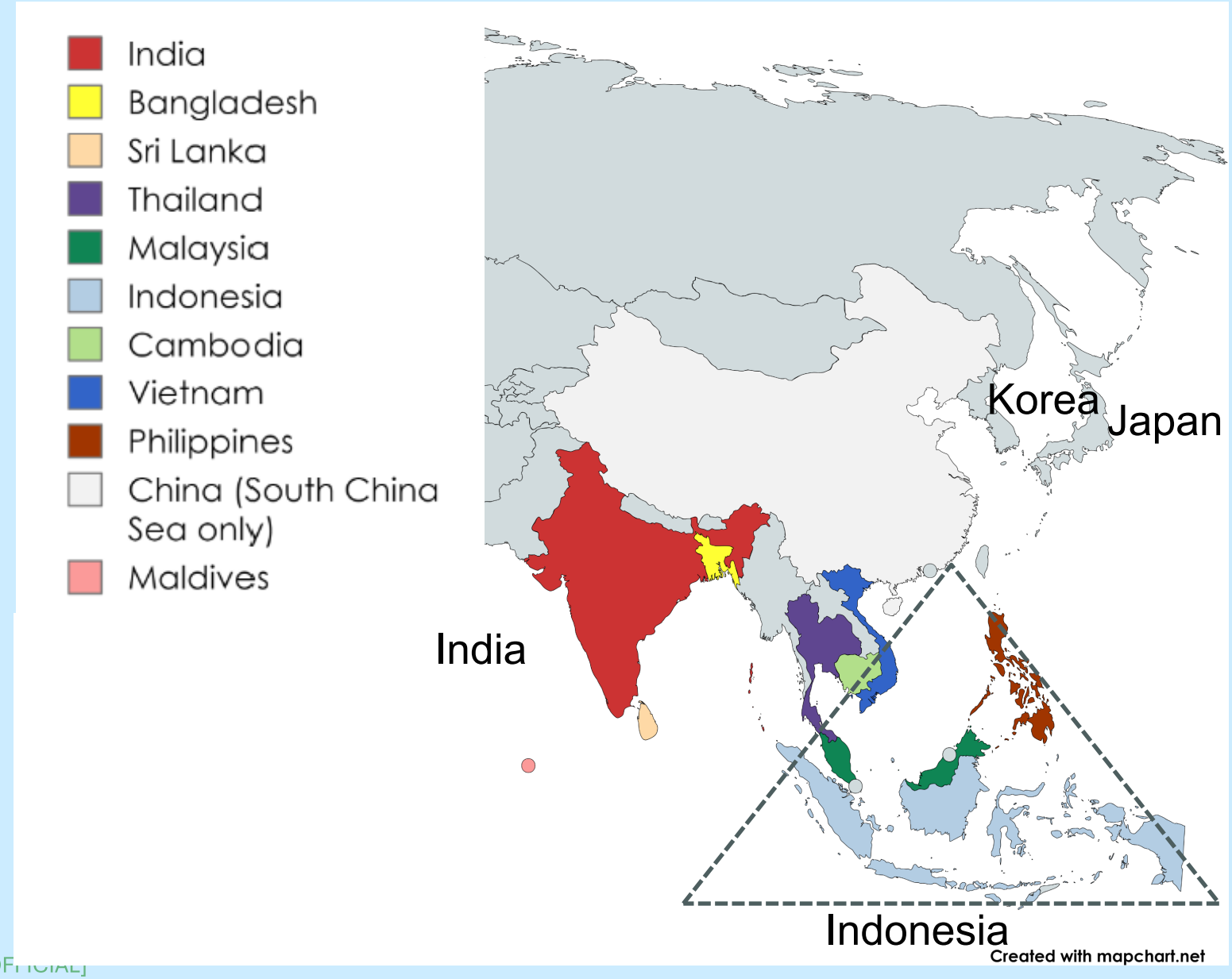
Top ten marine capture fisheries nations (FAO, 2026)



Philippines 12th, Thailand 14th, Malaysia 15th (> 1.3 million tonnes)

Asia: largest fleet in the world – 3.5 million vessels, 75% of the global fleet

Asian Fisheries and Aquaculture – Asia-Pacific region



1. Largest marine capture fisheries landings globally
2. Largest aquaculture production globally
3. Millions of livelihoods supported
4. Global centre of Marine biodiversity (Coral Triangle)

>70% of global seafood

The Asian Fisheries Society
founded in 1984, now over 40 years old

Vision: "A vibrant Asia-Pacific society of researchers and other stakeholders that is valued by members for its ability to provide **opportunities** for **communication**, **collaboration** and **capacity development** in fisheries and aquaculture science."

AFS Council

- 14 Councillors from 7 countries
- Maximum of 2 from each country
- Secretariate at University Putra Malaysia

Prof.Liping SHOU

Prof. Hoa NLU

Communication, collaboration, networking

The Asian Fisheries Society produces the journal Asian Fisheries Science & organises 5 International Conferences with co-hosts

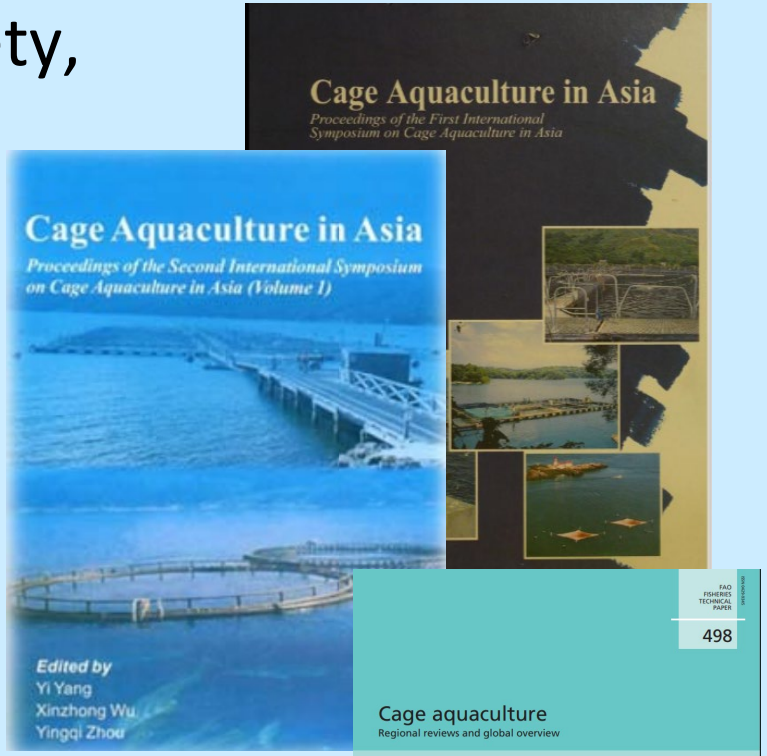
- Asian Fisheries and Aquaculture Forum (15AFAF – 2028 Guangzhou, China)
- International Symposium on Aquaculture and Fisheries Education (ISAFE5 – 2027 – Indonesia)
- Diseases in Asian Aquaculture (DAA) – Theme at this conference
- Gender in Aquaculture and Fisheries (GAF) – special session at CAA8

International Symposia on Cage Aquaculture in Asia – July 16-18 2026

History of Cage Aquaculture in Asia (CAA)

* = proceedings published (4); + book of abstracts (3)

- *CAA1 1999 – Tunkang – World Aquaculture Society, Taiwan Fisheries Research Institute
- *CAA2 2006 Huangzhou – Zheijian University; China Fisheries Society, with FAO
- +CAA3 2011 Kuala Lumpur; +CAA4 2013 Yeosu; *CAA5 2015 Kochi ; *CAA6 2018 Surat Thani 2018
- +CAA7 2023 Hainan; Hainan University, SHOU, China-ASEAN Belt and Road Joint laboratory, OUC, "Green and Smart development of Cage Culture in Asia"



CAA8:

"Green and Smart development of Cage Culture in Asia"

- increasing emphasis on sustainable development

- rapid developments in AI, data centres and technology since CAA7

Themes (oral presentations = 63 + 7 keynotes, posters = 21)

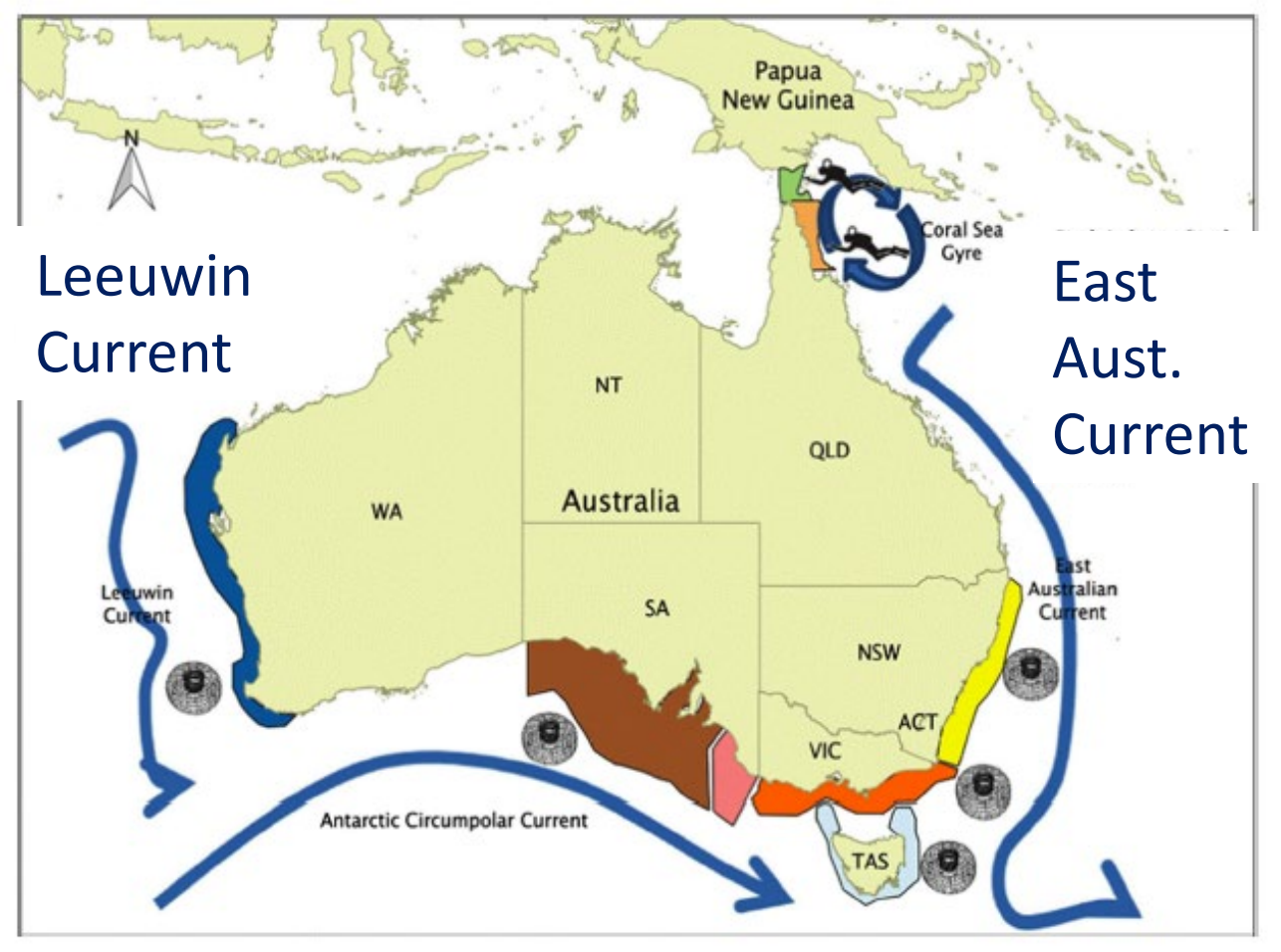
1. Cage and offshore aquaculture systems (12, 2);

5 Themes relevant to all aquaculture production systems

2. Breeding, seed production and genetic improvement (9, 2);
3. Nutrition, feed and resource efficiency and seafood processing (11, 6);
4. Environment, climate change and carbon dynamics (8, 5);
5. Health management, biosecurity and governance (10, 6);
6. Sustainable welfare, socio-economics, livelihoods and **gender in aquaculture** (13, 0).

Australian marine environment and fisheries and aquaculture

Fisheries and marine environment of Australia



(Figure 1, Plaganyi et al., 2017)

- EEZ covers 10 million km^2
- 3rd largest EEZ
- Low nutrient currents

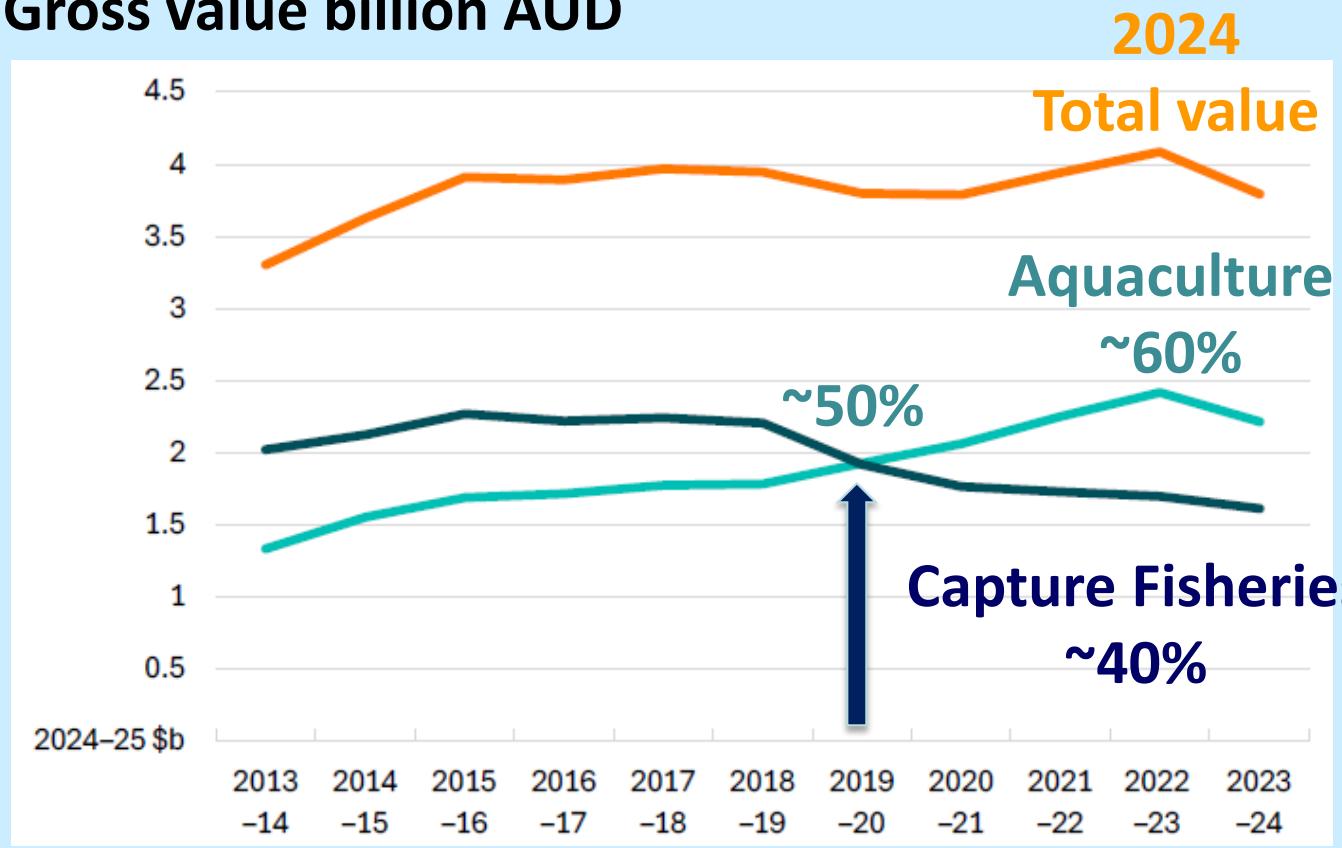
- Capture Fisheries #58
  ~180,000 tonnes,
  very high value lobster/prawn

- Employment = 21,000 – few people

Low nutrient environment
Low capture fisheries production

Australian fisheries and aquaculture production

Gross value billion AUD



Value by species

1. **Atlantic Salmon >50%**
2. Prawns ~10%
3. Oysters ~5%
4. **Barramundi ~5%**
5. **Tuna ~3%**

Fish cage culture in Australia – food production systems

Atlantic salmon in Tasmania ~42 ^{o}S

"Cold" water ~12 to 18 ^{o}C

Barramundi in West. Australia ~16 ^{o}S
Sea bass/siakap

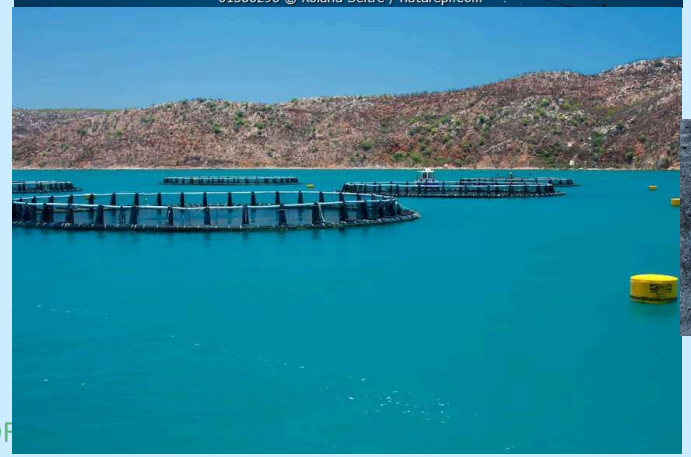
"Warm" water ~23 to 31 ^{o}C

Tuna in South Australia ~35 ^{o}S

"Cold" water ~15 to 20 ^{o}C

The Future and challenges in Australia –

for food production systems



The future

- Large, multi-national enterprises e.g., Tassal, Huon, Petuna – economic priority
- Proposed increased production
  E.g. barramundi from 5,000 to 20,000 tonnes

Challenges

- High protein requirements for high trophic level (TL, TL ~4) species – feeds use fish from capture fisheries (low **$**value fish – “trash fish”)
- Disease, antibiotic use & resistance – vibrio in salmon, virus in imported feed for Tuna
- Impact on endangered species (a skate)
- Competing uses in coastal zones – marine parks, tourism, and traditional owners

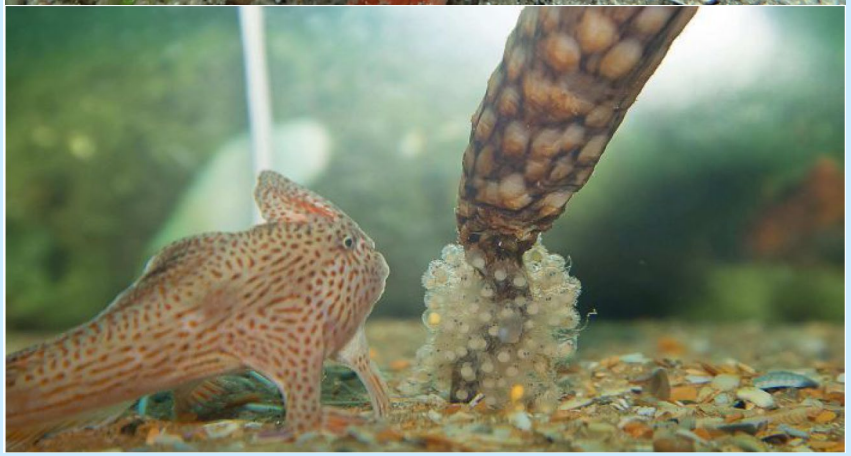
[OF

Aquaculture for environmental and species restoration

Mussels (*Mytilus* spp.) and port development

- Filter water and improve water quality
- Provide habitat for other species
- Provide food for fish and crabs

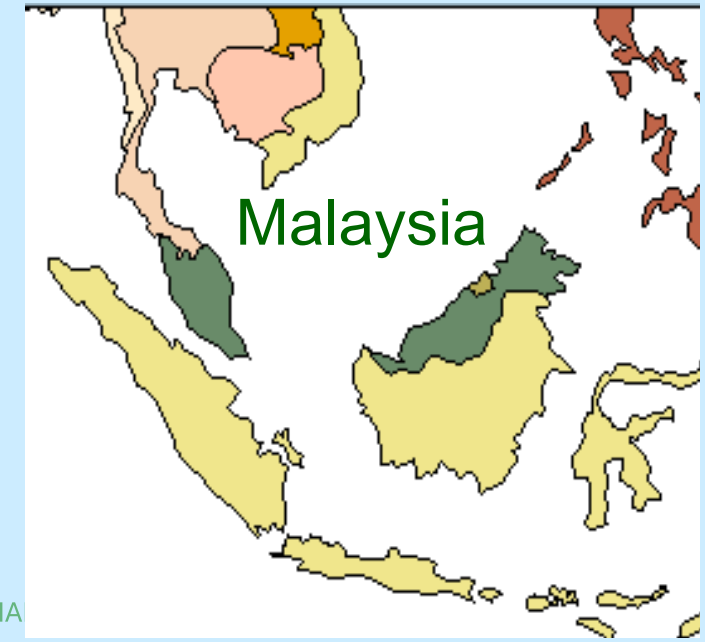
Handfish (*Brachionichthys*) restoration



- Critically endangered species (<100 fish)
- Combining aquaculture with habitat enhancement and citizen science

Asia is different!

- Much higher population densities than Australia, NZ, United States
  - more intensive resource use; greater human impact on environment; greater competition/conflict for resource use
- Small-scale farmers/fishers (village and households) are very important
- Livelihoods and people's welfare are important for governments



2,000 trawlers along
200 km of coastline of
western peninsular Malay.

10,000 bagnet fishers
in WPM

Cage culture and aquaculture in Asia
Freshwater, brackish-water and marine cage culture

Grass carp farming in Vietnam

Cyprinidae
Ctenopharyngodon idella

Giant freshwater prawn in China

Palaemonidae,
Macrobrachium

- Many species and many culture systems from small to large-scale
- Mainly herbivores – low TL (<3)
- Small-scale village and household operations are important (livelihoods of many people)

- Large scale operations are also important e.g.,
  - One giant prawn hatchery in China can produce billions of fry
  - Supplies fry to many companies

Brackish water, Marine – many systems, many species

Grouper, China
(Serranidae – many species)

- Capture-based aquaculture – collection of fry/puerulus in nature

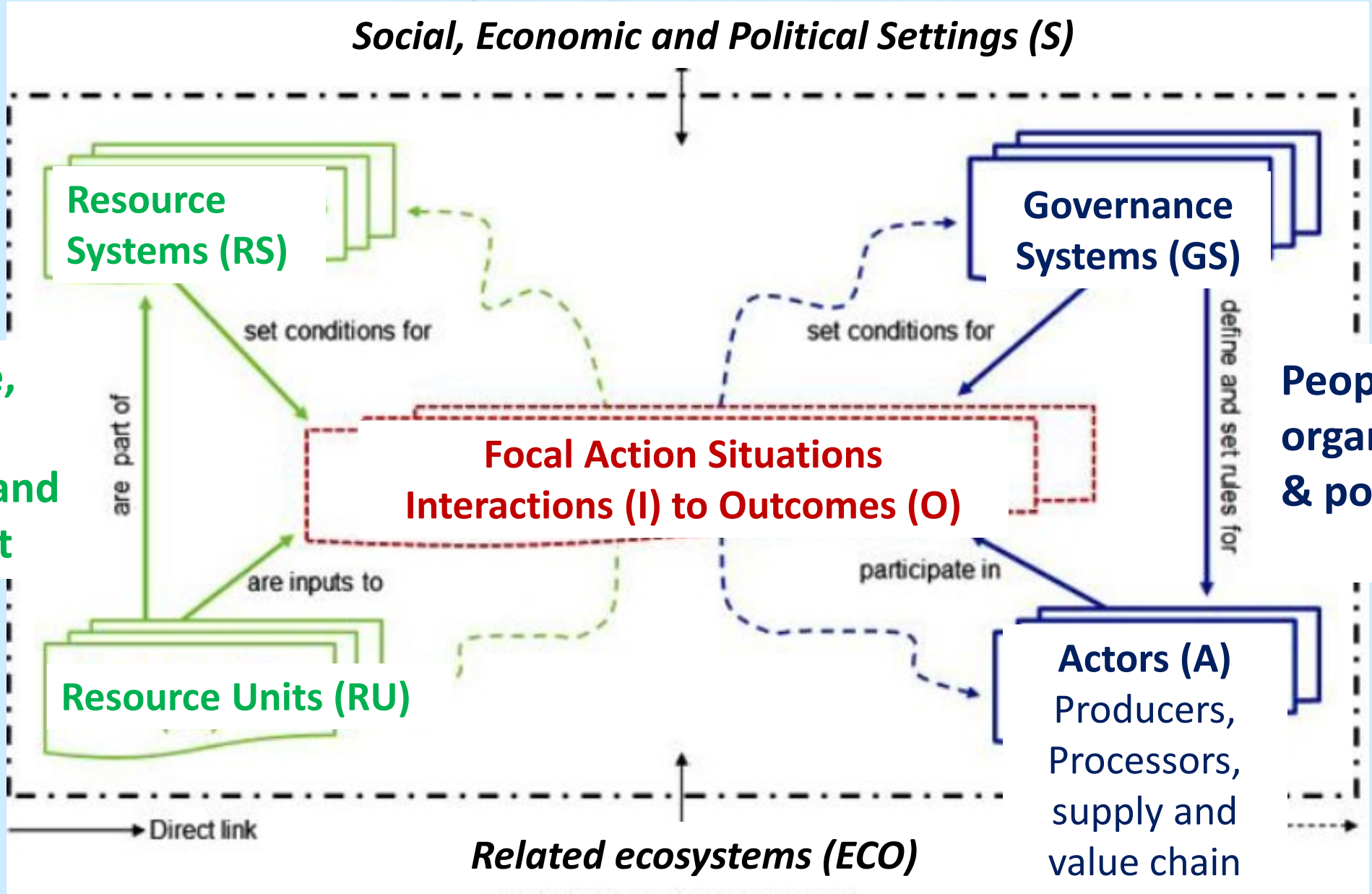
- Feed low $value fish in grow-out – ecological impacts

Lobster, Vietnam
(Panuluridae)

- Lobster fry collected in the north, production in the south

- Livelihoods and value chains are supported in
  - two regions of Vietnam
  - two countries (Indon., Phil.)

Framework for considering aquaculture Socio-ecological systems (Ostrom, 2009)



Cage culture, Species, Production and Environment

People, organisations & policy

Green development:

Sustainable development goals and certification schemes

Aquaculture and SDGs (UN annual reports)

- Ocean protection and climate
- Environmentally sustainable production
- Economic and social welfare; and gender and inequality

"Green and smart development"

- Projected growth in seafood production will largely come from aquaculture
- United Nation SDG Goals – **government**
- Certification to show green credentials, obtain market access and premium price – **producers** (large scale & farmer/fisher collectives)

Certification schemes (2 examples)

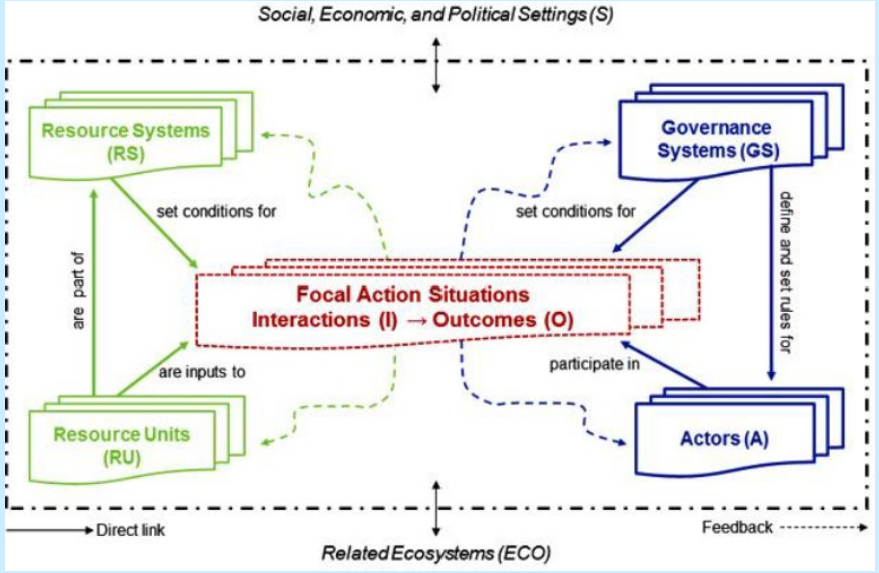
asc ASC-AQUA.ORG ™

Best Aquaculture Practices

- Conserve biodiversity
- Address climate change
- Fish health and welfare
- Lives, livelihoods and communities

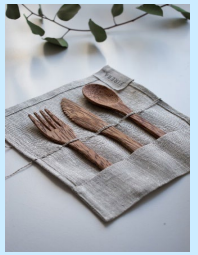
The future for research and development

A framework of thinking where people are an integral part of the system



Evaluate the different components of Cage culture

Economic Environment Social



Governance of the production system in the production environment

Trans-disciplinary, partnership and collaboration approach

- People, culture & aquaculture
- Production systems
- Data, statistics & technology
- Communication – all parties

AI + HI

Human Intelligence

Cage aquaculture in Asia as an integral part of global seafood production systems:

Thank you to the organisers, team at Nha Trang University, Sponsors, Participants and Student helpers