Is urban aquaculture of bivalves an attractive promise for delivering food and economic security?

CAMBRIDGE GLOBAL FOOD SECURITY

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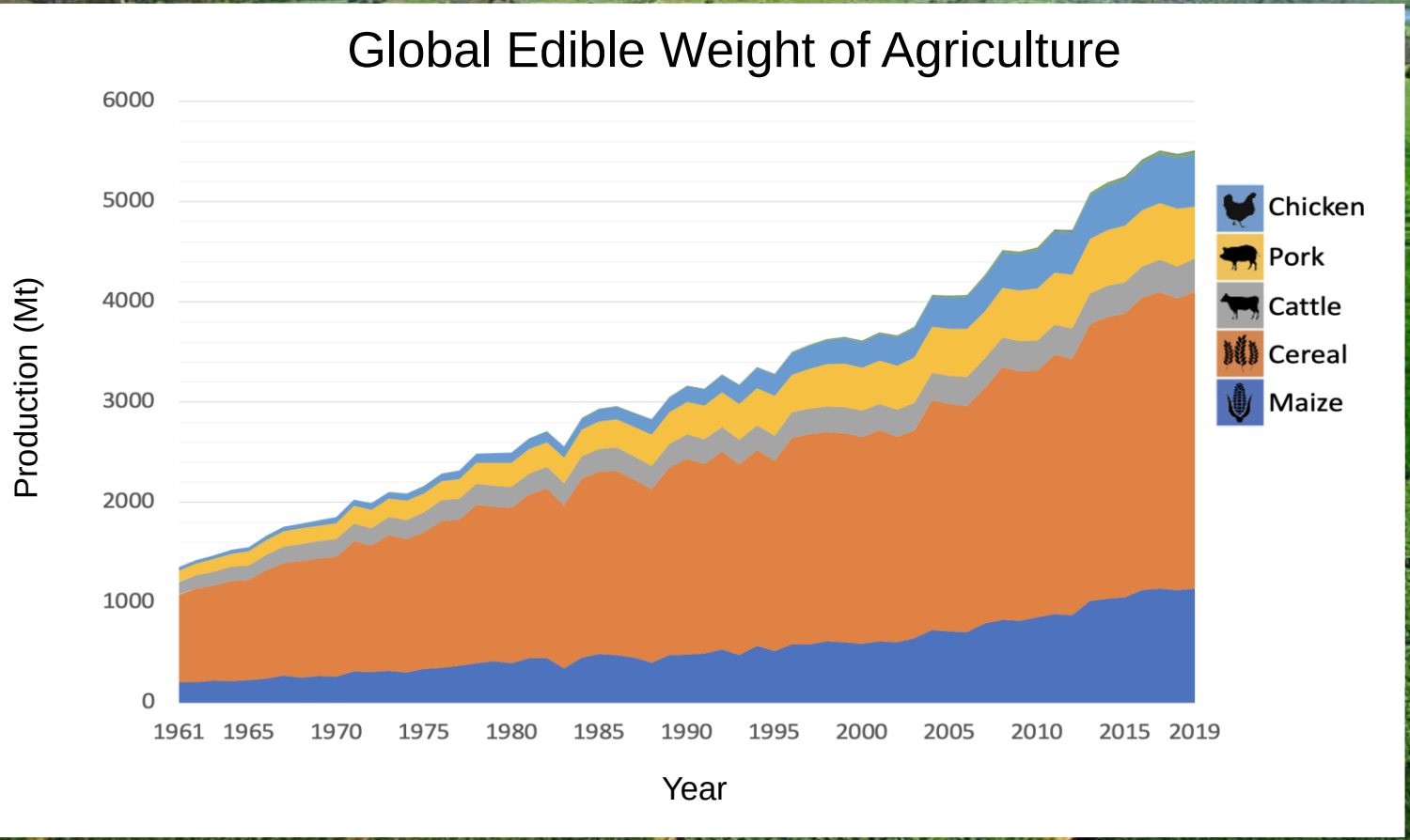
Why Food Security?

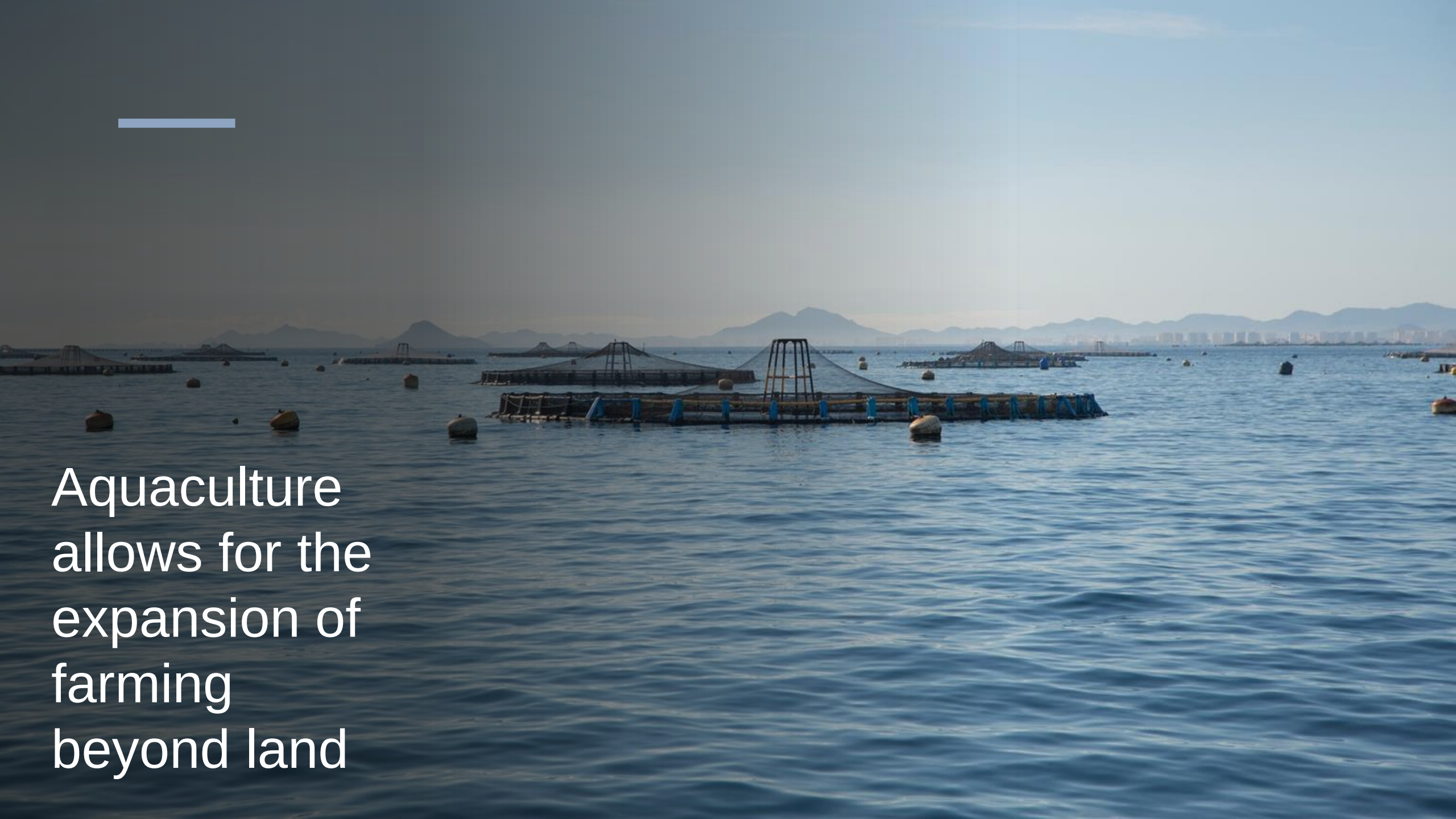
- Current human population of 7.6 billion
- Expected to grow to 9.8 billion by 2050
- Over 2 billion people world-wide suffer from a micronutrient deficiency
  - Deficiencies include:
    - Iron
    - Vitamin B_{12}
    - Vitamin A

Global agriculture production isn’t sufficient



Problems

- Fertilizers and pesticides
- Biodiversity loss
- Deforestation
- Disease
- No effluent control
- Soil stripping
- Farmland is finite



Aquaculture allows for the expansion of farming beyond land

Blue Foods

- “All edible aquatic organisms, including fish, shellfish and algae from marine and freshwater production systems.”

- Global Seafood Alliance

- FAO categorizes blue foods into three main categories.

Aquaculture outperforms agriculture

Nutritional profile of main agricultural and aquaculture products								
	Beef	**Chicken**	**Pork**	**Salmon**	**Lobster**	**Oyster**	**Clam**	**Mussel**
Nutrient								
Protein (mg kcal^{-1}**)**	99.6	178.6	134.6	143.1	183.9	117.3	170.9	146.2
Omega 3 (µg kcal^{-1}**)**	0.0	0.6	0.0	7.8	3.6	9.9	1.2	4.8
Iron (µg kcal^{-1}**)**	10.0	6.4	4.7	3.3	10.7	63.0	18.6	81.4
Zinc (µg kcal^{-1}**)**	24.5	6.9	13.1	3.3	50.9	204.9	5.8	15.2
Vitamin B_{12} (ng kcal^{-1}**)**	9.6	1.7	2.8	51.0	31.3	197.5	131.4	114.3
Vitamin A (IU kcal^{-1}**)**	0.0	0.2	0.0	1.3	0.2	3.3	3.5	1.9

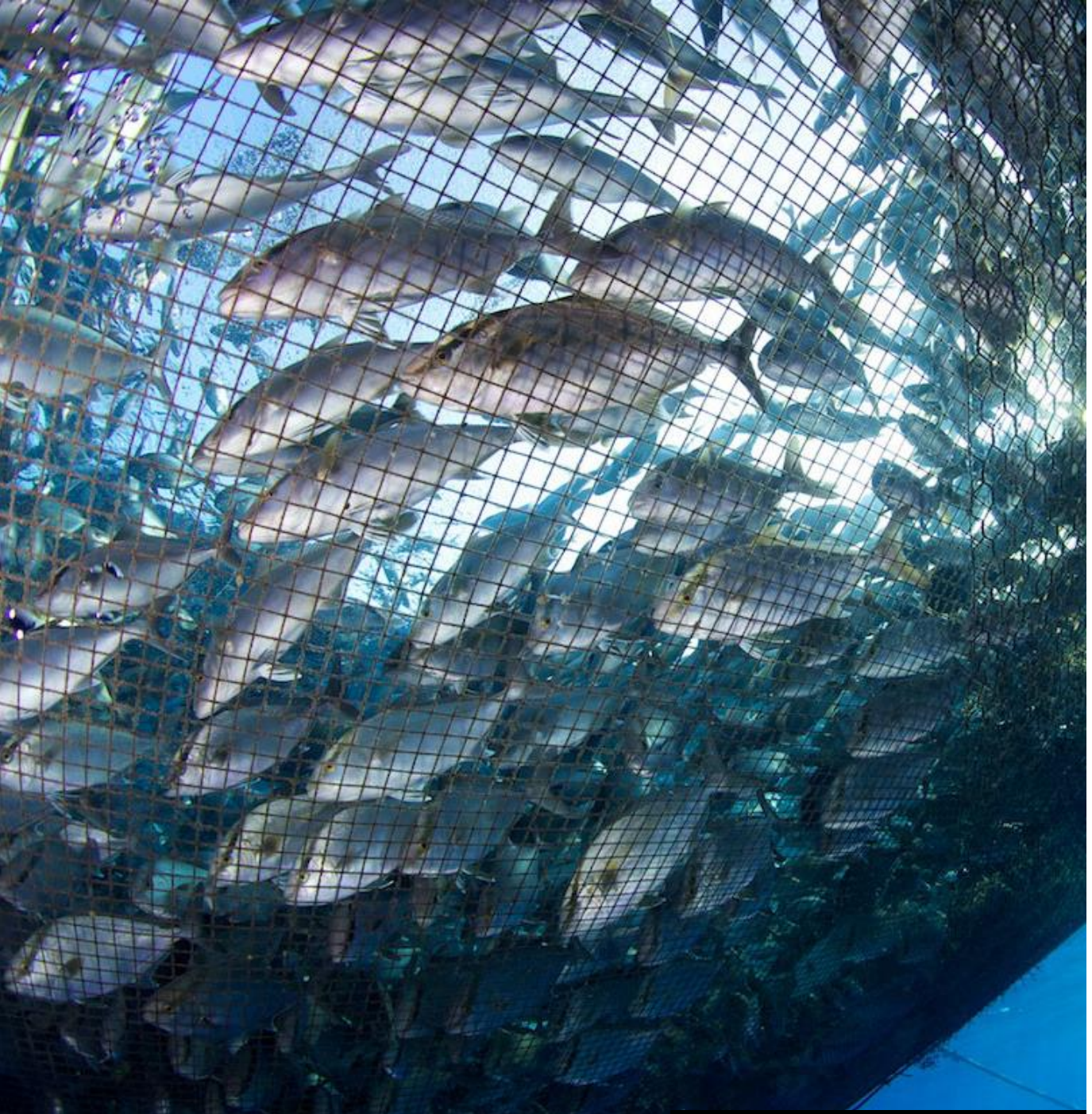
What even is a bivalve?

"An aquatic mollusk which has a compressed body enclosed within a hinged shell"

Mussels

Clams

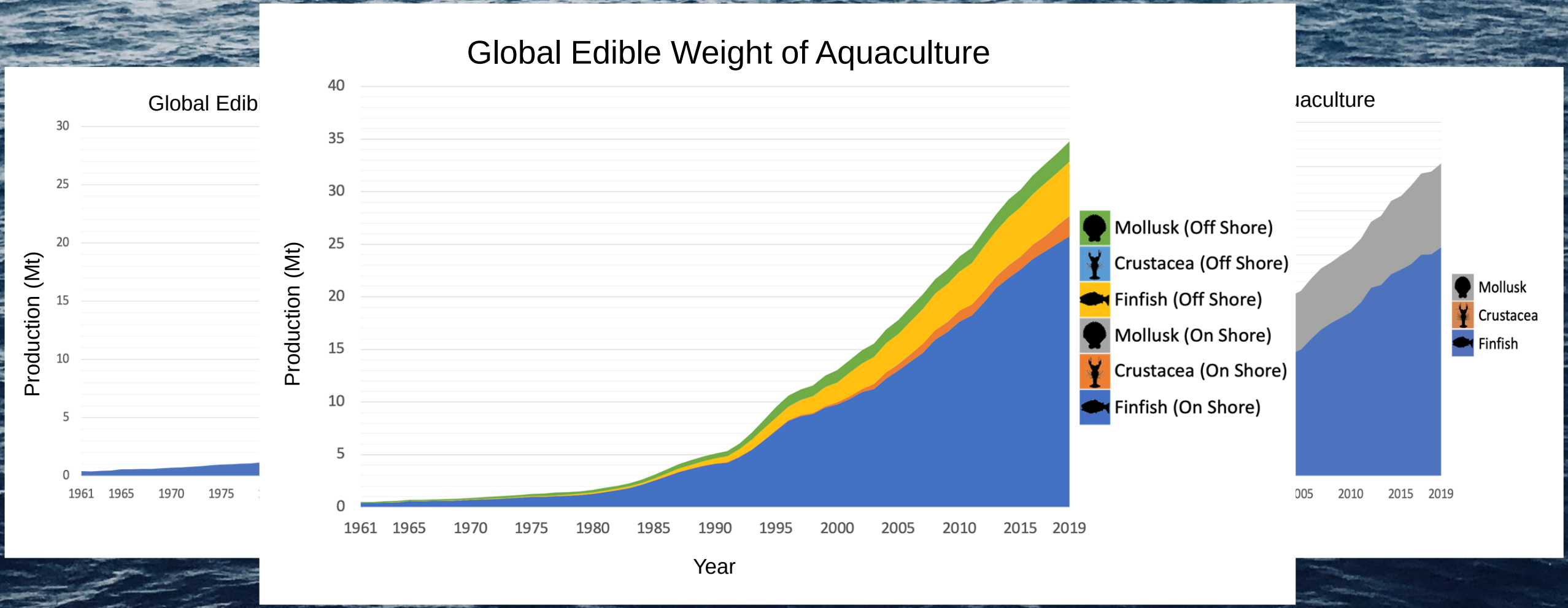
Oysters



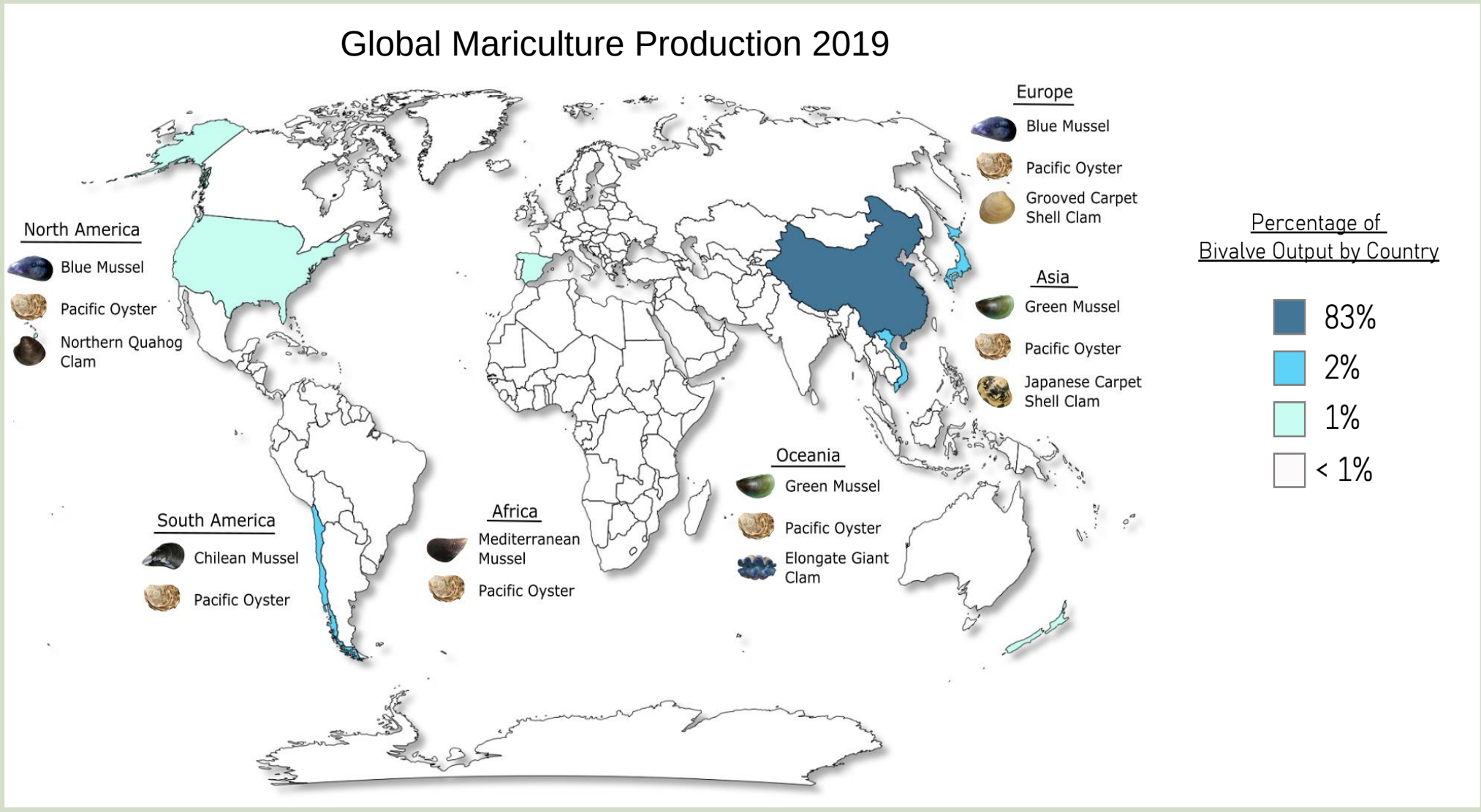
Standard Aquaculture

Pros

Global Aquaculture Production



Top saltwater bivalves produced by each continent



We need to invest in proactive solutions

Standard Aquaculture

Cons

Urban Aquaculture

Pros

Urban Aquaculture

Cons

Schematic of Urban Aquaculture

Future potential of urban aquaculture is promising

Standard Aquaculture

Increase in global food production

Increased jobs

Integration of high protein food source

Urban Aquaculture

Increase in global food production

Blue Farming expanded to landlocked regions

Decreased transport

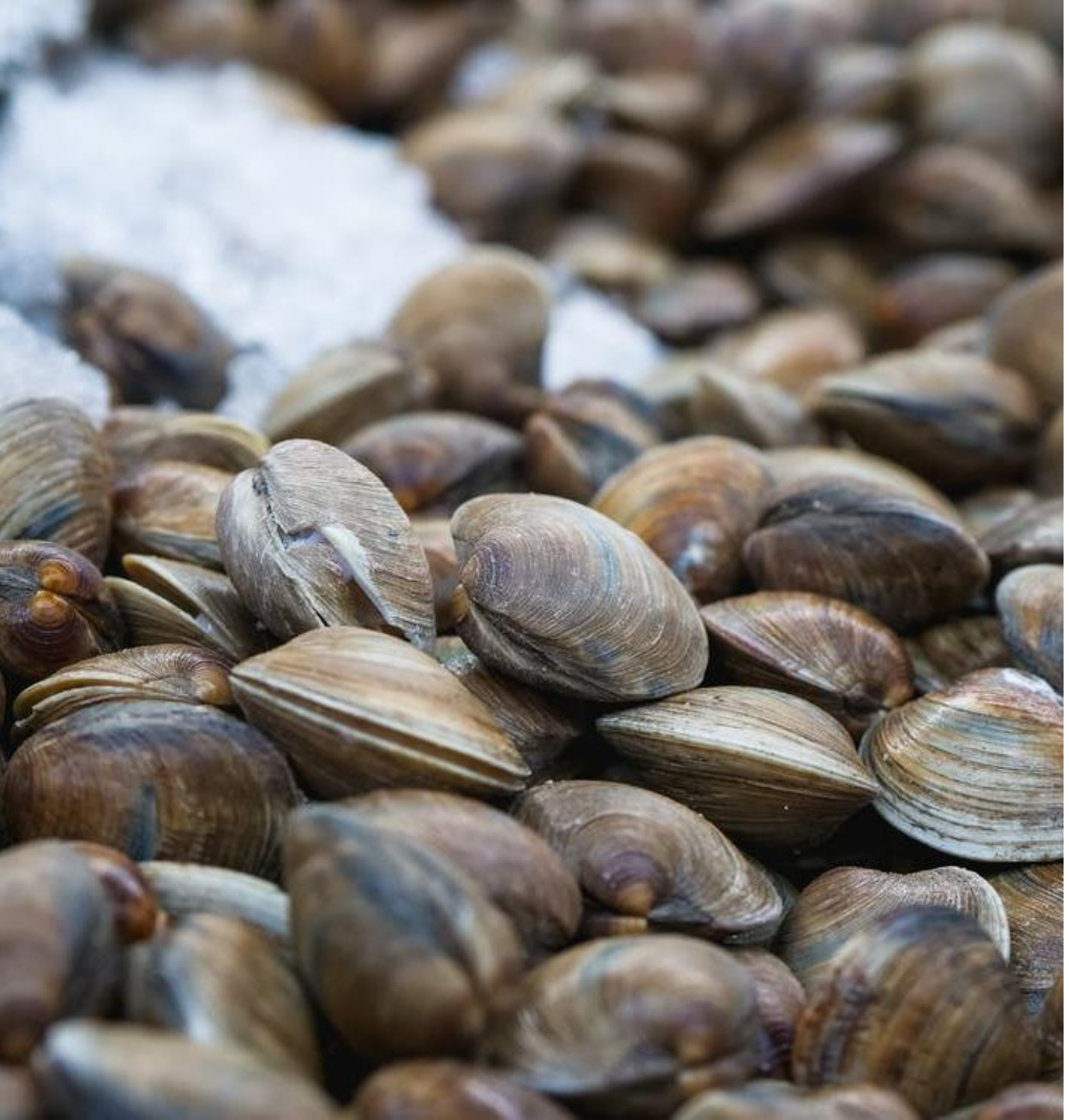
Increased jobs

Integration of high protein food source

Poly-culture

Production of high value products

Decreased health hazards



Future Directions

- Validate the growth of bivalves in the lab environment

Thank you!

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Questions?

Interested in collaborating or talking more?

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