

W7, PICES 18th Annual Meeting, Jeju Island, 24 Oct 2009

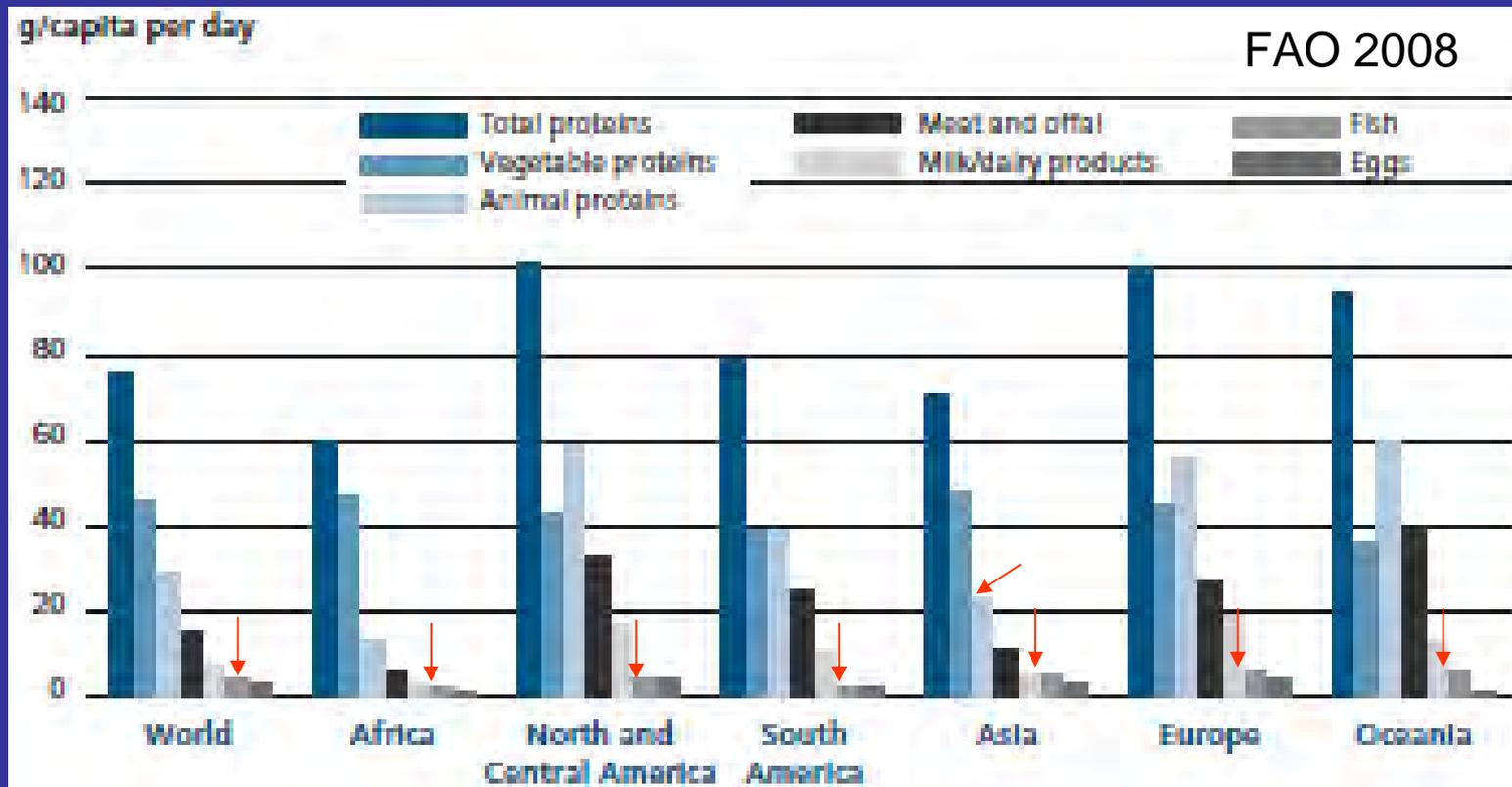
Challenges and Opportunities of Environmental Issues Faced by Coastal Aquaculture in China

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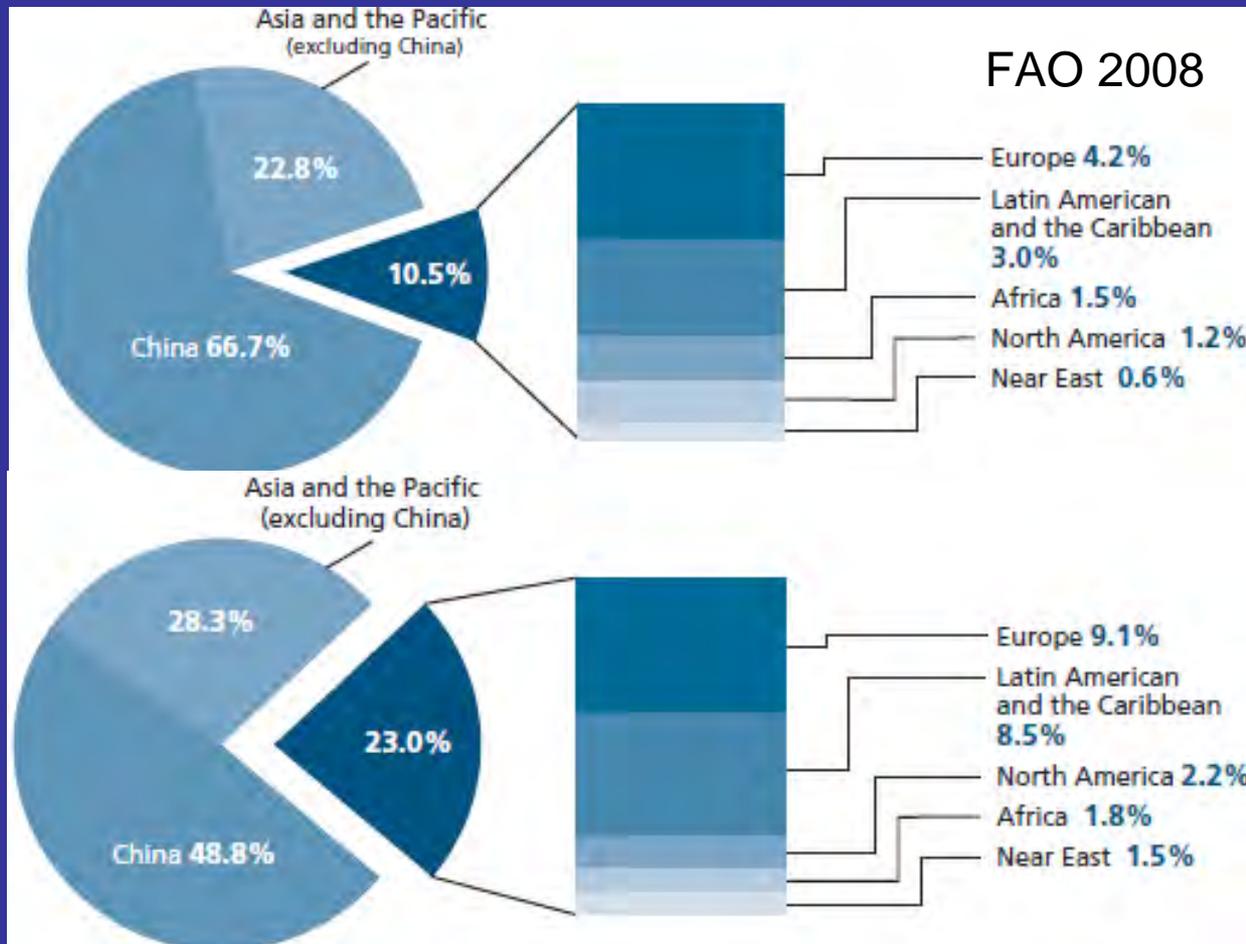
Fish is an important protein supply in Asia

- Protein supplies by continent and major food group (2003-05)



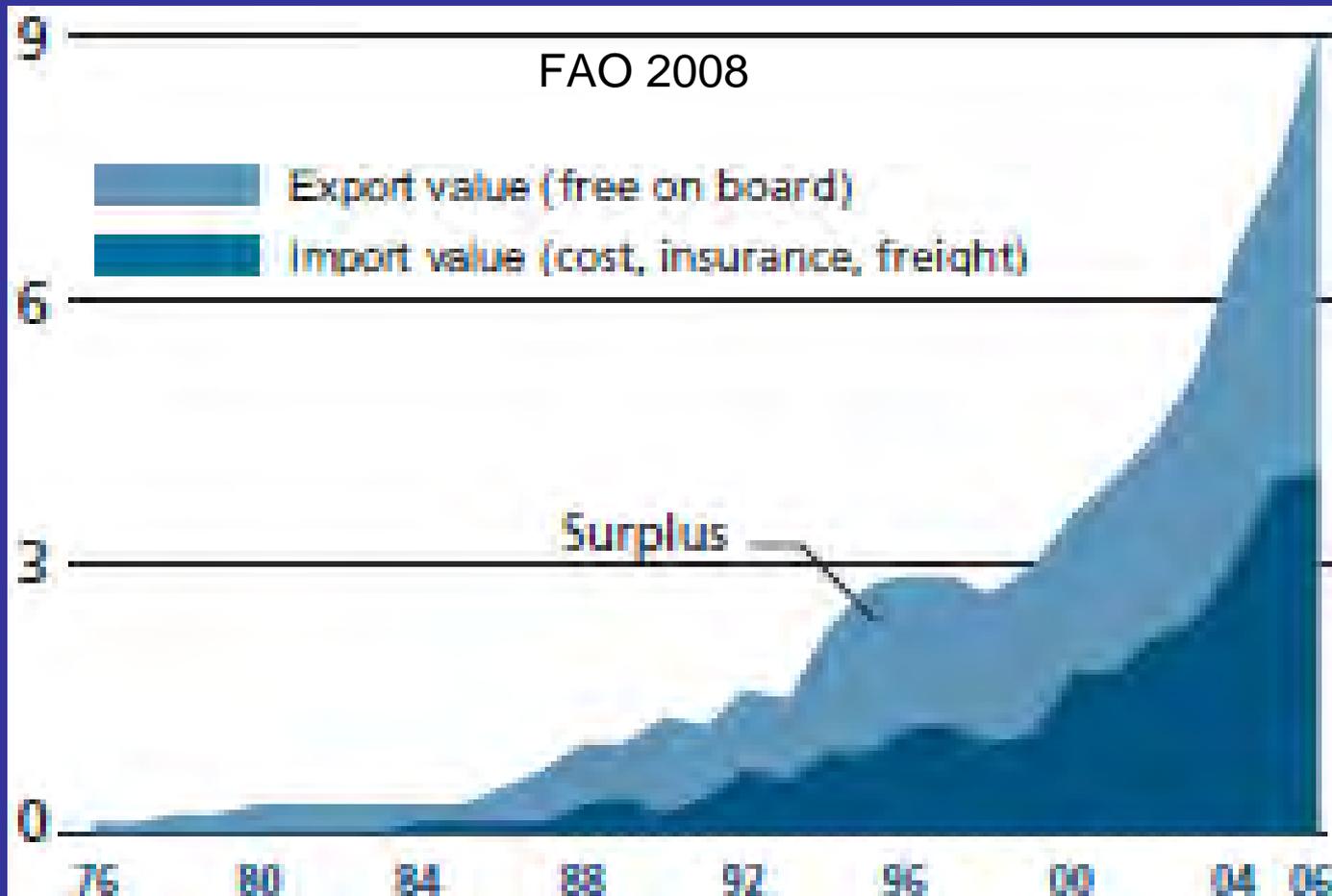
China is an important fish producer

- China's aquaculture produces the largest volume and number of species in world
- World aquaculture in 2006 (excl. aquatic plants)



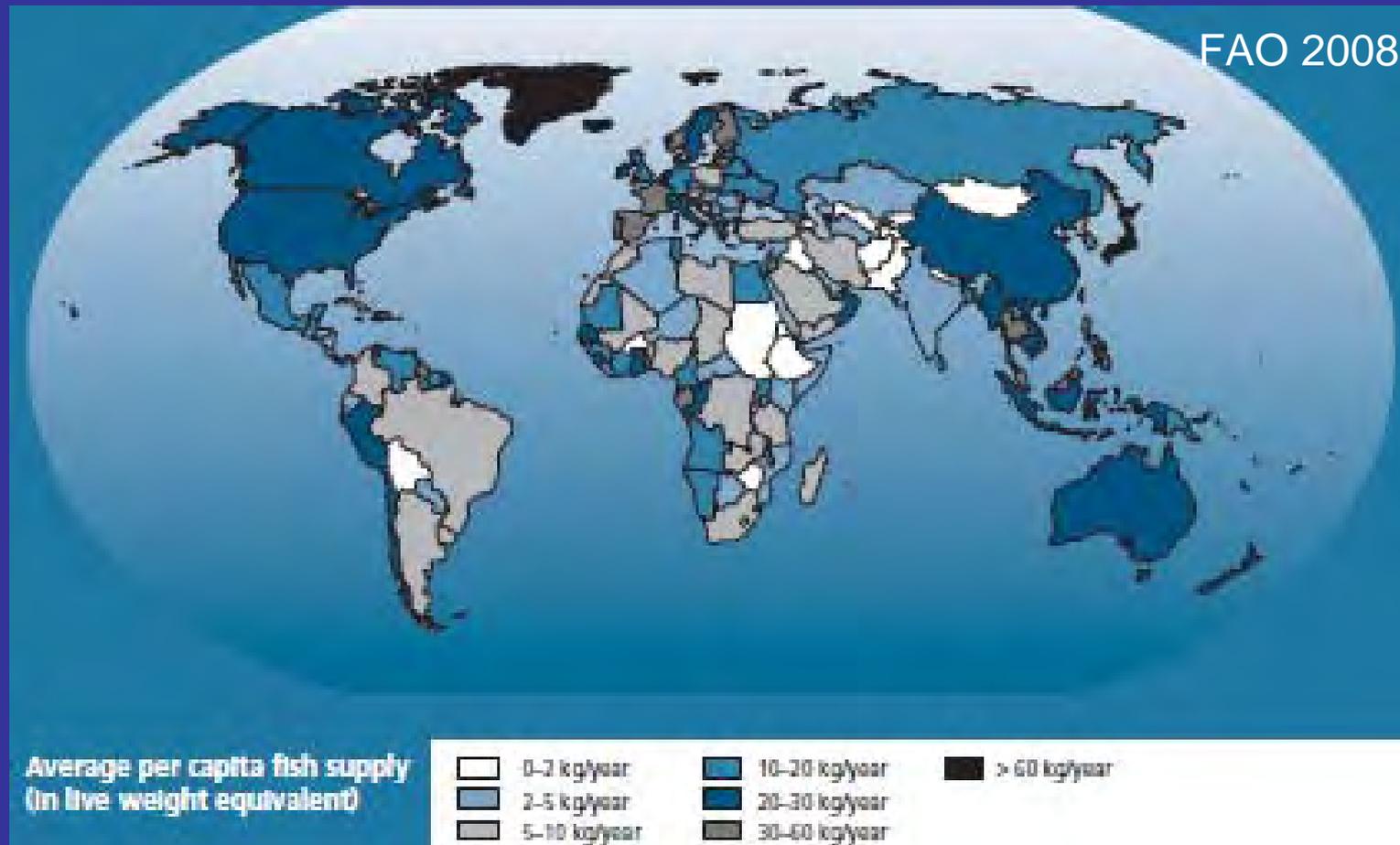
China is an important fish trader

- China's imports and exports of fish and fishery products (US\$ billions)



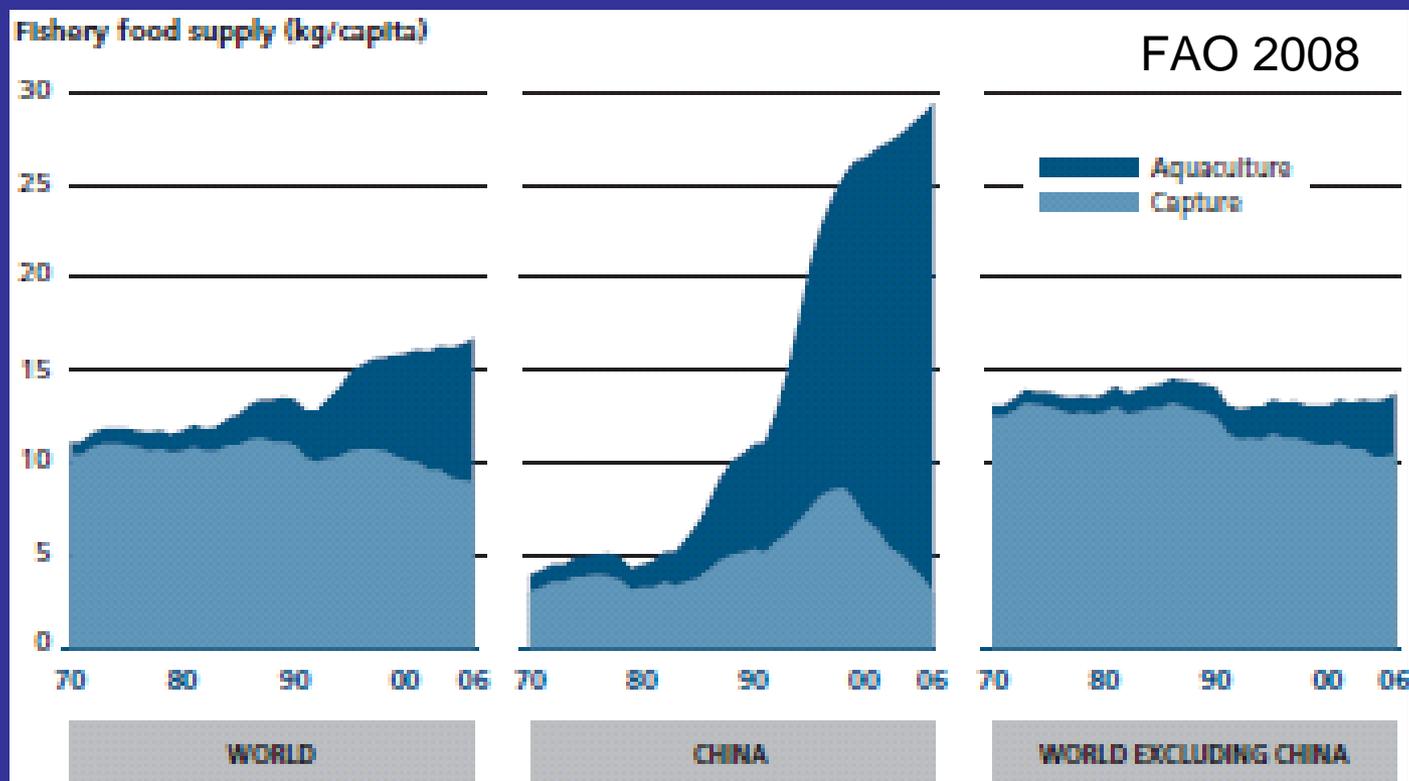
Fish consumption is high in China

- Fish as food: per capita supply (average 2003-05)



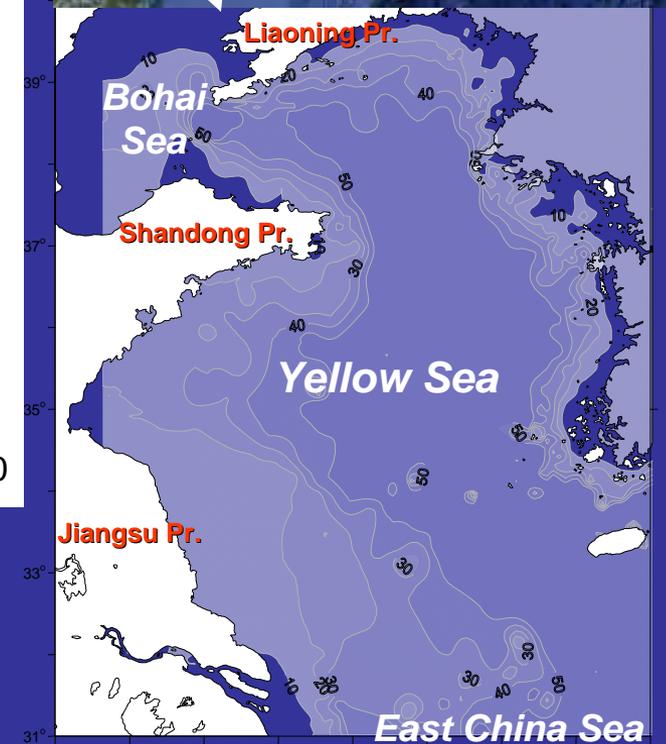
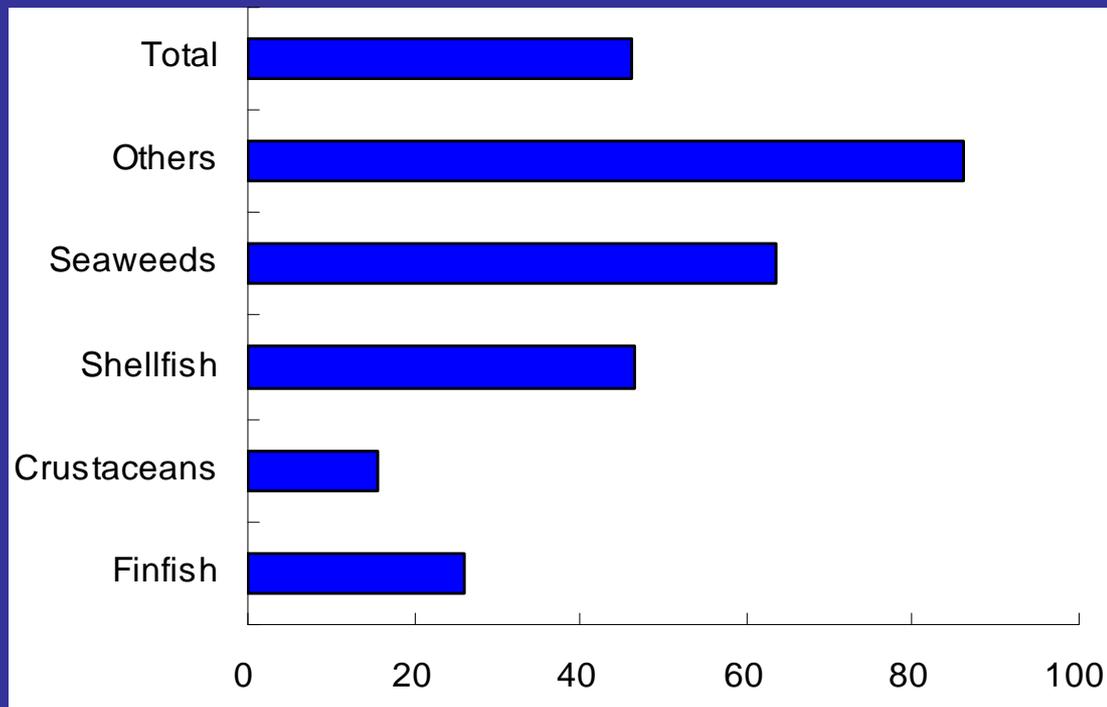
Aquaculture provides more food than capture fisheries in China

- Relative contribution of aquaculture and capture fisheries to food fish consumption



Mariculture in the Yellow Sea region is important in China

- % Contribution of mariculture volume in the YS to China



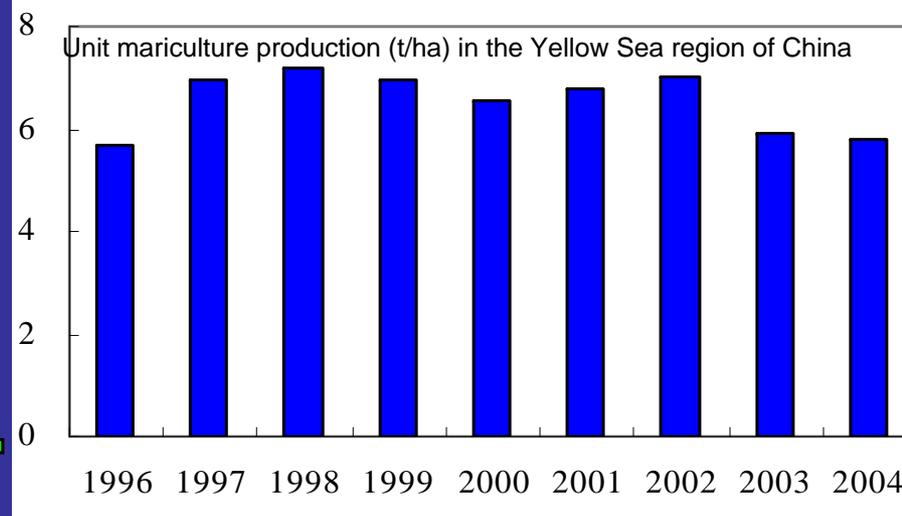
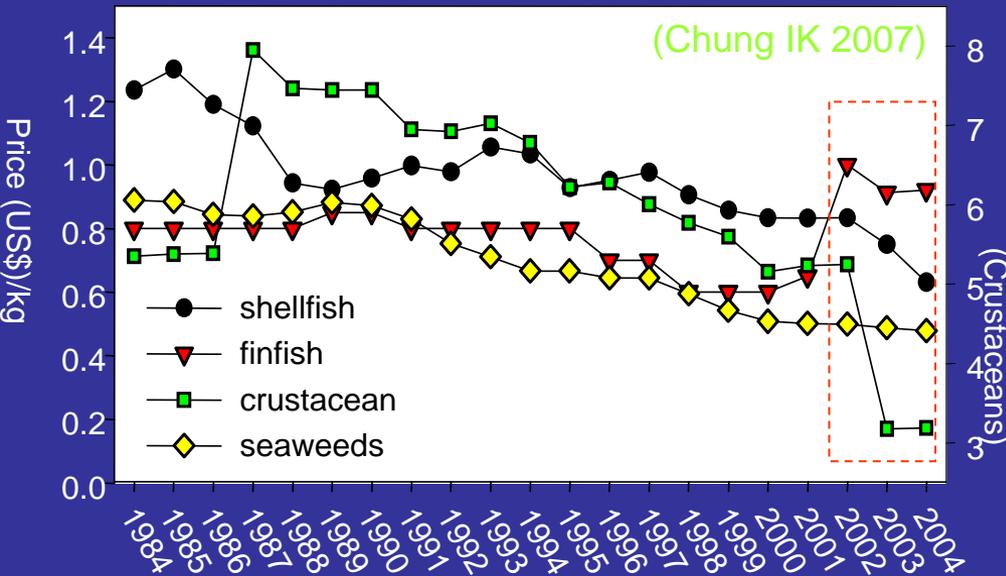
Some important species cultured in the Yellow Sea region of China

- Longline – kelps (*Laminaria japonica*, *Porphyra yezoensis*, *Undaria pinnatifida*)
- Longline – shellfish (*Crassostrea gigas*, *Chlamys farreri*, *Patinopecten yessoensis*, *Haliotis discus hannii*)
- Bottom propagation – clams (*Ruditapes philippinarum*, *Bullacta exarata*, *Arca granosa*)
- Pond – sea cucumber (*Stichopus japonicus*) and shrimps (*Litopenaeus vannanei*, *Penaeus japonicus*)
- Cage – finfish (*Lateolabrax japonicus*, *Sebastes schlegelii*, *Hexagrammos otakii*)
- On land – finfish (*Scophthalmus maximus*, *Paralichthys olivaceus*)



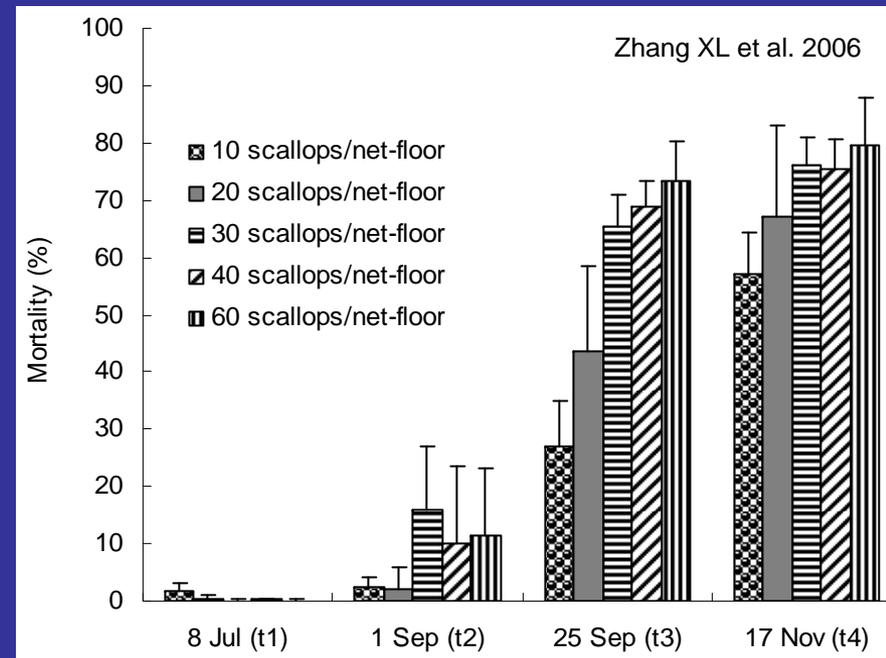
Major challenges (1)

- Available coastal area is limited for aquaculture
- Other sector may demand to use the same sites of mariculture
- This requires increasing “production efficiency”
 - Higher volume of marketable food within unit area and time
- For most of the traditional aquaculture, technique already “fully” developed
- This requires **intensified uses of area and time**
- The market also stimulates **more culture for finfish**
- Risk – more environmental problems foreseen



Major challenge (2)

- Diseases in aquaculture
 - Population/species is more vulnerable to disease infections after generations of cultivation
 - Many diseases emerging, as aquaculture intensified, seed sources diversified, along with environmental degradation and climate change
 - The last century has witnessed disastrous diseases in shrimp and scallop culture
 - What/will next?



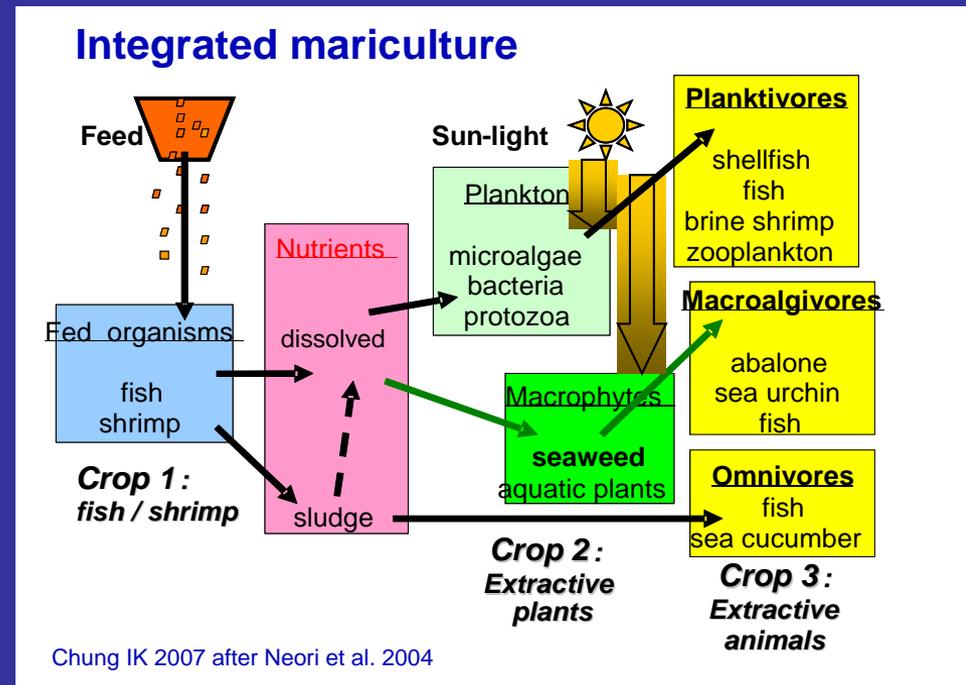
Opportunity (1)

- Integrated multi-trophic aquaculture (polyculture)
- The wishes:
 - Better usage of the resources (space, nutrients)
 - Less environmental problems (waste internalized)
 - Higher production efficiency (volume & value)

- Other stimuli:

CO₂ emission quota trade

New energy demand



Opportunity (2)

- Marine ranching and offshore (deepwater) culture
- Successful experience (MR) in Korea
 - Health and quality food
 - Little environmental problems (waste minimized)
 - High production (volume & value) than capture fishery
- Constraint:
 - Heavy load of management
 - Technology
 - Environment requirement
 - Huge investment



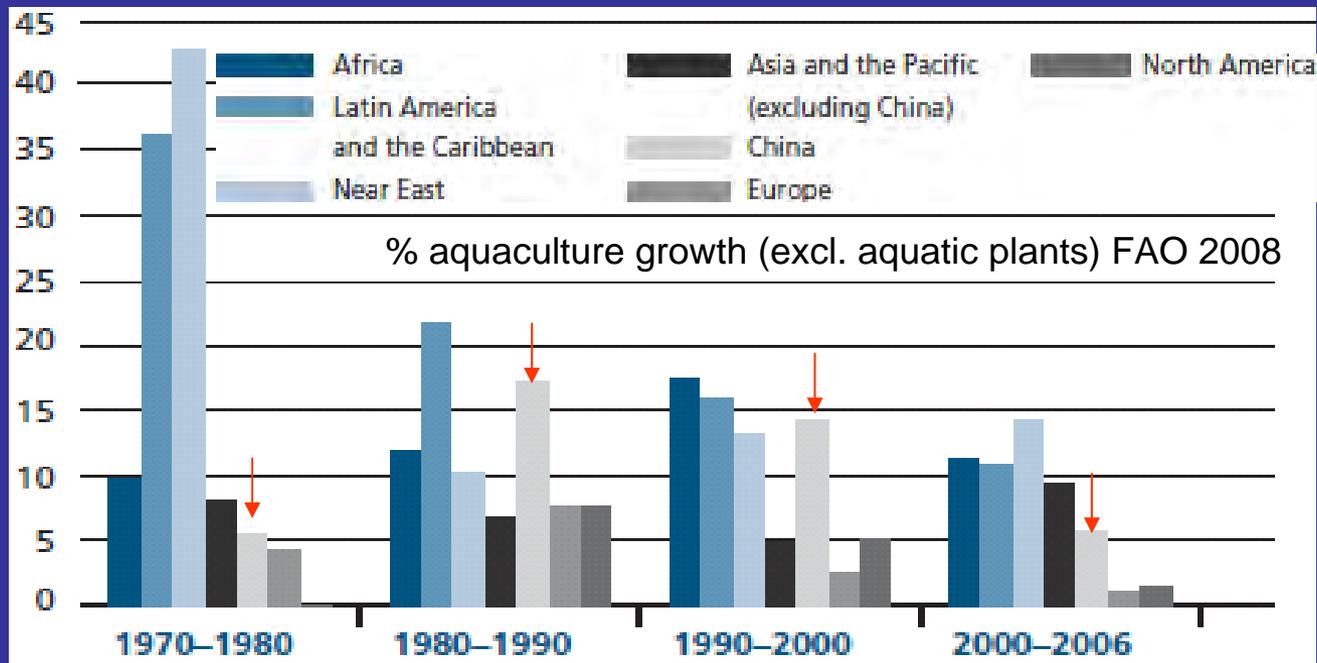
Opportunity (3)

- Shifting from the mode production of large quantity of low quality (cheap) to smaller quantity of higher quality (higher value) food
- Drivers:
 - Consumers' attitude (as a result of living standard shift-up)
 - Producer side: constraint due to increasingly shared resources (materials, inputs, labor) with other sectors

Conclusion

FAO 2008:

- Little doubt that aquaculture growth will slow, albeit with growth spurts for particular species and regions
- The success of the industry is bringing out constraints that were only potential when it started to grow
- However, it is evident that aquaculture will continue to grow in response to demand for fish and seafood generally



Thank you