



Sustainability, Fisheries and Aquaculture

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What this lecture will do

- Explore central issues in fish or aquatic foods (capture fisheries and aquaculture) and sustainability/food security

Popularity of fish and aquatic foods

- Reasons for addressing sustainability:
 - Fish or aquatic foods are important elements in food security and nutrition
 - Global fish supply will have to be expanded significantly in order to meet these demands
- Key issues influencing sustainability: Governance, resource management, climate change, overfishing, availability of fish feed and distributive justice
(Österblom et al., 2010, O’Leary et al., 2011; (Cheung et al., 2010; Agnew et al., 2009)

What are capture fisheries?

- Capture fishery is harvesting of naturally occurring living resources in marine & freshwater environments
- Current concern: 80% of 523 world fish stocks are reported as fully or over-exploited

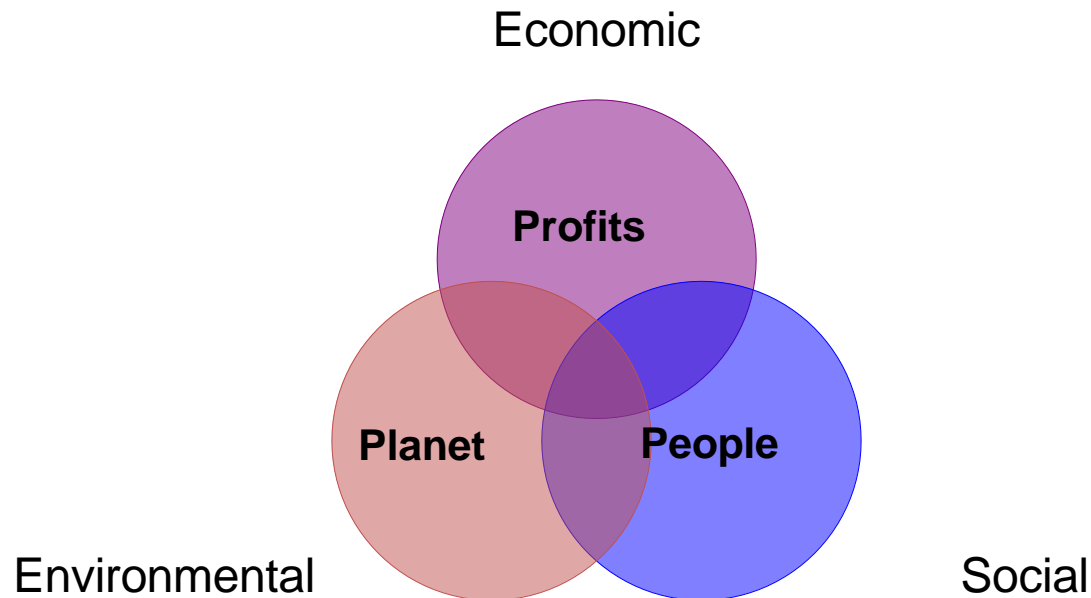
What is aquaculture?

- "The farming of aquatic organisms in inland and coastal areas, involving intervention in the rearing process to enhance production and the individual or corporate ownership of the stock being cultivated" (FAO, 2007)
- Estimated to produce over 600 food fish and algal species in over 190 countries (FAO, 2012)
- Two general types:
 - Marine (saltwater) aquaculture: e.g., Washington oysters, clams, mussels, shrimp and Alaska salmon hatcheries
 - Freshwater aquaculture: e.g., Idaho trout, Mississippi catfish and tilapia
- Current concerns: Fish welfare and environmental impacts

Relevance to sustainability

- Sensible sustainability solutions are needed
- Effective policies and practices require:
 - Good governance, appropriate regulation and risk management
 - Fish welfare
 - Equity for those in fisheries and aquaculture
 - Evaluating global (over) consumption of protein from animal sources
 - Feeding future fish supplies
 - Consideration of environment, climate change pressure and ecosystem resilience
 - Impact on disadvantaged groups

What is sustainable fisheries and aquaculture?



Consider long-term health and vitality of environmental (e.g., oceans and terrestrial spaces developed for aquaculture), social, and economic systems.

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Capture fisheries: Teasing out the dimensions of sustainability...

- People
- Planet
- Profit

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People

- Human health, nutrition, food security, income
- Food safety: mercury contamination and other organic contaminants
- Rising prices as demand increases
- Accessibility and affordability, especially for vulnerable populations
- Equity (e.g., low worker wages, poor working conditions, and a lack of legal protections, demand for cheap labor)

Planet

- Environmental impacts (e.g., trawling, scraping ocean floor)
- Feeding future fish supplies: land, water, energy
- Pollution (e.g., from fishing vessels and aquaculture industry, including development of new infrastructure)
- Climate change
- Overfishing and collapse of some fisheries
- Food loss and waste (pre and post harvest)
- Animal welfare (e.g., pain and suffering, humane slaughter and harvest, disease)

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Profits

- Income, livelihood and equity (fair price, price variability, trade treaties)
- Overfishing and variability in ecosystem conditions
- Adequate access to food sources (e.g., fish lower in the aquatic chain or terrestrially based feed)
- Competition from aquaculture and GMOs
 - E.g., costs of managing land and water resources, comparative contaminant levels of farm-raised versus wild caught seafood, health benefits

Aquaculture: Teasing out the dimensions of sustainability...

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People

- Politics of food and technology
 - (e.g., impacts of large-scale, corporate activity and technological intensification)
- Consumer resistance
- Cultural issues, including concern for indigenous ways of life and rights
- Contaminants (e.g., organic pollutants, mercury)
- Fair wages and good working conditions, equitable pay

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Planet

- “Fish for non-food use” problem: Feed requirement to meet demand for increased yields (include environmental impact of transport fishmeal)
- “Sustainable intensification” – expansion into new regions; water supplies and quality and access
- Greater integration of land and water use, and increased production in coastal margins (areas could become more salinized due to hydrological changes and/or sea level rise)
- Decline of species on ecosystem and biodiversity
- Other potential environmental costs:
 - a. Escapes
 - b. Disease (control)

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Profits

- Income, year round employment (revenue from support activities) and economic diversification
- Unstable markets
- Unfavorable regulatory environment
- Competition with wild fisheries
- Animal based feed availability
- Product quality

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Specific animal welfare challenges in aquaculture

- Welfare interest: fish pain and suffering matter morally (e.g., Chandroo et al, 2004; Sneddon et al, 2003)
- Consider feelings-based, function-based and nature-based welfare concerns
- Who sets welfare standards?

Specific animal welfare challenges in aquaculture

- Concentrate on which species strains or individuals will flourish in the farm environment
- Develop husbandry systems that minimize adverse effects on welfare
- Develop welfare inventory and management practices that are sensitive to changing needs and demands of producers/consumers

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Strategies for moving forward

- Involve affected communities and industry (other relevant stakeholders): e.g., well planned, transparent, participatory processes towards common interests/shared goals)
- Develop regulations based upon actual experience developed in consultation with industry and other stakeholders
- Regulations should be based on sound knowledge of the species and environments concerned
- Develop practical tools for on-farm assessment of welfare collaboratively developed by scientists and industry
- Consider industry initiated monitoring, overseen by regulators (from Castle et al. 2008)



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