

Introduction to Fisheries Economics

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Key concepts, analytical tools, and policy implications

1. What Is Fisheries Economics?

- **Definition:** The study of how societies allocate resources (fish stocks, capital, labor, and technology) to produce and distribute fish and seafood.
 - **Scope:**
 - Biological (stock dynamics, sustainability)
 - Economic (costs, revenues, market behavior)
 - Institutional (property rights, regulations, governance)
 - Social (livelihoods, cultural values)
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2. Core Economic Principles Applied to Fisheries

Principle	Application in Fisheries
Scarcity	Fish stocks are finite; over-exploitation reduces future supply.
Opportunity Cost	Choosing to fish a species means foregone use of effort on other species or activities.
Marginal Analysis	Fishers compare marginal revenue (price × marginal catch) with marginal cost (fuel, labor, gear).
Externalities	Over-fishing imposes costs on other fishers and future generations; by-catch and habitat damage affect non-target species.
Public Goods	Healthy marine ecosystems provide non-excludable benefits (e.g., tourism, coastal protection).

3. Fishery Types & Management Regimes

Fishery Type	Typical Management Tools	Economic Implications
Open-access	None or minimal regulation	Zero economic rent; “tragedy of the commons”.

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Fishery Type	Typical Management Tools	Economic Implications
Limited?entry (quota, license)	Permit systems, catch shares, individual transferable quotas (ITQs)	Generates economic rent, promotes efficiency, can lead to consolidation.
Community?based	Co?management, local stewardship, traditional rights	Aligns incentives with local sustainability, may limit economies of scale.
Ecosystem?based	Multi?species quotas, habitat protection, ecosystem services valuation	Balances production with broader ecological goals; more complex cost?benefit analysis.

4. Key Economic Variables

1. **Catch (C)** – quantity harvested (tons).
2. **Stock biomass (B)** – living fish mass available.
3. **Price (P)** – market value per unit weight (USD/ton).
4. **Cost structure:**
 - *Variable costs* (fuel, bait, labor).
 - *Fixed costs* (vessel purchase, licensing).
5. **Profit (?):** ?? = $P \cdot C - (\text{Variable} + \text{Fixed Costs})$.
6. **Rent:** Economic surplus after covering all costs; often captured by rights holders in regulated fisheries.

5. Biological–Economic Models

5.1. Gordon?Schaefer Model (Simple Bio?Economic Model)

- **Biological component:** Logistic growth

$$\left[\frac{dB}{dt} = rB \left(1 - \frac{B}{K} \right) - C \right]$$
 where r = intrinsic growth rate, K = carrying capacity.
- **Economic component:** Harvest revenue vs. cost

$$\left[\pi = P \cdot C - c \cdot E \right]$$
 with E = effort, c = cost per unit effort.
- **Equilibrium outcomes:**

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- **Maximum Sustainable Yield (MSY):** Biomass = $K/2$, harvest = $rK/4$.
- **Maximum Economic Yield (MEY):** Lower effort than MSY; maximizes profit.

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