Economics of Fishery: Open Access Resources

• Background on Status of World Fisheries
  • Bio-economic Model and Terms
  • Effort – Open Access
Reliance on Fishery Output
Differences in Fishing Activity by Country

FIGURE 4
Marine and inland capture fisheries: top producer countries in 2000

- China: 17.0
- Peru: 10.7
- Japan: 5.0
- United States: 4.7
- Chile: 4.3
- Indonesia: 4.1
- Russian Fed.: 4.0
- India: 3.6
- Thailand: 2.9
- Norway: 2.7
- Iceland: 2.0
- Philippines: 1.9

Million tonnes
Use of Oceans by Extent of Fishery Production

**FIGURE 5**
Capture fisheries production by principal marine fishing areas in 2000

<table>
<thead>
<tr>
<th>Area</th>
<th>Production (Million tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacific, Northwest</td>
<td>23.1</td>
</tr>
<tr>
<td>Pacific, Southeast</td>
<td>15.8</td>
</tr>
<tr>
<td>Atlantic, Northeast</td>
<td>10.9</td>
</tr>
<tr>
<td>Pacific, Western Central</td>
<td>9.9</td>
</tr>
<tr>
<td>Indian Ocean, Eastern</td>
<td>4.7</td>
</tr>
<tr>
<td>Indian Ocean, Western</td>
<td>3.9</td>
</tr>
<tr>
<td>Atlantic, Eastern Central</td>
<td>3.5</td>
</tr>
<tr>
<td>Pacific, Northeast</td>
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</tr>
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<td>Atlantic, Northwest</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Note: Fishing areas listed are those with a production volume of more than 2 million tonnes in 2000.
Temporal Patterns of Production for Different Areas of the Oceans - I
Temporal Patterns of Production for Different Areas of the Oceans -II
Major Species in Capture Fisheries

**FIGURE 6**
Capture fisheries production: top species in 2000

- Anchoveta: 11.3 million tonnes
- Alaska pollock: 3.0 million tonnes
- Atlantic herring: 2.4 million tonnes
- Skipjack tuna: 1.9 million tonnes
- Japanese anchovy: 1.7 million tonnes
- Chilean jack mackerel: 1.5 million tonnes
- Largehead hairtail: 1.5 million tonnes
- Chub mackerel: 1.5 million tonnes
- Capelin: 1.5 million tonnes
- Blue whiting: 1.4 million tonnes

Note: Species listed are those with a production volume of more than 1 million tonnes in 2000.
Some Terms

- **Bioeconomic Model** – a model that combines biology of fishery growth with incentives for economic behavior
- **Fishery** – collection of some type of fish that inhabit a well defined area of marine environment
- **Open Access** – free ability to fish a given section of marine environment, provided economic agent has equipment
- **Logistic Model of fishery** – relationship between growth in number of fish as function of stock
- **Effort-Yield Curve** – production function for harvesting of fish based on effort
Stock of fish

Change in stock of fish

Effort (boat/hours)

Yield (fish harvested by weight)

Maximum Sustained Yield

$e_{\text{MAX}}$

Effort (boat/hours)
If price is constant, Marginal Revenue = Price

Open Access continues until no incentive to enter TR – TC = 0 at $e_{0A}$

Open Access – excess use of fishery
Regulations on fishery practices designed to raise costs

$TC_H$ – total cost with regulations on year used

Regulations “may” protect stock but increase costs and lead to inefficiency

e_Q = Quota – costs do not increases but face issue of allocation among fishers
Putting Concepts of Logistic Growth with Yield/Effort

Cost when Stock = $S_1$

Cost when Stock = $S_2$

Slope = Price

Locus of catch (price = MC for given stock)

$Q^*(S_1)$ $Q^*(S_2)$

Growth – change in stock

Exhaustion

Stable

Optimal Stock

$Y_1$ $Y_2$ $Y_3$