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Food and Agriculture Organization of the United Nations. Rome, Italy
Global Contribution of Fisheries and Aquaculture to Food Security
Fishery production and utilization

Fish production
(million tonnes live weight)

Per capita fish supply (kg)

Aquaculture for human consumption
Capture for human consumption
Non-food uses
Per capita food fish supply
Fishery production 2011

**Capture**
- Other: 49%
- China: 17%
- Peru: 9%
- Indonesia: 6%
- USA: 5%
- India: 5%
- Russian Federation: 5%
- Japan: 4%

**Aquaculture**
- China: 62%
- India: 7%
- Indonesia: 4%
- Viet Nam: 5%
- Bangladesh: 4%
- Norway: 2%
- Thailand: 2%
- Others: 16%
<table>
<thead>
<tr>
<th>Country</th>
<th>Production</th>
<th>World rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>35,074,560</td>
<td>1</td>
</tr>
<tr>
<td>India</td>
<td>3,791,920</td>
<td>2</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>2,556,200</td>
<td>3</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1,749,291</td>
<td>4</td>
</tr>
<tr>
<td>Thailand</td>
<td>1,396,020</td>
<td>5</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>1,064,285</td>
<td>6</td>
</tr>
<tr>
<td>Norway</td>
<td>961,840</td>
<td>7</td>
</tr>
<tr>
<td>Chile</td>
<td>792,891</td>
<td>8</td>
</tr>
<tr>
<td>Myanmar</td>
<td>778,096</td>
<td>9</td>
</tr>
<tr>
<td>Philippines</td>
<td>737,397</td>
<td>10</td>
</tr>
</tbody>
</table>
Aquaculture in Asia Pacific Region

- Asia Pacific Region produced about 50 million tonnes of fish by aquaculture
- Five SE Asian countries in global top ten: – 7.7 million tonnes, – 13.7 billion dollars,
- SE Asia production: – 16 % of global total, – 13 % of total value
- Southeast Asia highest growth in aquaculture of the Asian sub-regions in recent years: – 45% increase over last decade
- FAO study of aquaculture policies in Southeast Asia reveals that well-planned government interventions built on comparative advantages and fostering an enabling incentive environment can lead to economic growth, food security and better living standards.
Aquaculture in Asia Pacific Region

• Backyard aquaculture contributes to livelihoods
• Major contribution to local economies and fish supply
• Significant contribution to household and local food/nutritional security
• Effective integration of aquaculture with other livelihood activities
• More effective utilization to limited resources available to small farm holder
• Empowerment of women
• Increased resilience of livelihood of smallscale farmer
A complete nutrient package

• Major source of animal proteins and micronutrients for many coastal populations

• Unique source of poly-unsaturated fatty acids (DHA, EPA) for optimal brain development and the prevention of coronary heart disease

• Unique & complete source of micronutrients (calcium, iodine, zinc, iron, selenium,...)

• Source of vitamins (A, D, B group) generally scarce in rural diets
Comparison of Omega-3 levels in fish and other meats

<table>
<thead>
<tr>
<th></th>
<th>Salmon, farmed</th>
<th>Salmon, wild</th>
<th>Carp, common</th>
<th>Tilapia</th>
<th>Chicken</th>
<th>Beef</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein g/100g</td>
<td>20</td>
<td>20</td>
<td>18</td>
<td>20</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>Lipids g/100g</td>
<td>13</td>
<td>6.3</td>
<td>5.6</td>
<td>1.7</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Water g/100g</td>
<td>65</td>
<td>69</td>
<td>76</td>
<td>78</td>
<td>66</td>
<td>65</td>
</tr>
<tr>
<td>Ash g/100g</td>
<td>1.1</td>
<td>2.5</td>
<td>1.5</td>
<td>0.9</td>
<td>0.8</td>
<td>1.0</td>
</tr>
<tr>
<td>DHA + EPA (ω-3) mg/100g</td>
<td>1966</td>
<td>1436</td>
<td>350</td>
<td>91</td>
<td>40</td>
<td>3</td>
</tr>
</tbody>
</table>

USDA National Nutrient Database (USDA, 2012)
### Examples of the importance of micronutrients

<table>
<thead>
<tr>
<th>Micronutrient deficiency</th>
<th>Level of micronutrient in 100 g edible part</th>
<th>Recommended daily intake for children:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>250 million preschool children are vitamin A deficient</strong></td>
<td>Small sized fish eaten whole, good source; &gt; 2 500 µg RAE in 100 g Mola (<em>Amblypharyngodon mola</em>)</td>
<td>500 µg RAE</td>
</tr>
<tr>
<td><strong>54 countries are still iodine-deficient</strong></td>
<td>Seafood nearly the only natural food source of iodine; 250 µg iodine in 100 g Cod (<em>Gadhus morhua</em>)</td>
<td>120 µg</td>
</tr>
<tr>
<td><strong>Iron deficiency affects about 2 billion people</strong></td>
<td>Small sized fish eaten whole, good source; 45 mg iron in 100 g Chanwa pileng (<em>Esomus longimanus</em>)</td>
<td>8.9 mg</td>
</tr>
<tr>
<td><strong>800 000 child deaths per year are attributable to zinc deficiency</strong></td>
<td>Small sized fish eaten whole, good source; 20 mg zinc in 100 g Chanwa pileng (<em>Esomus longimanus</em>)</td>
<td>3.7 mg</td>
</tr>
</tbody>
</table>
Contribution of fish to human diet (2009)

- **WORLD**: 16.5%
- **LIFDC's**: 24.2%
- **Latin America & Caribbean**: 7.0%
- **Northern America**: 7.4%
- **Oceania**: 11.0%
- **Europe**: 11.6%
- **Africa**: 19.3%
- **Asia**: 22.6%

**Fish as percentage of total animal protein intake**
Global Contribution of Fisheries and Aquaculture to Social and Economic Development
Employment & Livelihoods

- 54.8 million total employment (2010)
  - 90% small scale
  - 38.2 million capture
  - 16.6 million aquaculture
Fish and seafood utilization (in volume)

Million tonnes (live weight)

- Non-food purposes
- Canning
- Curing
- Freezing
- Marketing as fresh produce

[Graph showing trends from 1961 to 2008 with different categories indicating utilization.]
Socio-Economic importance of the fish and seafood value chain
Estimated Total Value 818 US $ billion in 2008

Employment in fisheries and aquaculture:
- 52 million persons in fisheries and aquaculture 2008
- 195 million along the value chain-
- 660 - 880 million persons (12%) depend on the sector for their livelihoods
Enabling Trade and Wealth Extraction
Export of fish and seafood: 1976 – 2012 (US $ billion)

Source: GTIS ® (2012)
<table>
<thead>
<tr>
<th>Species</th>
<th>Production (1000 t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shrimp</td>
<td>3,450</td>
</tr>
<tr>
<td>Tilapia</td>
<td>2,500</td>
</tr>
<tr>
<td>Salmon</td>
<td>1,540</td>
</tr>
<tr>
<td>Pangasius</td>
<td>1,375</td>
</tr>
<tr>
<td>Channel catfish</td>
<td>350</td>
</tr>
<tr>
<td>Trout</td>
<td>320</td>
</tr>
<tr>
<td>Seabream</td>
<td>160</td>
</tr>
<tr>
<td>Seabass</td>
<td>150</td>
</tr>
<tr>
<td>Other flatfish</td>
<td>125</td>
</tr>
<tr>
<td>Barramundi</td>
<td>45</td>
</tr>
<tr>
<td>Cobia</td>
<td>40</td>
</tr>
<tr>
<td>Atlantic cod</td>
<td>23</td>
</tr>
<tr>
<td>Oysters</td>
<td>4,320</td>
</tr>
<tr>
<td>Clams, cockles, arkshells</td>
<td>1,620</td>
</tr>
<tr>
<td>Mussels</td>
<td>1,620</td>
</tr>
</tbody>
</table>

Main aquaculture species in international trade (2008)
Challenges
Challenges

Decreasing resource base:
1. Overexploited fish stocks
2. IUU fishing
3. Overcapacity in fishing fleets
4. Degraded environment and ecosystems
5. Climate Changes
6. Post harvest losses

Increasing demand:
1. Population increase
2. Economic development
3. Increased consumption
Stock Status of Marine Fishery Resources

• % of non-fully exploited stocks continuously decreased
• 30% of stocks overexploited in 2009
• Fully exploited stocks at around 50%
• An increasing trend in fully exploited stocks from 1990 to present
Fish Stock Status by Region

Non-fully exploited | Fully exploited | Overexploited

0% 20% 40% 60% 80% 100%
77
67
81
71
48,58,68
61
21
57
87
51
27
37
47
34
31

18 Arctic Sea
21 Atlantic, Northwest
27 Atlantic, Northeast
31 Atlantic, Western Central
34 Atlantic, Eastern Central
37 Mediterranean and Black Sea
41 Atlantic, Southwest
47 Atlantic, Southeast
48 Atlantic, Antarctic
51 Indian Ocean, Western
57 Indian Ocean, Eastern
58 Indian Ocean, Antarctic
61 Pacific, Northwest
67 Pacific, Northeast
71 Pacific, Western Central
77 Pacific, Eastern Central
81 Pacific, Southwest
87 Pacific, Southeast
88 Pacific, Antarctic

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## Perspectives of fish supply

### Fish supply (mt)

<table>
<thead>
<tr>
<th></th>
<th>2010 (baseline)</th>
<th>2020/2030 projection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquaculture</td>
<td>59</td>
<td>95/123</td>
</tr>
<tr>
<td>Capture fisheries</td>
<td>88</td>
<td>88/88</td>
</tr>
<tr>
<td><strong>Total supply</strong></td>
<td><strong>147</strong></td>
<td><strong>168/211</strong></td>
</tr>
<tr>
<td>% of aquaculture:</td>
<td>40 (48 for human consumption)</td>
<td>57/58 (65/65 for human consumption)</td>
</tr>
</tbody>
</table>

Source: Estimation of FI Department

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### World Fish Production

- **Capture fisheries**
- **Aquaculture**

Source: FAO FISHSTAT
Fish demand
driven by population and income growth

### Fish Demand (mt)

<table>
<thead>
<tr>
<th>Region</th>
<th>2007 (baseline)</th>
<th>2030 (projection)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>9.0</td>
<td>18.7</td>
</tr>
<tr>
<td>Asia</td>
<td>86.4</td>
<td>186.3</td>
</tr>
<tr>
<td>Europe</td>
<td>19.4</td>
<td>23.4</td>
</tr>
<tr>
<td>L.A. &amp; C.</td>
<td>15.2</td>
<td>18.3</td>
</tr>
<tr>
<td>Northern A.</td>
<td>9.1</td>
<td>12.9</td>
</tr>
<tr>
<td>Oceania</td>
<td>1.1</td>
<td>1.8</td>
</tr>
<tr>
<td><strong>World</strong></td>
<td><strong>140.3</strong></td>
<td><strong>261.2</strong></td>
</tr>
</tbody>
</table>

Source: Estimation of FI Department
## Fish supply-demand gaps

<table>
<thead>
<tr>
<th></th>
<th>Supply 2030</th>
<th>Demand 2030</th>
<th>S-D gap 2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>11.7</td>
<td>18.7</td>
<td>-7.0</td>
</tr>
<tr>
<td>Asia</td>
<td>156.5</td>
<td>186.3</td>
<td>-29.8</td>
</tr>
<tr>
<td>Europe</td>
<td>18.6</td>
<td>23.4</td>
<td>-4.8</td>
</tr>
<tr>
<td>L.A. &amp; C.</td>
<td>16.2</td>
<td>18.3</td>
<td>-2.1</td>
</tr>
<tr>
<td>Northern A.</td>
<td>6.2</td>
<td>12.9</td>
<td>-6.6</td>
</tr>
<tr>
<td>Oceania</td>
<td>1.5</td>
<td>1.8</td>
<td>-0.3</td>
</tr>
<tr>
<td><strong>World</strong></td>
<td><strong>210.7</strong></td>
<td><strong>261.2</strong></td>
<td><strong>-50.6</strong></td>
</tr>
</tbody>
</table>

Source: Estimation of FI Department

- **Per capita fish demand in 2020 estimated based on assumptions:**
  - GDP per capita projection by IMF
  - Prices unchanged
  - Preference unchanged

- **Total fish demand in 2030 estimated based on:**
  - Estimated per capita demand in 2020.
  - UN population projection in 2030.
  - Non-food fish demand unchanged

- **Results:**
  - Supply < Demand
    - *51 mt shortage*
  - S-D gaps decline in all regions
    - Largest insufficiency in Asia
Aquaculture growth rate is declining!
Bridging the supply-demand gaps

<table>
<thead>
<tr>
<th>Aquaculture growth rate during 2007-2030</th>
<th>Expected APR (%)</th>
<th>Required APR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>4.0</td>
<td>5.6</td>
</tr>
<tr>
<td>Africa</td>
<td>7.2</td>
<td>11.5</td>
</tr>
<tr>
<td>Asia</td>
<td>4.0</td>
<td>5.3</td>
</tr>
<tr>
<td>Europe</td>
<td>3.1</td>
<td>4.0</td>
</tr>
<tr>
<td>L.A. &amp; C.</td>
<td>4.4</td>
<td>7.6</td>
</tr>
<tr>
<td>Northern A.</td>
<td>0.4</td>
<td>9.0</td>
</tr>
<tr>
<td>Oceania</td>
<td>2.6</td>
<td>7.9</td>
</tr>
</tbody>
</table>

Source: Estimation of FI Department

- If countries aquaculture production follow the recent trend, expected aquaculture growth rate: –4.0 percent annually.

- Improved capture fisheries 10-20 mill. t.

- To feed growing and wealthier world population, required aquaculture growth rate: –5.0/5.5 percent annually.

➡ Insufficiency
International regulatory framework for fisheries Governance

1982 UN Convention on the Law of the Sea

1992 UNCED: Rio Declaration + Agenda 21

Ecosystem approach to fisheries: Reykjavik 2001

2002 WSSD Johannesburg Plan of Implementation

Rio + 20 U. N Conference on Sustainable Development

1995 Code of Conduct for Responsible Fisheries

Port State Measures: Model Scheme 2005 + 2009 Agreement Flag State Performance

Strategies: Status & Trends on Capture Fisheries 2003, Status & Trends on Aquaculture 2007


Regional Fisheries Bodies

[World map showing various regional fisheries bodies and their acronyms]

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Regional approach in the Nansen Programme
FAO Approach: Focus

- Focus on trust and cooperation
  - Level Playing field

- Take into account differences in capacity and culture:
  - Sub-regional Approach

- Identify Common Interests/Issues
  - Centre points for cooperation

- Capacity Development for National/Local Institutions
  - Teach HOW TO FISH

- Common forum for management discussions and agreements
  - Formal meeting point
The Areas Beyond National Jurisdiction
Market based measures

- Food scares: Mad cow disease, Dioxin, Avian flu, SARS,...
- Loss of confidence in public control authorities
- Concern over the sustainability of natural resources, the marine fauna (dolphins, whales, turtles,...) and environment
- Increasing influence of civil society and consumer advocacy groups

- Globalization of production, processing and trade
- Vertical integration and Consolidation
- “Supermarketization”, including in developing countries
- Increasing role of retailers as the last link between suppliers and consumers
- The use of B2B standards to protect reputations
- Emergence of coalitions (GFSI, BRC)
Market Response

If you think your seafood is sustainable, it’s time to prove it.

Individual logos are the property of the owner and used for illustration purposes only.
Do we not **ALL** have shared responsibility?

- Governments
- Policymakers
- Fisheries Bodies
- CSO’s
- Catching
- Farming Sector
- Processors
- Retailers

**Fisheries sustainability is too important to be left to International Organizations, Governments, Industry, RFBs, CSOs or markets alone. All share the responsibility**
Thank you!

Merci!

Gracias!

Спасибо!