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Fish to 2020: Supply and Demand in Changing Global Markets

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Outline of Presentation

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- **Fish supply – capture vs. aquaculture**
- **Fish demand – food and feed in the 1990s**
- **Brief description of projections model to 2020**
- **A look at the future: projections results**
- **Main issues and policy implications**

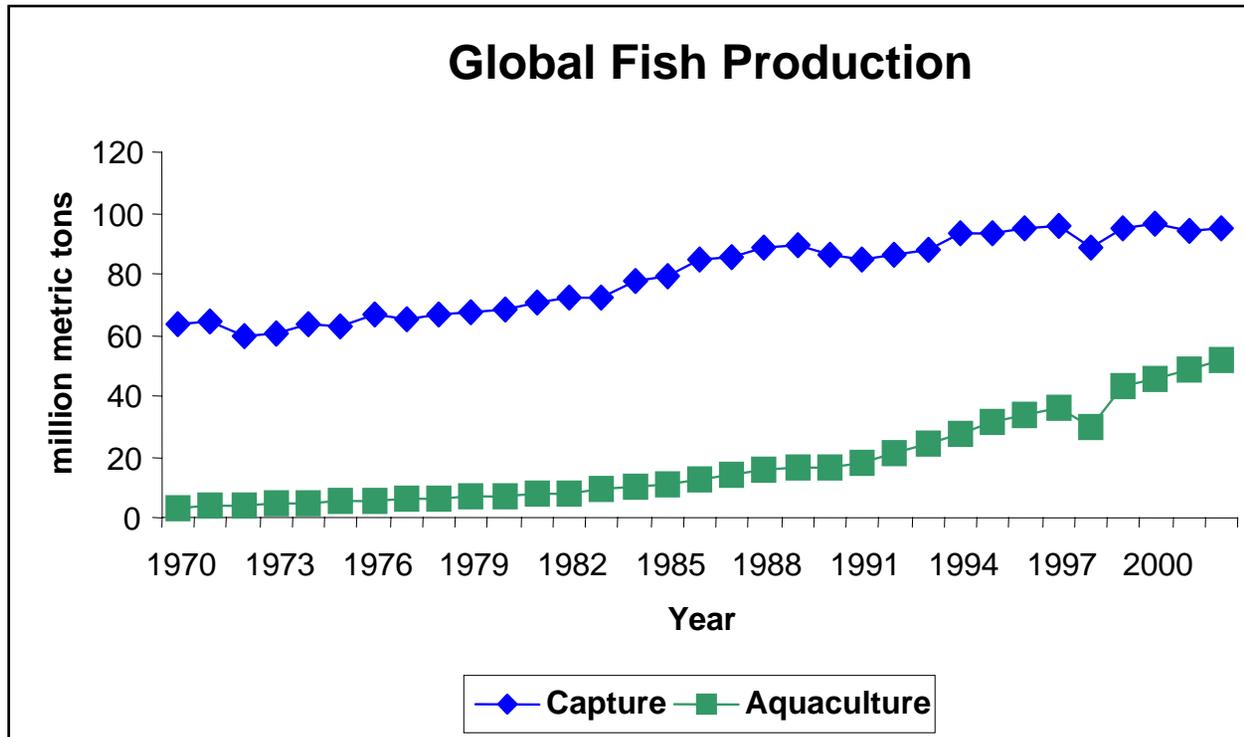
Fish Supply – Capture vs. Aquaculture

Fish Supply (1)

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Capture Fisheries

- Slow growth since late 1980s; steady at around 95 million metric tons in late 1990s
- Majority of stocks are fully or over-exploited

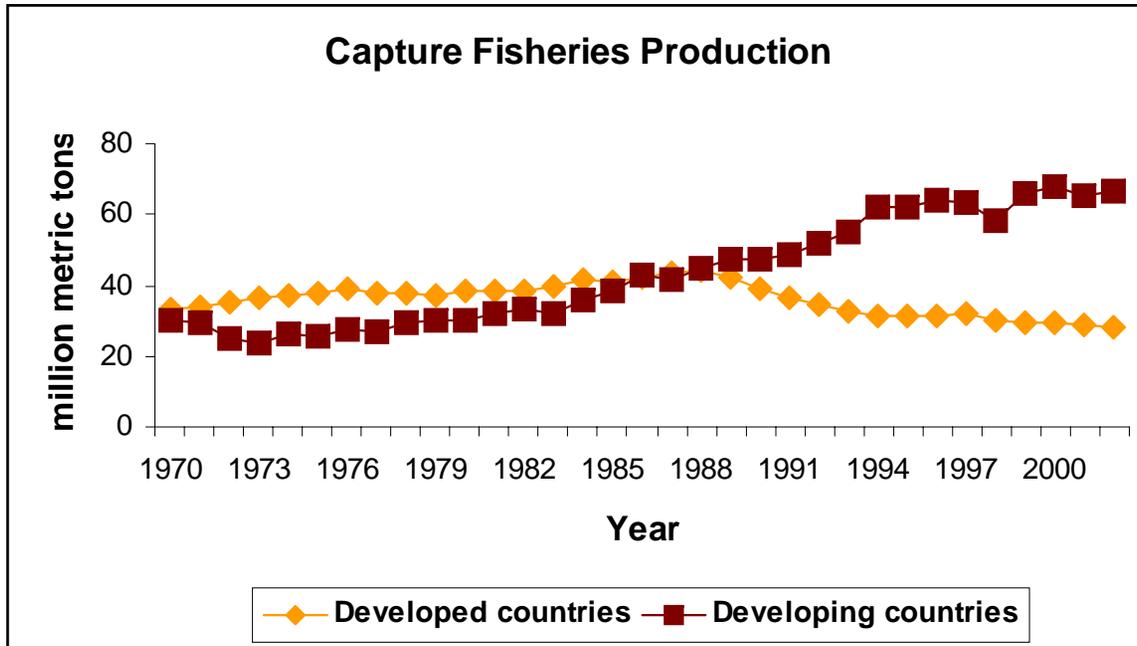


Aquaculture

- Rises from 7% (1973), 12% (1985) to over 30% (2002) of total production
- Responsible for around 70% of total growth in food fish production by weight from 1985-2002

Fish Supply (2) – Capture Fisheries

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Developed Countries

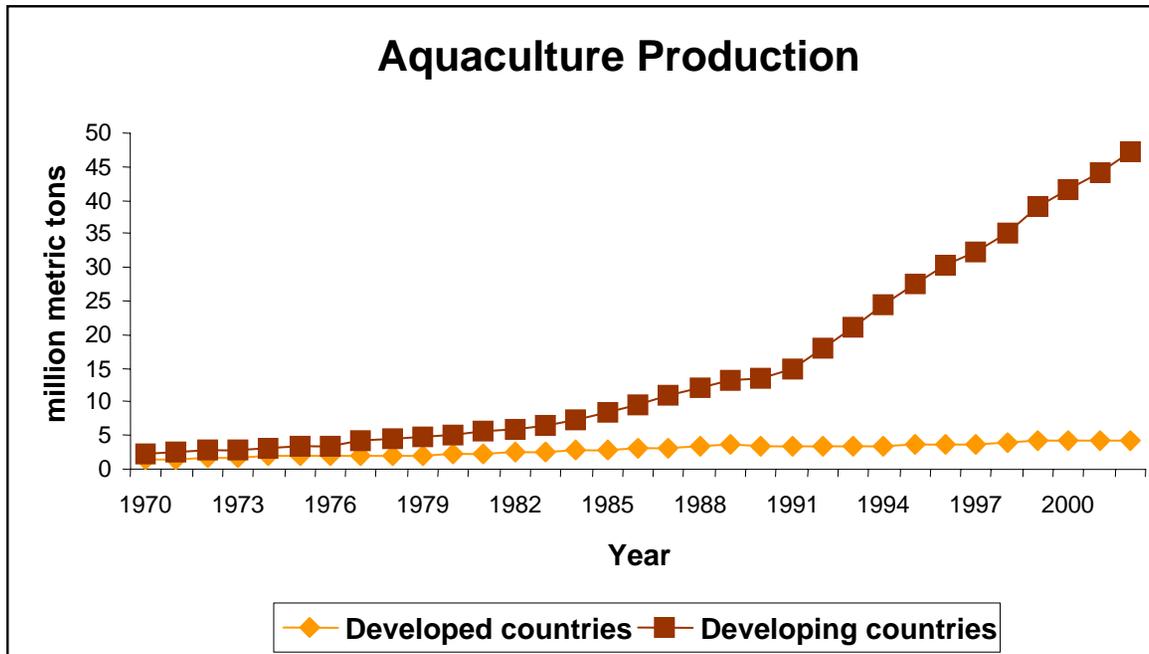
- Japan – decline in production due to EEZ and dwindling stocks of fish such as pilchard
- Production declined from 33.5 to 28 million metric tons during 1970 to 2002

Developing Countries

- China – largest producer whose share in global capture food fish production increased from 9% in 1973 to 21% in 1997
- Southeast Asia – tripled production from 5 to 15.63 million metric tons in 1973 to 2002; mainly contributed by Indonesia, Thailand

Fish Supply (3) – Aquaculture

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Developing Countries

- Produced 58% of global aquaculture products in 1973 to over 90% in 2002 with 2.76 to 47 million metric tons during 1973-2002
 - Boom in aquaculture is mainly attributed to expanded area
 - Asia accounts for 87% production by weight
- China's share is 68% in 1997 vs. 32% in 1973
 - Part of Chinese government policies to promote aquaculture as a means to improve domestic food supply and increase foreign exchange earnings including policies targeted at seed and feed inputs

Fish Demand – Food and Feed

Food Fish Consumption (1)

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| Region | Total consumption (million metric tons) | | | Annual growth rate (%) |
|--------------------|--|------|------|------------------------------|
| | 1973 | 1985 | 1997 | 1985-1997 |
| China | 4.9 | 8.7 | 33.2 | 11.8 |
| Southeast Asia | 5.4 | 7.9 | 11.3 | 3.1 |
| India | 1.8 | 2.8 | 4.5 | 4.3 |
| Latin America | 2.1 | 3.6 | 3.8 | 0.6 |
| Sub-Saharan Africa | 2.6 | 3.7 | 3.7 | 0 |
| United States | 2.9 | 4.5 | 5.4 | 1.5 |
| Japan | 7.6 | 7.4 | 7.9 | 0.5 |
| Developing world | 20.4 | 32.5 | 63.2 | 5.7 |
| Developed world | 25 | 29.4 | 28.1 | -0.4 |
| World | 45.4 | 61.9 | 91.3 | 3.3 |

Food Fish Consumption (2)

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Developing Countries

- Important source of animal protein accounting for 20% in low-income food deficit countries vs. 13% in industrialized countries
- Growth in food fish consumption with increased share from 45% in 1973 to 70% in 1997
- China dominates aggregate consumption of fisheries products from 11% in 1973 to 36% in 1997
- Sub-Saharan Africa – stagnant per capita fish consumption for the last 30 years

Developed Countries

- Aggregate consumption level declined since 1985 as a consequence of lower per capita consumption in the former Eastern Bloc countries

Feed Fish Demand (1)

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| Region | Total use (thousand metric tons) | | | Annual growth rate (%) |
|--------------------|-------------------------------------|-------|-------|------------------------------|
| | 1973 | 1985 | 1997 | 1985-1997 |
| China | 112 | 554 | 1,573 | 9.1 |
| Southeast Asia | 135 | 238 | 728 | 9.8 |
| India | 17 | 32 | 25 | -2.0 |
| Latin America | 483 | 672 | 451 | -3.3 |
| Sub-Saharan Africa | 15 | 12 | 14 | 1.6 |
| United States | 334 | 463 | 267 | -4.5 |
| Japan | 828 | 1,052 | 731 | -3.0 |
| Developing world | 877 | 1,821 | 3,148 | 4.7 |
| Developed world | 3,637 | 4,273 | 2,982 | -2.9 |
| World | 4,514 | 6,094 | 6,133 | 0.1 |

Feed Fish Demand (2)

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- **Fishmeal and fish oil – derived from wild-caught fisheries used for feeding terrestrial livestock and farmed fish**
- **Demand is determined by demand for livestock and fish, influenced by feed conversion efficiency, relative prices of competing feeds, outlook for competing sectors that also consume fishmeal and fish oil**
- **Demand for fishmeal and fish oil has increased significantly in China and Southeast Asia with rapid growing poultry, pig and aquaculture sectors**
- **Demand in other regions has declined with substitutions of maize and soybean for fishmeal**

IMPACT Model

The Policy Analysis Tool

IMPACT Overview (1)

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- **IMPACT is a food and agricultural sector supply and demand model**
- **36 countries and regions**
- **28 commodities: 6 fish, 6 livestock, cereals, roots & tubers, milk, eggs, soybeans, oils, oilcakes, and meals**
- **Model specified as a set of country-level supply and demand equations**

IMPACT Overview (2)

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- **Country-level models are linked to the rest of the world through trade**
- **World food prices are determined annually at levels that clear international commodity markets**
- **Model output: prices, production and consumption levels, net trade by commodity and region, annually to 2020**

IMPACT Fish Categories

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- **Low-Value Food Fish** (carp, sardines)
- **High-Value Finfish** (salmon, tuna)
- **Crustaceans** (shrimp, crabs)
- **Mollusks** (clams, oysters, squid)

All the above are disaggregated into wild-caught and farm-raised, plus:

- **Fishmeal**
- **Fish oil**

Scenarios for Sensitivity Analysis

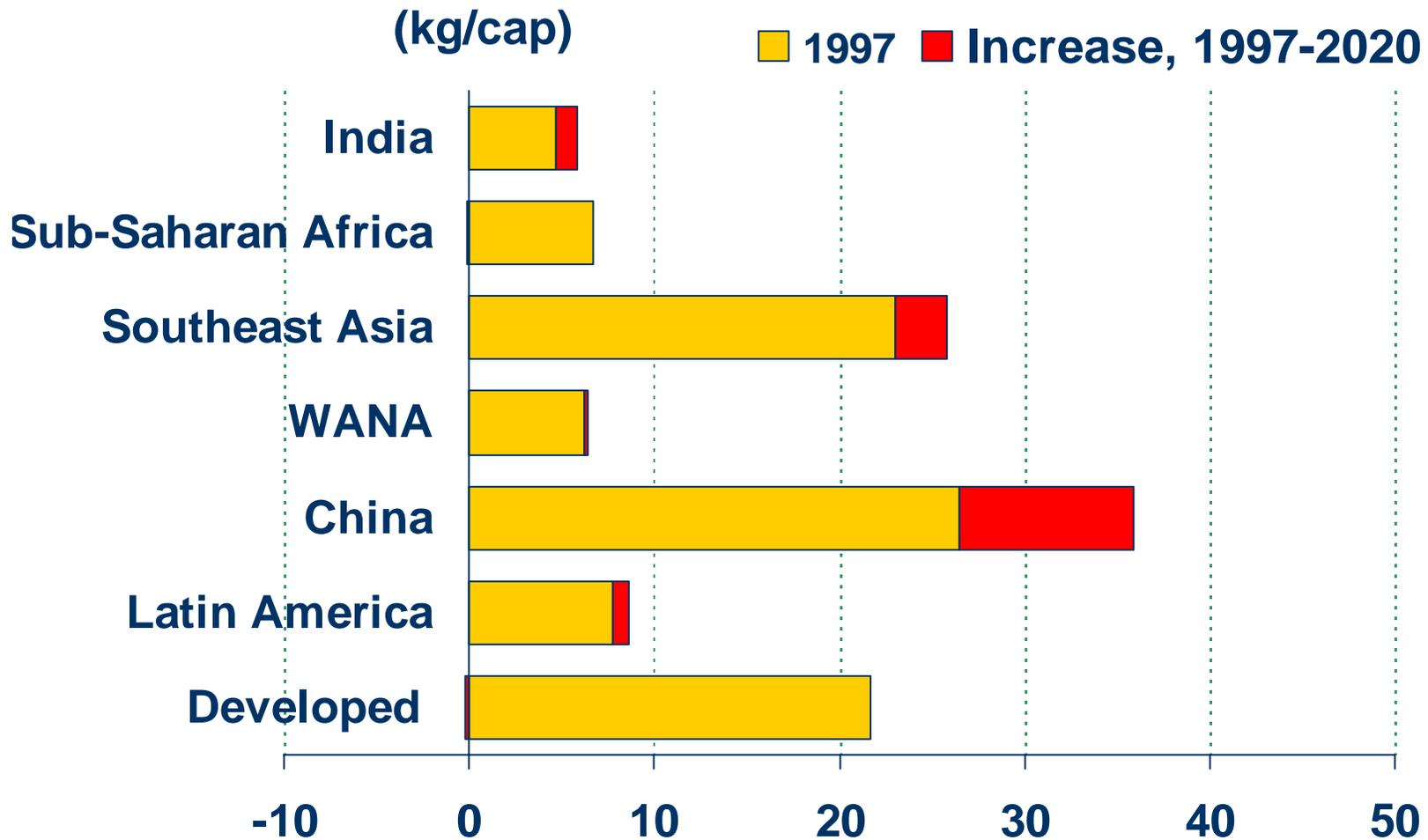
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- **Baseline (best estimate)**
- **Faster Aquaculture Expansion (more investment)**
- **Slower Aquaculture Expansion (less investment)**
- **Ecological Collapse (very pessimistic)**

Baseline Projections

Per Capita Demand for Fish Products, 1997-2020, Baseline Scenario

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Global per capita Food Consumption, Baseline Scenario

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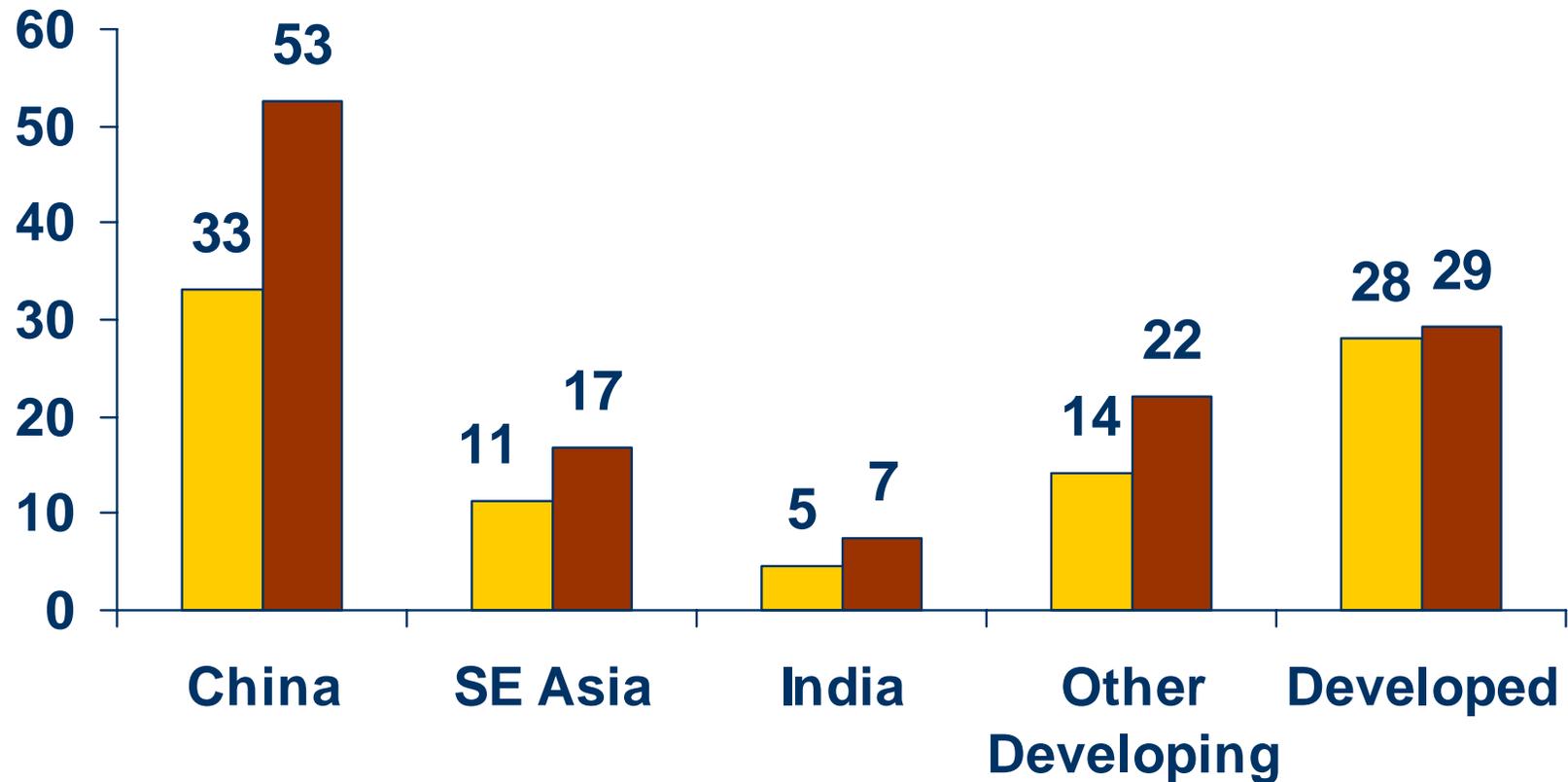
| | 1997 | 2020 |
|------------------------|----------------|-------------|
| | (kg/person/yr) | |
| Low value food fish | 7.5 | 8.2 |
| High value finfish | 4.5 | 4.2 |
| Mollusks | 2.6 | 3.2 |
| Crustaceans | 1.2 | 1.4 |
| Total food fish | 15.8 | 17.1 |

Food Fish Demand, 1997 and Projected 2020, Baseline Scenario

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(million mt)

1997 2020



Share of World Fish Production (%), Baseline Scenario

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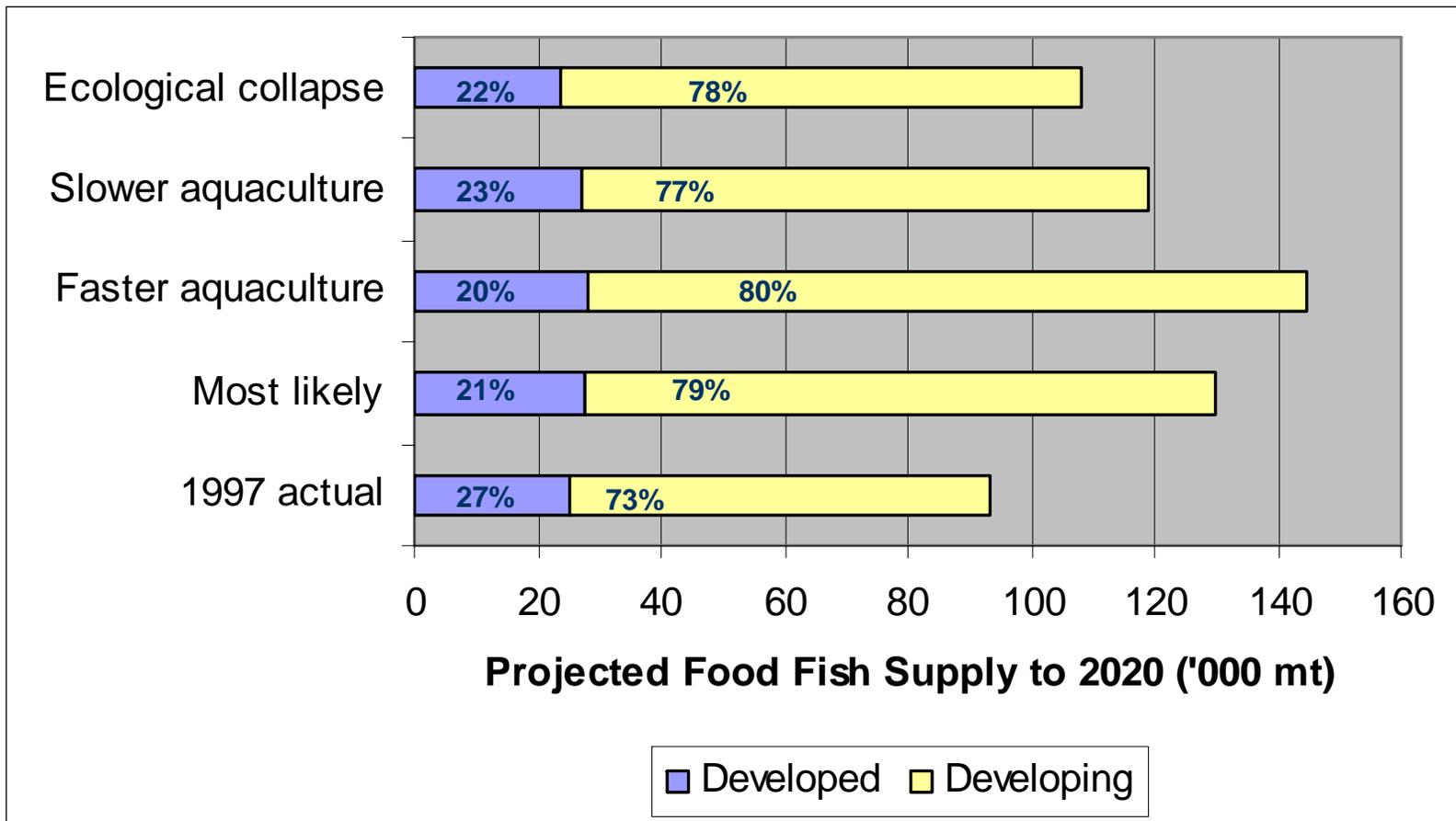
| | 1973 | 1997 | 2020 |
|-------------------------|-----------|-----------|-----------|
| China | 10 | 36 | 41 |
| Other Developing | 33 | 37 | 38 |
| Japan | 17 | 6 | 4 |
| EU 15 | 13 | 6 | 5 |
| All Developed | 56 | 27 | 21 |

Share of World Fish Production (%)

All Scenarios

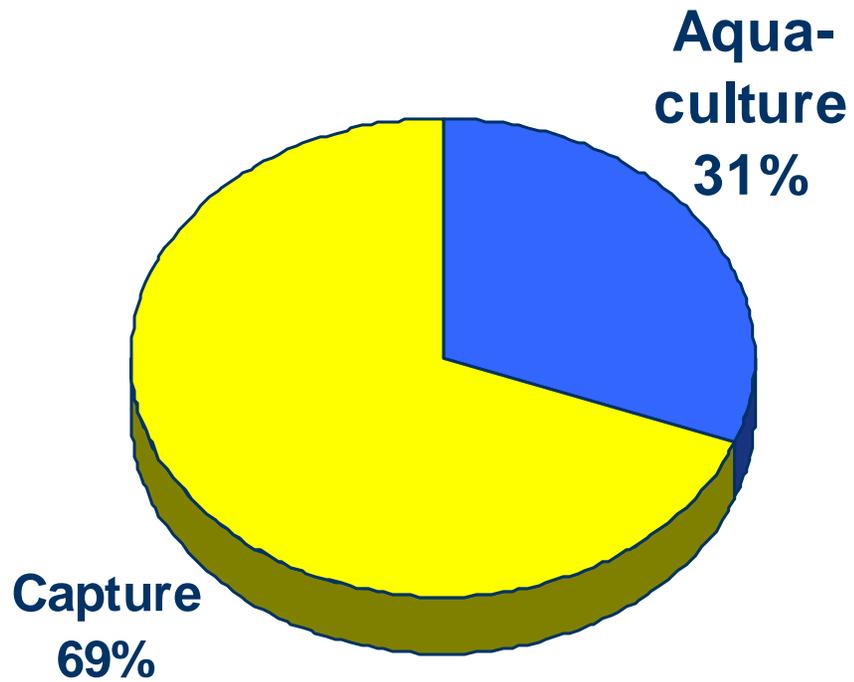
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Developing Countries continue to Dominate Production

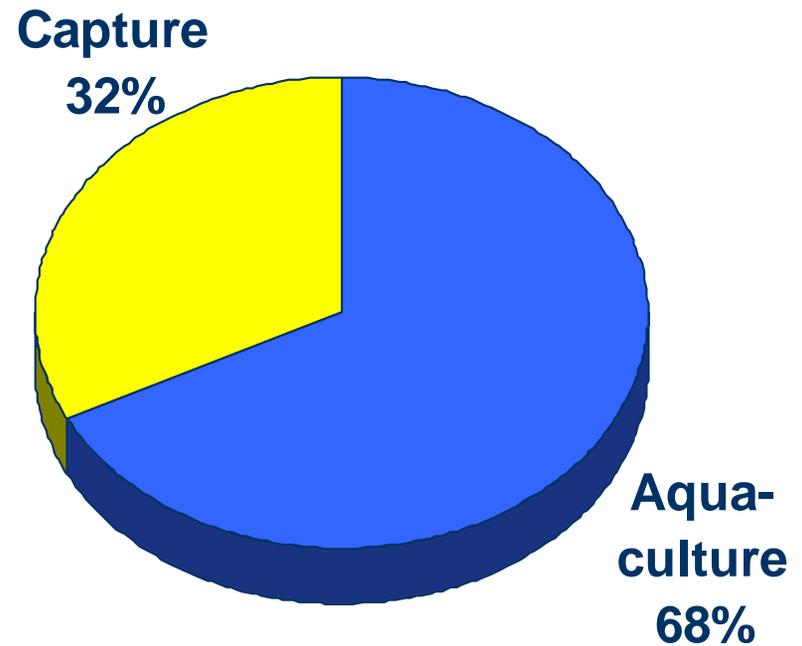


Share of Aquaculture in Fish Production, 1997 and Increase from 1997-2020, Baseline Scenario

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Fish production 1997

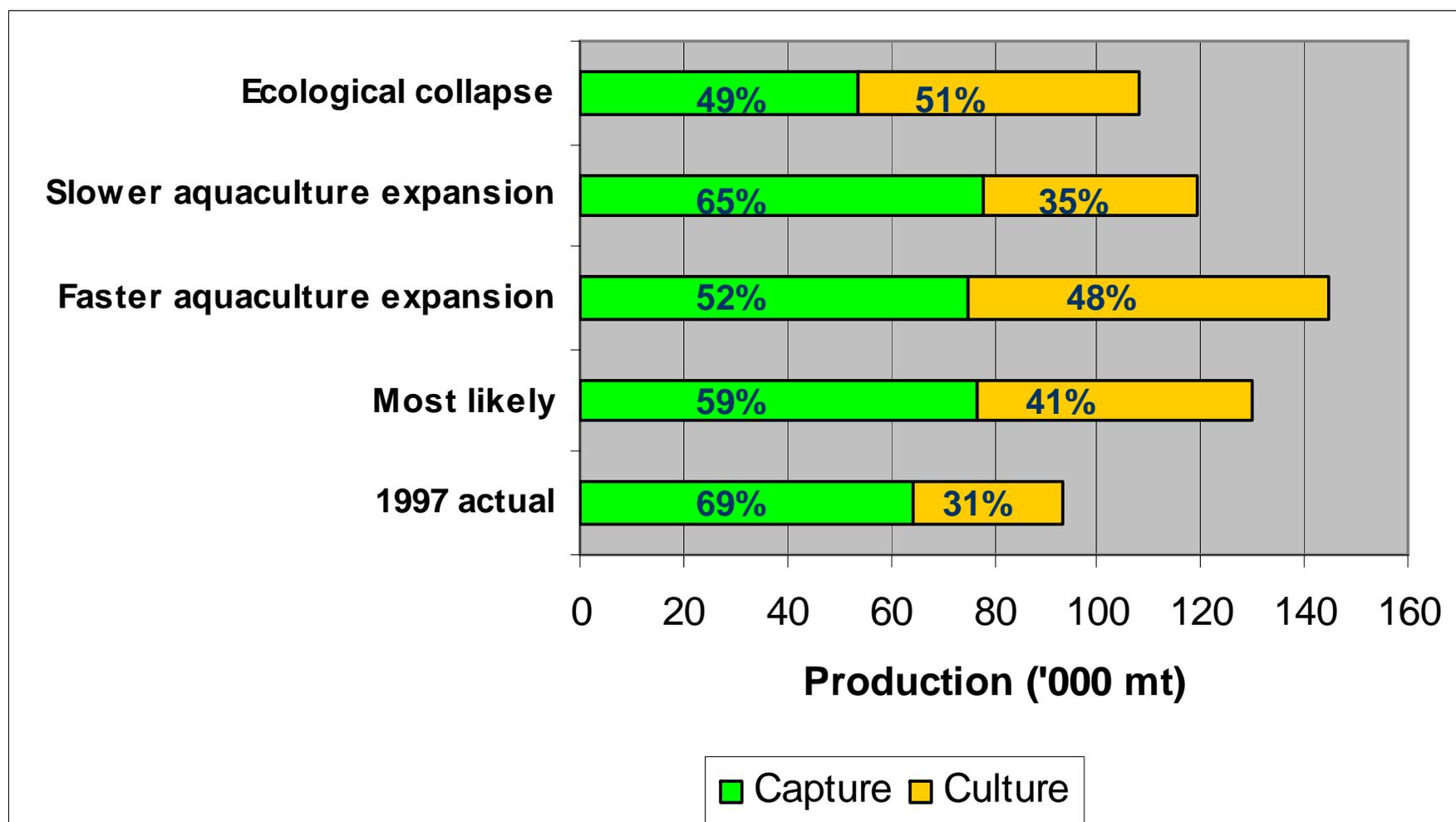


Increase in fish production, 1997-2020

Share of Aquaculture in Fish Production (All Scenarios)

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Growing Share of Aquaculture to Total Production



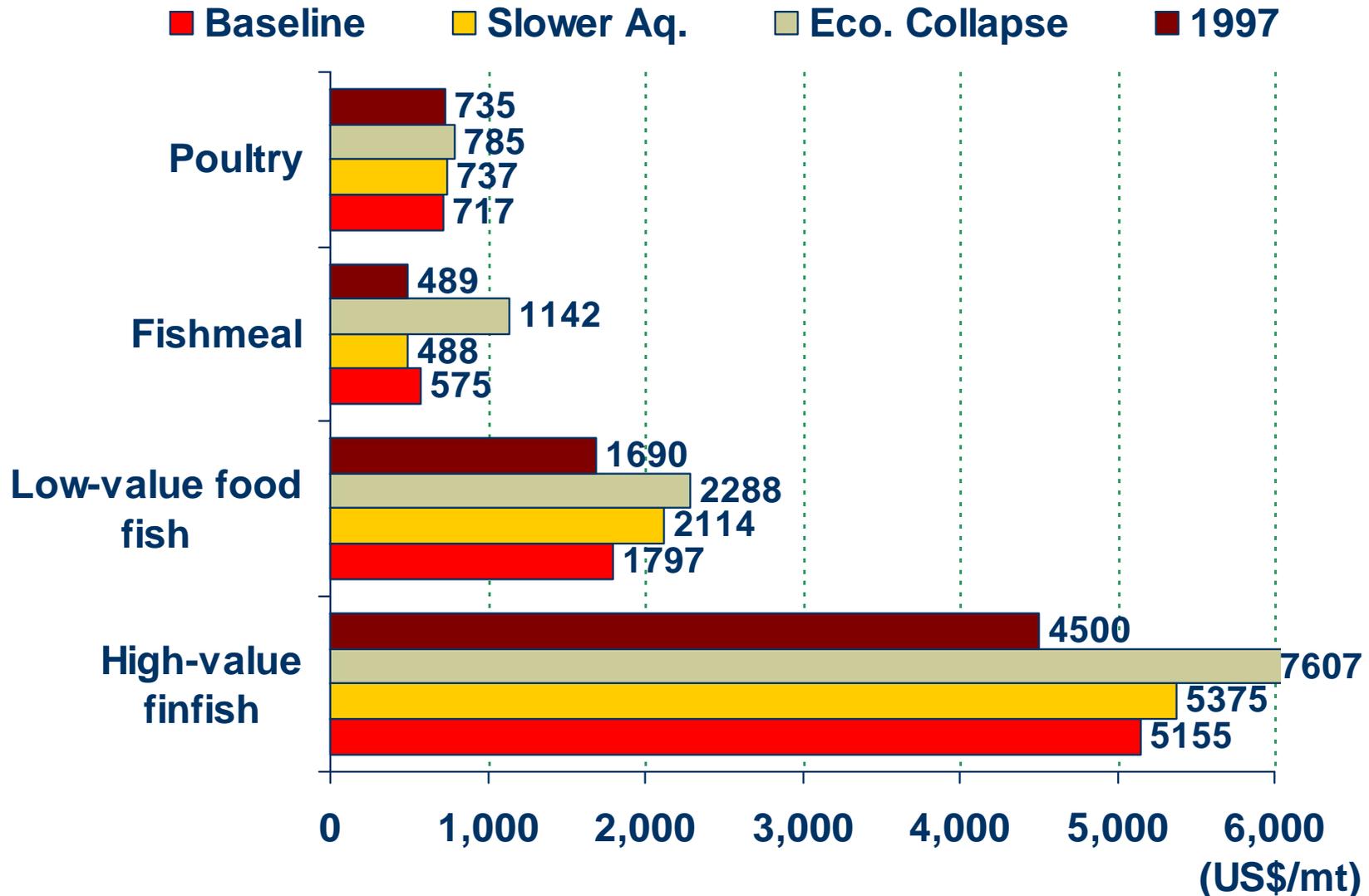
Net Exports of Fish Products (live weight, mmt), Baseline Scenario

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| | 1997 | 2020 |
|------------------|-------|-------|
| China | 0.18 | 0.54 |
| SE Asia | 1.13 | 0.48 |
| India | 0.12 | 0.43 |
| Latin America | 2.44 | 3.05 |
| Other developing | 0.18 | -1.69 |
| Developed | -4.05 | -2.81 |

International Fish and Meat Prices, 1997 and Projected 2020, Baseline Scenario

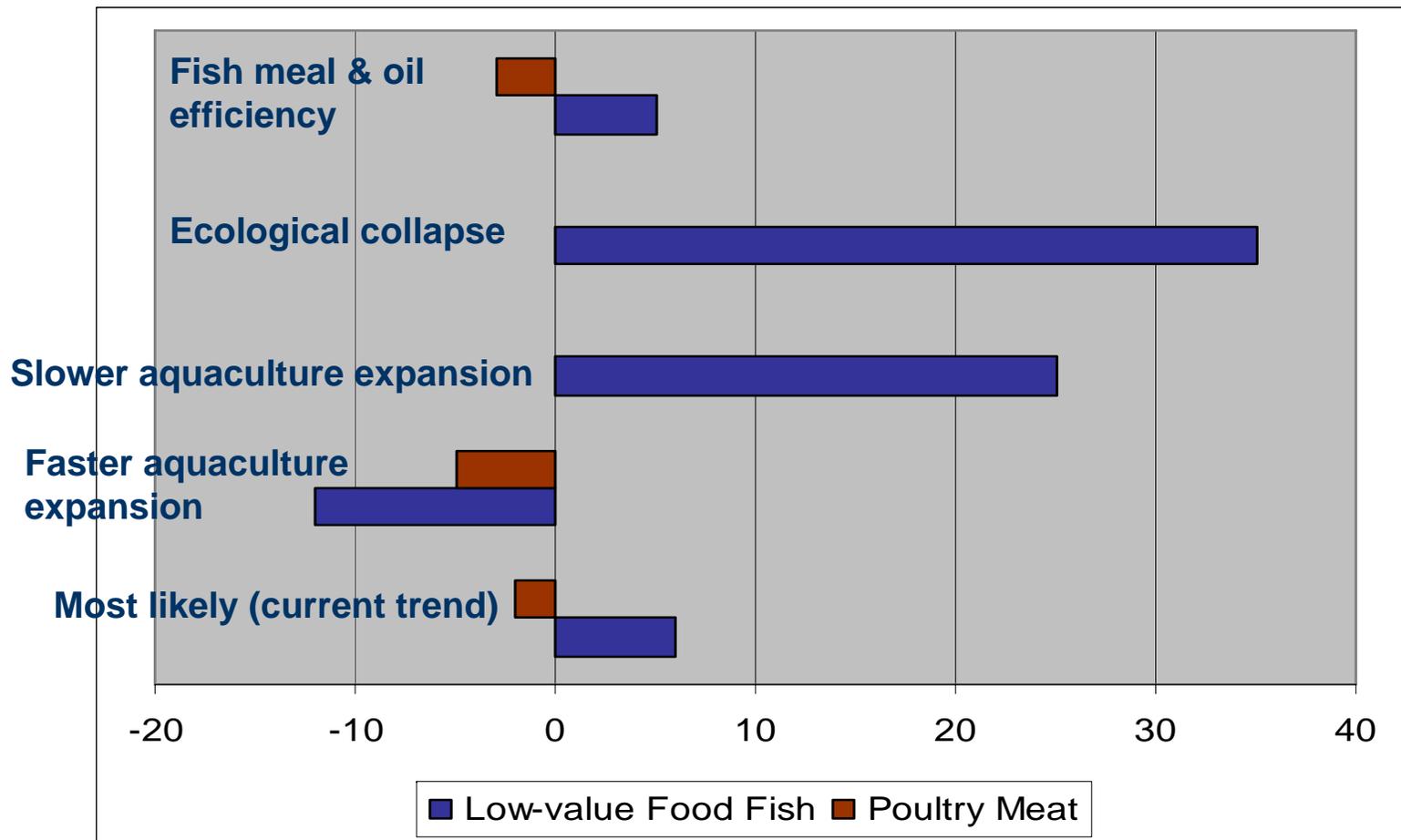
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Fish Prices Under All Scenarios

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Poor to Feel the Pinch of Rising Fish Prices



Main Issues Raised by the Projection Results

Where will Supply Come From?

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- **Capture still accounted for over 2/3 of world food fish in late 1990s**
- **But 2/3 of the projected 40% growth in global food fish production to 2020 will be farmed**
- **The big growth in aquaculture is projected to be in Asia**

The Future of Prices

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- **Fish are the only food commodities projected to increase in (real) price**
- **High-value finfish and crustacean real prices will increase by 15% through 2020; low-value fish prices will rise by 6%**
- **Increased food security risks**
- **Fishmeal & oil prices projected to rise by 18%, and will be more volatile in future**

Prices and Scenarios

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- **Only scenario that lowers price of low-value food fish is higher levels of aquaculture investment**
- **Ecological collapse in capture fisheries results in very large price increases**

Outlook for Trade

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- **Developing countries will remain net importers of low-value fish, exporters of high-value fish**
- **Fisheries trade is likely to be increasingly South-South**
- **More rapid aquaculture growth results in higher net exports from South-North**
- **Pessimistic scenarios lead to lower South-North exports**

China is a Major Player (for sure)

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- **Concerns have been raised about the accuracy of capture data for China**
- **Building the “Pessimistic” view into the model only reduces world consumption by 1 kg/cap in 2020, mostly within China itself, due to price adjustments elsewhere**
- **Discounting Chinese data (incl. aquaculture) by 20% does not significantly alter the trend conclusions of this policy exercise**

Conclusions

Increasing Pressure on Capture Fisheries

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- **Demand pressures will push prices higher, which will further increase environmental pressure**
- **Literature suggests that community-based coastal management will be critical in developing countries**
- **These higher prices will also push aquaculture development forward...**

Investment in Aquaculture is Key

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- Higher investment in aquaculture raises per capita food fish consumption by almost 2 kg per person in 2020
- Investment in aquaculture is the best way to increase access of the poor to fish (the only scenario with a decline in price of low-value food fish)
- Targeting aquaculture investment to non-carnivorous species will be most effective from a food security standpoint

Implications for the Poor

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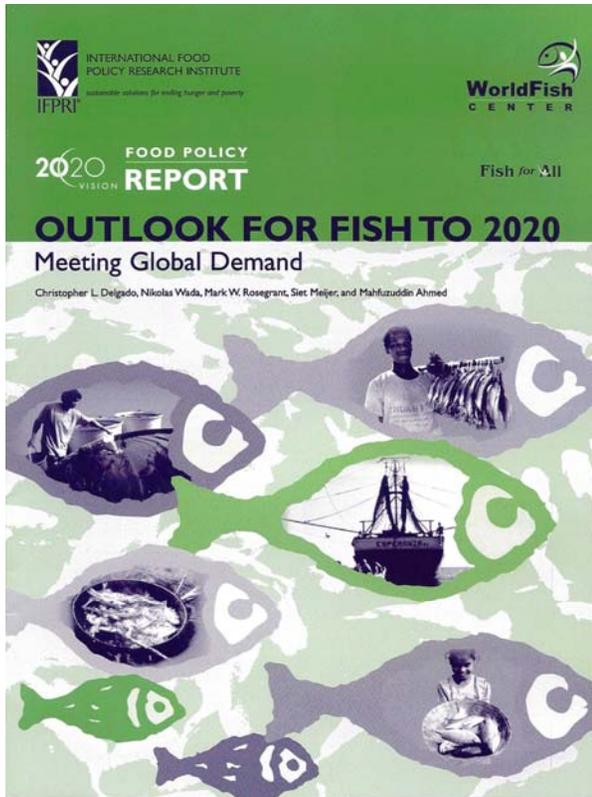
- **Poor may substitute away from fish toward meat, with negative nutritional outcomes**
- **Intensification and scaling-up of aquaculture production risks exclusion of poor smallholders**
- **But appropriate aquaculture development would spur economic activity, improve incomes**

Opportunities and Challenges

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- **Need to find the right mix of policy and institutional support to improve governance and access to resources and information**
- **Not clear whether private sector incentives exist to expand sustainable technologies for small-scale, non-carnivorous aquaculture (scope for policy exists here)**
- **Tremendous opportunities exist... as well as tremendous risks for the environment and poor consumers/producers of fish**

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Thank You!

