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The global picture - world aquaculture

Taken from FAO: The State of World Fisheries and Aquaculture 2012 (230 pages)

<http://www.fao.org/docrep/016/i2727e/i2727e.pdf>

Global production

- In 2010, global production of farmed food fish was 59.9 million tonnes (mt), (an all time high) up by 7.5% from 55.7 mt in 2009 (32.4 mt in 2000), with an estimated total value of US\$ 119 billion. This figure excludes aquatic plants and non-food products), with an estimated total value of US\$ 119 billion. When farmed aquatic plants and non-food products are included, world aquaculture production in 2010 was 79 mt, worth US\$ 125 billion.
- One-third of the world's farmed food fish harvested in 2010 was achieved without the use of feed, through the production of bivalves and filter-feeding carps.
- Farmed food fish include finfishes, crustaceans, molluscs, amphibians (frogs), aquatic reptiles (except crocodiles) and other aquatic animals (such as sea cucumbers, sea urchins, sea squirts and jellyfishes), which are indicated as fish throughout this document. The reported grow-out production from aquaculture is almost entirely destined for human consumption.
- The total farmgate value of food fish production from aquaculture is estimated at US\$ 119.4 billion for 2010.
- The global population is increasing and, in order to maintain at least the current level of per-capita consumption of aquatic foods, the world will require an additional 23 million tonnes thereof by 2020. This additional supply will have to come from aquaculture.
- Meeting the future demand for food from aquaculture will largely depend on the availability of quality feeds in the requisite quantities. Although the discussion on the availability and use of aquafeed ingredients often focuses on fishmeal and fish-oil resources (including low-value fish)...the sustainability of the aquaculture sector will probably be closely linked with the sustained supply of terrestrial animal and plant proteins, oils and carbohydrates for aquafeeds.

Key messages/facts (taken from 2010 report)

- In the last three decades (1980–2010), world food fish production of aquaculture has expanded by almost 12 times, at an average annual rate of 8.8%. Global aquaculture production has continued to grow, albeit more slowly than in the 1980s and 1990s. Aquaculture enjoyed high average annual growth rates of 10.8% and 9.5% in the 1980s and 1990s, respectively, but has since slowed to an annual average of 6.3%.
- World aquaculture production attained another all-time high in 2010, at around 60 mt (52.5 mt) (excluding aquatic plants and non-food products), with an estimated total value of US\$ 119 billion. When farmed aquatic plants and non-food products are included, world aquaculture production in 2010 was 79 mt, worth US\$ 125 billion. About 600 aquatic species are raised in captivity in about 190 countries for production in farming

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systems of varying input intensities and technological sophistication. These include hatcheries producing seeds for stocking to the wild, particularly in inland waters.

- In 2010, global production of farmed food fish (including finfishes, crustaceans, molluscs, amphibians (frogs), aquatic reptiles (except crocodiles) and other aquatic animals (such as sea cucumbers, sea urchins, sea squirts and jellyfishes), was 59.9 mt, up by 7.5% from **55.7 mt** in 2009 (52.5 in 2008, 32.4 in 2000).
- Freshwater fishes dominate global aquaculture production (56.4%, 33.7 mt), followed by molluscs (23.6%, 14.2 mt), crustaceans (9.6%, 5.7 mt), diadromous fishes (6.0%, 3.6 mt), marine fishes (3.1%, 1.8 mt) and other aquatic animals (1.4%, 814,300 t).
- The growth rate in farmed food fish production from 1980 to 2010 far outpaced that for the world population (1.5%), resulting in average annual per capita consumption of farmed fish rising by almost seven times, from 1.1 kg in 1980 to 8.7 kg in 2010, at an average rate of 7.1%.
- The total farmgate value of food fish production from aquaculture is estimated at US\$ 119.4 billion for 2010.
- While feed is generally perceived to be a major constraint to aquaculture development, one-third of all farmed food fish production (**20 mt**) is currently achieved without artificial feeding, as is the case for bivalves and filter-feeding carps. However, the percentage of non-fed species in world production has declined gradually from more than 50% in 1980 to the present level of 33.3%, reflecting the relatively faster body-growth rates achieved in the culture of fed species and increasing consumer demand for higher trophic-level species of fishes and crustaceans.
- In the last five years, the number of people engaged in fish farming has increased by 5.5 percent per year compared with only 0.8 percent per year for those in capture fisheries, although capture fisheries still accounted for 70 percent of the combined total in 2010.
- It is apparent that, in the most important fishing nations, the share of employment in capture fisheries is stagnating or decreasing while aquaculture is providing increased opportunities.
- Overall, production per person is lower in capture fisheries than in aquaculture, with global outputs of 2.3 and 3.6 t per person per year respectively, reflecting the huge numbers of fishers engaged in small-scale fisheries

Global distribution

- The global distribution of aquaculture production across the regions and countries of different economic development levels remains imbalanced. In 2010, the top ten producing countries accounted for 87.6% by quantity and 81.9% by value of the world's farmed food fish.
- Asia accounted for 89% of world aquaculture production by volume in 2010, and this was dominated by the contribution of China, which accounted for more than 60% of global aquaculture production volume in 2010.
- Other major producers in Asia are India, Viet Nam, Indonesia, Bangladesh, Thailand, Myanmar, the Philippines and Japan.
- In Asia, the share of freshwater aquaculture has been gradually increasing, up to 65.6% in 2010 from around 60% in the 1990s. In terms of volume, Asian aquaculture is dominated by finfishes (64.6%), followed by molluscs (24.2%), crustaceans (9.7%) and miscellaneous species (1.5%). The share of non-fed species farmed in Asia was 35% (18.6 mt) in 2010 compared with 50% in 1980.
- In North America, aquaculture has ceased expanding in recent years, but in South America it has shown strong and continuous growth, particularly in Brazil and Peru. In terms of volume, aquaculture in North and South America is dominated by finfishes

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(57.9%), crustaceans (21.7%) and molluscs (20.4%). Bivalve production fluctuated between 14 and 21% of total aquaculture production in the 1990s and 2000s, after dropping rapidly in the 1980s from 48.5%.

- In Europe, the share of production from brackish and marine waters increased from 55.6% in 1990 to 81.5% in 2010, driven by marine cage culture of Atlantic salmon and other species. Several important producers in Europe have recently ceased expanding or have even contracted, particularly in the marine bivalve sector. In 2010, finfishes accounted for three-quarters of all European aquaculture production, and molluscs one-quarter. The share of bivalves in total production decreased continuously from 61% in 1980 to 26.2% in 2010.
- Africa has increased its contribution to global production from 1.2% to 2.2% in the past ten years, albeit from a very low base. The share of freshwater aquaculture in the region fell from 55.2% to 21.8% in the 1990s, largely reflecting the strong growth in brackish-water culture in Egypt, but it recovered in the 2000s, reaching 39.5% in 2010 as a result of rapid development in freshwater fish farming in sub-Saharan Africa, most notably in Nigeria, Uganda, Zambia, Ghana and Kenya. African aquaculture production is overwhelmingly dominated by finfishes (99.3% by volume), with only a small fraction from marine shrimps (0.5%) and marine molluscs (0.2%). In spite of some limited successes, the potential for bivalve production in marine waters remains almost completely unexplored.
- Oceania is of relatively marginal importance in global aquaculture production. Production from this region consists mainly of marine molluscs (63.5%) and finfishes (31.9%), while crustaceans (3.7%, mostly marine shrimps) and other species (0.9%) constitute less than 5% of its total production. Marine bivalves accounted for about 95% of the total produced in the first half of 1980s but, reflecting the development of the finfish culture sector (especially Atlantic salmon in Australia and chinook salmon in New Zealand), they currently account for less than 65% of the region's total production. Freshwater aquaculture accounts for less than 5% of the region's production.
- The least-developed countries (LDCs), mostly in sub-Saharan Africa and in Asia, remain minor in terms of their share of world aquaculture production (4.1% by quantity and 3.6% by value) with the main producers including Bangladesh, Myanmar, Uganda, the Lao People's Democratic Republic and Cambodia.
- However, some developing countries in Asia and the Pacific (Myanmar and Papua New Guinea), sub-Saharan Africa (Nigeria, Uganda, Kenya, Zambia and Ghana) and South America (Ecuador, Peru and Brazil) have made rapid progress to become significant or major aquaculture producers in their regions. In contrast, in 2010, developed industrialized countries produced collectively 6.9% (4.1 mt) by quantity and 14% (US\$ 16.6 billion) by value of the world's farmed food fish production, compared with 21.9% and 32.4%, respectively, in 1990.

Aquaculture growth

- Aquaculture production has contracted or stagnated in Japan, the United States of America and several European countries. An exception is Norway, where, thanks to the farming of Atlantic salmon in marine cages, aquaculture production grew from 15,000 t in 1990 to more than one million t in 2010.
- Freshwater fishes dominate global aquaculture production (56.4%, 33.7 mt), followed by molluscs (23.6%, 14.2 mt), crustaceans (9.6%, 5.7 mt), diadromous fishes (6.0%, 3.6 mt), marine fishes (3.1 percent, 1.8 million tonnes) and other aquatic animals (1.4%, 814 300 t).

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- While feed is generally perceived to be a major constraint to aquaculture development, one-third of all farmed food fish production (20 mt) is currently achieved without artificial feeding, as is the case for bivalves and filter-feeding carps. However, the percentage of non-fed species in world production has declined gradually from more than 50% in 1980 to the present level of 33.3%, reflecting the relatively faster body-growth rates achieved in the culture of fed species and increasing consumer demand for higher trophic-level species of fishes and crustaceans.

Livelihoods

- Fisheries and aquaculture provided livelihoods and income for an estimated 54.8 million people engaged in the primary sector of fish production in 2010, of whom an estimated 7 million were occasional fishers and fish farmers.
- Asia accounts for more than 87% of the world total with China alone having almost 14 million people (26% of the world total) engaged as fishers and fish farmers. Asia is followed by Africa (more than 7%), and Latin America and the Caribbean (3.6%).
- About 16.6 million people (about 30% of the world total) were engaged in fish farming, and they were even more concentrated in Asia (97%), followed by Latin America and the Caribbean (1.5%), and Africa (about 1%).
- Employment in the fisheries and aquaculture primary sector has continued to grow faster than employment in agriculture, so that by 2010 it represented 4.2% of the 1.3 billion people economically active in the broad agriculture sector worldwide, compared with 2.7% in 1990.
- In the last five years, the number of people engaged in fish farming has increased by 5.5% per year compared with only 0.8% per year for those in capture fisheries, although capture fisheries still accounted for 70% of the combined total in 2010. It is apparent that, in the most important fishing nations, the share of employment in capture fisheries is stagnating or decreasing while aquaculture is providing increased opportunities.
- Europe experienced the largest decrease in the number of people engaged in capture fishing, with a 2% average annual decline between 2000 and 2010, and almost no increase in people employed in fish farming.
- In contrast, Africa showed the highest annual increase (5.9%) in the number of people engaged in fish farming in the same period, followed by Asia (4.8%), and Latin America and the Caribbean (2.6%). Overall, production per person is lower in capture fisheries than in aquaculture, with global outputs of 2.3 and 3.6 tonnes per person per year respectively, reflecting the huge numbers of fishers engaged in small-scale fisheries.

Production by culture environment

- Aquaculture production uses freshwater, brackish water and full-strength marine water as culture media. Data available at FAO show that, in terms of quantity, the percentage of production from freshwater rose from less than 50% before the 1980s to almost 62% in 2010, with the share of marine aquaculture production declining from more than 40% to just above 30%.
- In 2010, freshwater aquaculture was the source of 58.1% of global production by value. Brackish water aquaculture yielded only 7.9% of world production in terms of quantity but accounted for 12.% of total value because of the relatively high-valued marine shrimps cultured in brackish-water ponds. Marine water aquaculture accounted for about 29.2% of world aquaculture production by value.
- The average annual growth rate for freshwater aquaculture production from 2000 to 2010 was 7.2%, compared with 4.4% for marine aquaculture production.

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- Freshwater fish farming has been a relatively easy entry point for practising aquaculture in developing countries, particularly for small-scale producers. As such, freshwater aquaculture is expected to contribute further to total aquaculture production in the 2010s.
- The share of brackish-water aquaculture production has been stable, ranging between 6 and 8%, for most of the time. An exception was in the 1980s and early 1990s when accelerated development of brackish-water culture of marine shrimp species, particularly in coastal regions of Asia and South America, led to brackish-water aquaculture reaching 8–10% of total production. However, in the period 1994– 2000, world marine shrimp farming was hit by disease outbreaks in Asia and South America, and the share of brackish-water production fell to 6%.

Taken from: OECD – FAO Agricultural Outlook: Chapter on Fish Projections 2012 – 2021.

<http://www.oecd.org/newsroom/agricultureincreasedproductivityandamoresustainablefoodsystemwillimproveglobalfoodsecurityoecdandfaopublishnewagriculturaloutlook.htm>

Growth in fisheries and aquaculture sector

- Stimulated by higher demand for fish, world fisheries and aquaculture production is projected to reach about 172 mt in 2021, a growth of 15% above the average level for 2009–11. The increase should be mainly driven by aquaculture, which is projected to reach about 79 mt, rising by 33% over the period 2012–2021 compared with the 3% growth of capture fisheries.

Slowing in aquaculture growth

- However, a slowing in aquaculture growth is anticipated, from an average annual rate of 5.8% in the last decade to 2.4% during the period under review. This decline will be mainly caused by water constraints, limited availability of optimal production locations and the rising costs of fishmeal, fish oil and other feeds. Notwithstanding the slower growth rate, aquaculture will remain one of the fastest growing animal food-producing sectors.
- Products derived from aquaculture will contribute to an increasing share of global fishery production, growing from 40% on average in 2009–2011 to 46% in 2021.
- Aquaculture production is expected to continue to expand on all continents, with variations across countries and regions in terms of the product range of species and product forms. Asian countries will continue to dominate world aquaculture production, with a share of 89% in 2021, with China alone representing 6% of total production.

Fishmeal use

- The portion of capture fisheries used to produce fishmeal will be about 17% by 2021, declining by 6% compared with the 2009–2011 average owing to the growing demand for fish for human consumption.
- In 2021, fishmeal production should be 15% higher compared with the 2009–2011 average, but almost 87% of the increase will derive from improved use of fish waste, cuttings and trimmings.
- Growing income and urbanization will entail an increasing consumption of fish in fillets or prepared and preserved forms, thus creating more residual production to be used in fishmeal manufacturing. Fishmeal produced from fish waste should represent 43% of world fishmeal production in 2021 (36% in 2010).

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