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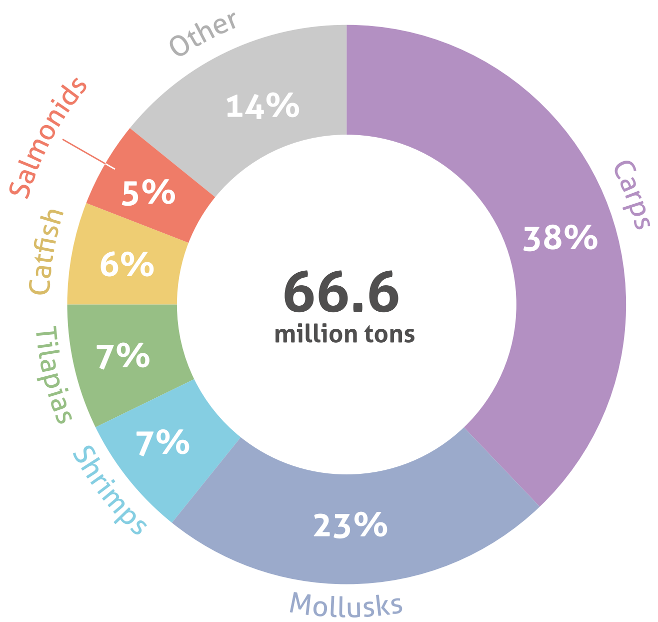
BACKGROUND BRIEF

Aquaculture

Aquaculture has been the world's fastest-growing food production system for decades, and is now providing more fish than wild capture fisheries for human consumption. While critical to meet future demand for protein, such growth comes with environmental challenges. The industry needs to continue to improve practices and foster innovations if aquaculture is to become truly sustainable, helping increase resilience across the global food system.

Overview

Aquaculture refers to the farming of aquatic organisms such as fish, crustaceans, molluscs and plants. The last few decades have seen a dramatic increase in production to keep up with the growing demand for seafood, and in response to stagnating wild fish supply[1]. Since 1970, aquaculture production grew at an average annual rate of 8.4% worldwide[2]. This substantially exceeds the growth rate of any other food production system, including poultry, beef, pork, dairy or cereal crops[3]. Although growth has slowed down in recent years – and is expected to continue doing so – aquaculture is still among the fastest-growing animal production sectors.



Aquaculture production by species group (million tons, harvested weight, 2012). Adapted from Waite et al. 2014 [10].

Production volumes and trends

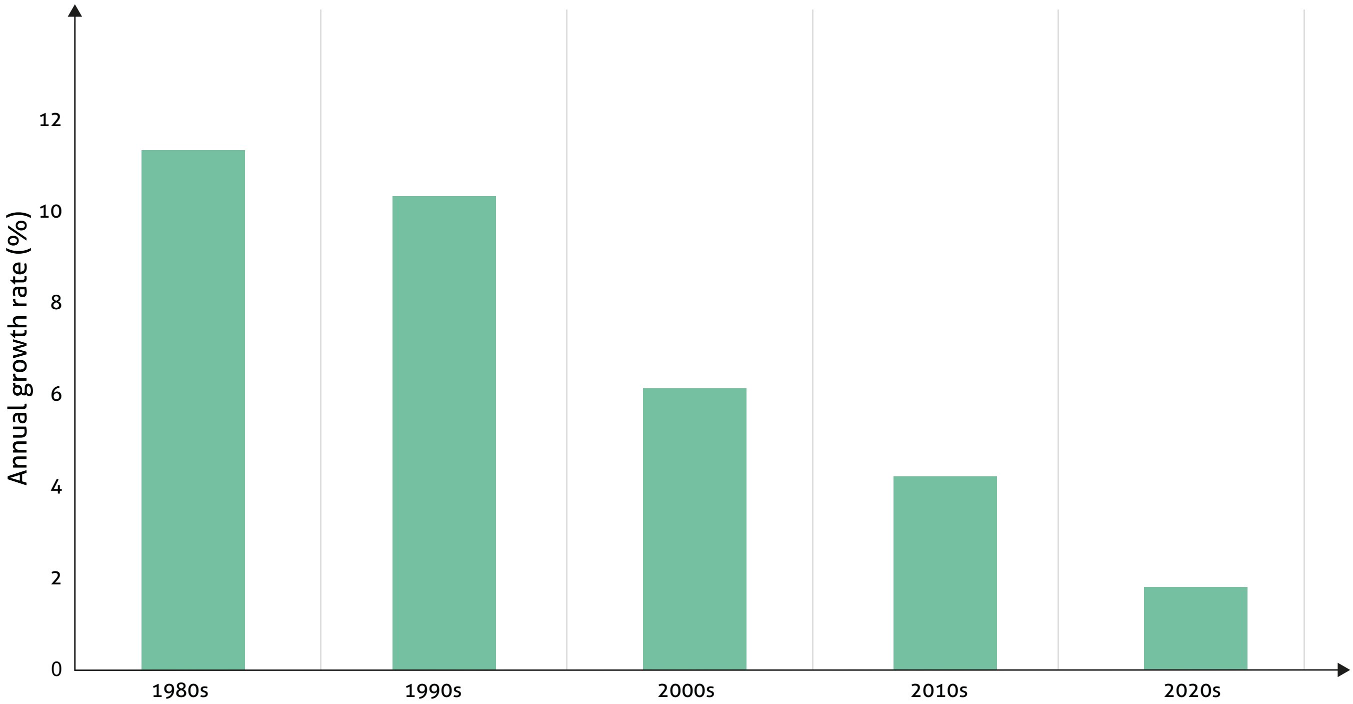
Total animal aquaculture production reached 74 million tonnes in 2014, with an estimated value of US$160 billion. Aquaculture's contribution to the supply of fish* for human consumption recently exceeded that of wild capture. However, most marine fish consumed still come from capture fisheries, as only 8.5% of marine aquaculture production is finfish[1]. Although freshwater species such as carp and tilapia represent the largest production volumes, salmon farming is much more valuable, and is a major driver of expansion in offshore environments.

China alone accounts for more than 60% of global aquaculture production volume. Along with other South East Asian countries, it is expected to maintain this leadership position[4]. Increasing production in South America and North Africa indicates that additional opportunities exist. However, general resource scarcity (e.g. suitable land and fresh water), along with compounding impacts from climate change, might limit the potential to further expand aquaculture in some regions.

Environmental challenges

Like most other animal production systems, aquaculture can result in environmental impacts, including nutrient and chemical pollution, species introduction, spread of diseases, habitat alteration and overuse of antibiotics. Feed conversion ratios (the amount of protein needed to produce a certain amount of farmed fish) have improved substantially in recent years. These ratios are now relatively effective compared to those used for other land-based animals (beef, pork and poultry). However, the need for higher-quality protein for growth – in salmon for instance, compared with plant-eating species – is still a challenge.

* Includes finfish, crustaceans and molluscs (but not seaweeds).



Decreasing growth rate of aquaculture over time. OECD and FAO Secretariats.

The widespread use of antibiotics in animal farming globally poses a serious concern for human health and the environment[5]. The production of aquaculture species still remains a cause of concern in relation to antibiotics use, but important segments of the industry have recently improved their practices, and now offer a source of animal protein with relatively limited use of antibiotics[6].

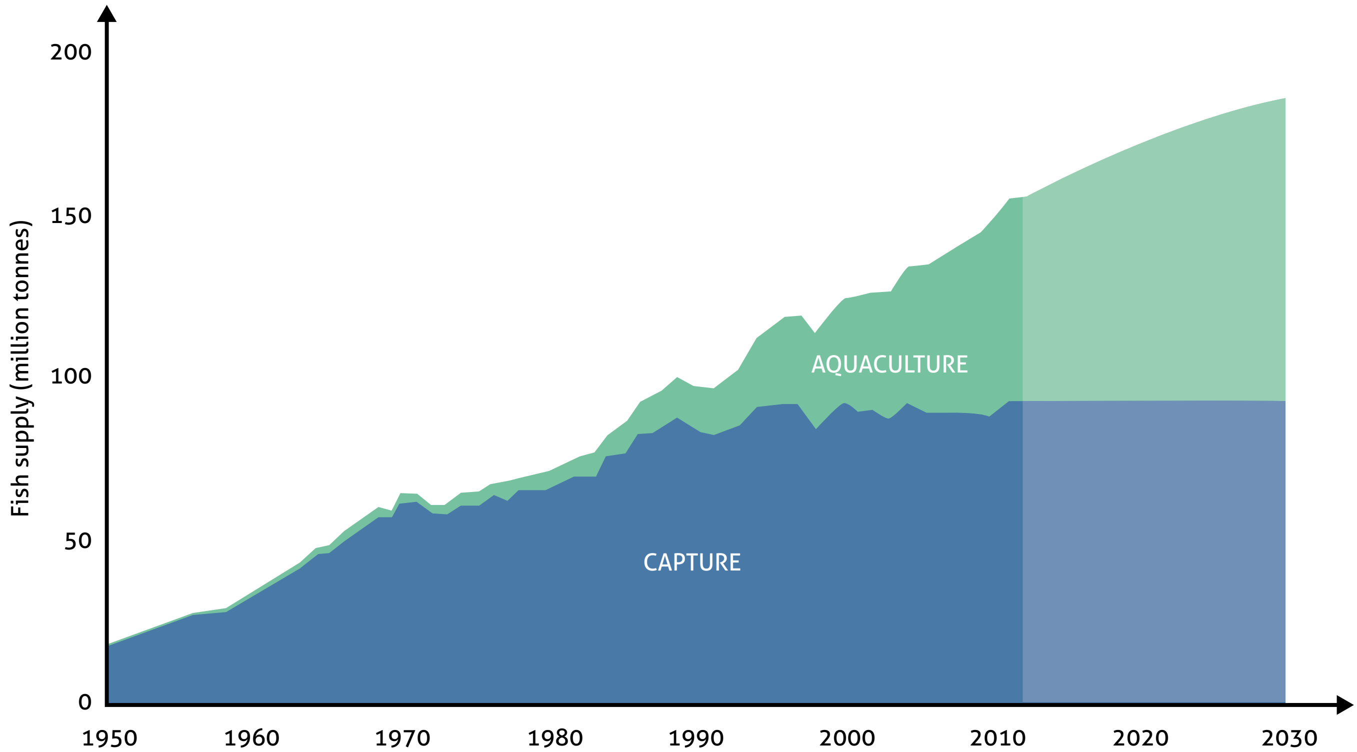
Feed for thought

Arguably, feed remains the main bottleneck for further expansion of aquaculture. Energy, protein and lipids in aquafeeds are currently derived from wild fisheries, crops, and a range of processing by-products, including from livestock, wild capture fisheries and aquaculture itself.

Dependency on marine protein, primarily small pelagic fish for fishmeal and fish oil, is still challenging for the industry. It will continue to be so even if by-products from fish processing plants are used more and more[4]. Using wild-caught fish as feed increases costs and pressure on marine ecosystems. It also raises ethical concerns, as such resources represent a primary protein source for many people in the developing world[7].

A significant share of aquaculture production still relies on fertiliser inputs and farm-made feeds to enhance fish growth, particularly in developing countries. These patterns are expected to change in the future as demand for high-value aquaculture products that rely on commercial aquafeeds continues to grow.

Giant freshwater prawn (*Macrobrachium rosenbergii*) farmed in India. Photo: Max Troell/Azote



Global fish supply: 1950–2030. FishStat and IMPACT model projections. Modified from Kobayashi *et al.* 2015 [11].

Future perspectives

Increasing dependence on terrestrial crops (such as soybean) as a key ingredient in aquaculture feeds raises concerns from an environmental perspective due to deforestation, nutrient pollution and water consumption issues associated with such crops. This is also a problem for human health, as feeds derived from terrestrial crops result in lower nutritional values in the final product[8].

Aquaculture standards, certification schemes and sustainable initiatives to reduce negative impacts are developing rapidly[9], attracting substantial investments for innovation. Prominent examples where the industry plays a key role include the Global Salmon Initiative (GSI) and the Aquaculture Stewardship Council (ASC). Still a relatively new industry, aquaculture has the potential to mature into one of the most sustainable food production systems on the planet.

Fish farms in Chile. Photo: Rene Lorenz/Getty images

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A Stockholm Resilience Centre event supported by Forum for the Future and the Soneva Foundation. Funded by the Walton Family Foundation and the David and Lucile Packard Foundation.

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Acknowledgements: The authors acknowledge long-term support from the *Global Economic Dynamics and the Biosphere Program*, funded by the Erling Persson Family Foundation, the *Nereus – predicting the future oceans* program, funded by the Nippon Foundation, the Baltic Ecosystem Adaptive Management Program, the Beijer Institute of the Royal Swedish Academy of Sciences, the *GRAID* program, funded by the Swedish International Development Agency (SIDA), and Mistra, providing a core grant to the Stockholm Resilience Centre

Graphics and layout: Jerker Lokrantz/Azote

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