

The Global Protein Challenge

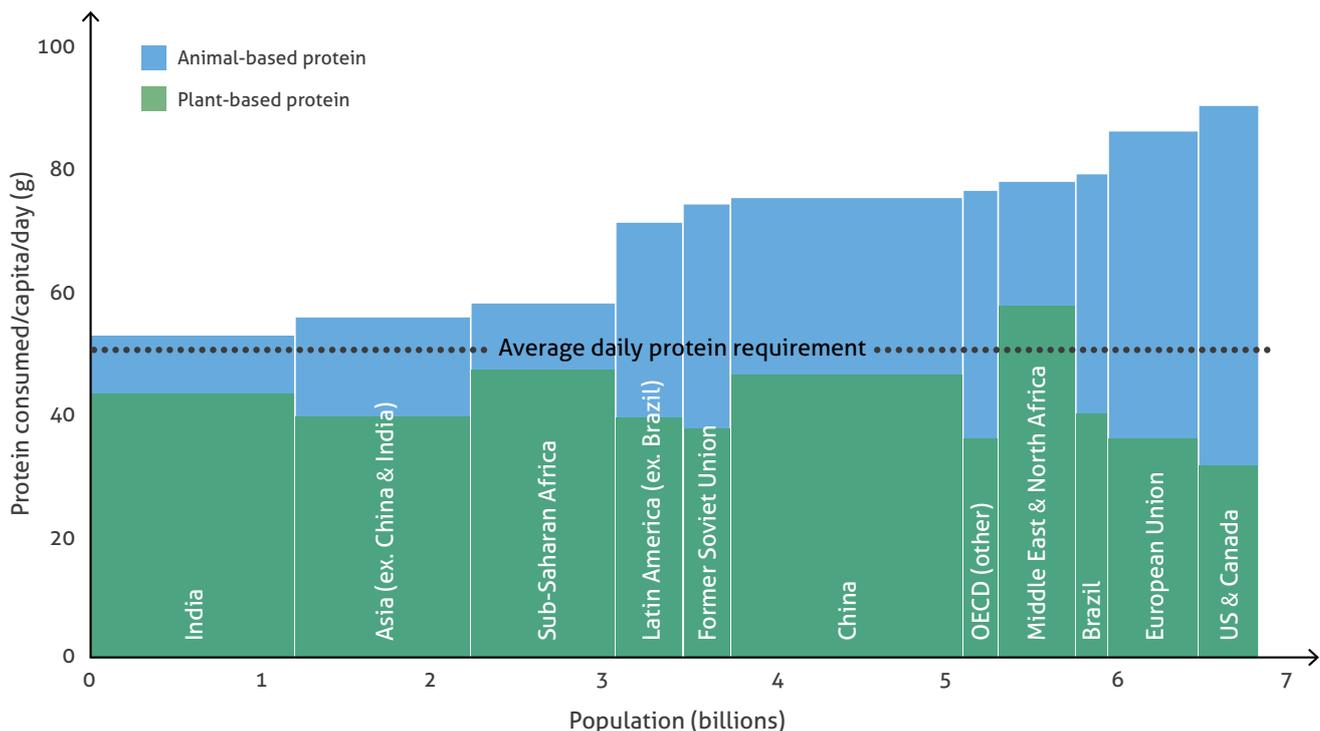
Policy-makers today are focused on increasing the amount of food the world will need by 2050. But the single most important element in that drive for increased production is protein: how are we to provide enough sustainably-derived protein for 9 billion people by 2050? Both wild capture fisheries and aquaculture have the potential to contribute substantially to the protein challenge, and to make a major contribution to nutritious, balanced diets.

Overview

Protein goes to the heart of the food security debate. Meeting the demand for protein, within environmental limits, is one of the biggest challenges for the global food system in the 21st century. Demand for protein, in all its forms, is expected to grow significantly as an increasingly affluent global population reaches over 9 billion by 2050. At the same time, supply will be constrained in the face of increased pressure on scarce resources, land and water, and the impacts of climate change. These trends clearly illustrate the need for an increase in the production of sustainable marine protein.

Why protein security rather than food security?

Protein is critical to human health. An estimated 795 million people, almost exclusively in developing countries, were suffering from chronic undernourishment in 2014¹. At the same time, more than 2 billion people are overweight or obese² and overall consumption exceeds nutritional need in many developing countries. In emerging economies, demand for animal protein is growing rapidly due to urbanisation and rising incomes. Overall protein consumption is predicted to nearly double by 2050, with marine-based proteins gaining a growing market share.



Protein consumption exceeds average estimated daily requirements in all the world's regions, especially in the wealthy ones. Width of bars is proportional to each region's population. Adapted from Ranganathan *et al.* 2016 [8].



Fresh caught fish at Confradia de Pescadores de Luarca, Confederation of Luarca Fishermen, at Puerto Luarca in Asturias, Spain. Photo: Tim Graham/Getty Images

Over-consumption of meat-based protein

Global meat consumption is predicted to double by 2050³. Not only will the corresponding increase in production represent a major challenge in terms of negative impacts on soils, water, biodiversity and animal welfare, but it will also have a range of negative health impacts. Over-consumption of meat-based protein is linked to rising levels of global obesity and Type II diabetes, as well as cardiovascular diseases, which were the leading cause of death in 2012².

Businesses, governments and civil society are increasingly waking up to the implications of this projected increase in meat-based protein and associated risks. China's new national nutritional guidelines, for instance, recommended that their citizens should cut their meat-based protein consumption in half⁴. Additionally, companies are innovating products to

encourage greater consumption of alternative protein sources, including artificially cultured meat, microalgae, bacteria, mycoproteins and insects.

The Sustainable Development Goals

The principles underpinning the Sustainable Development Goals are among key mechanisms used by the global community to assess progress on food security outcomes over the next decade, including critical socio-economic factors. Some 400 million people depend directly on fish for their food security – exceeding 50% of the population in many least-developed countries. Approximately 56.6 million people were engaged in the primary sector of capture fisheries and aquaculture in 2014⁵. Small-scale fisheries provide work to 90% of the people employed in capture fisheries.

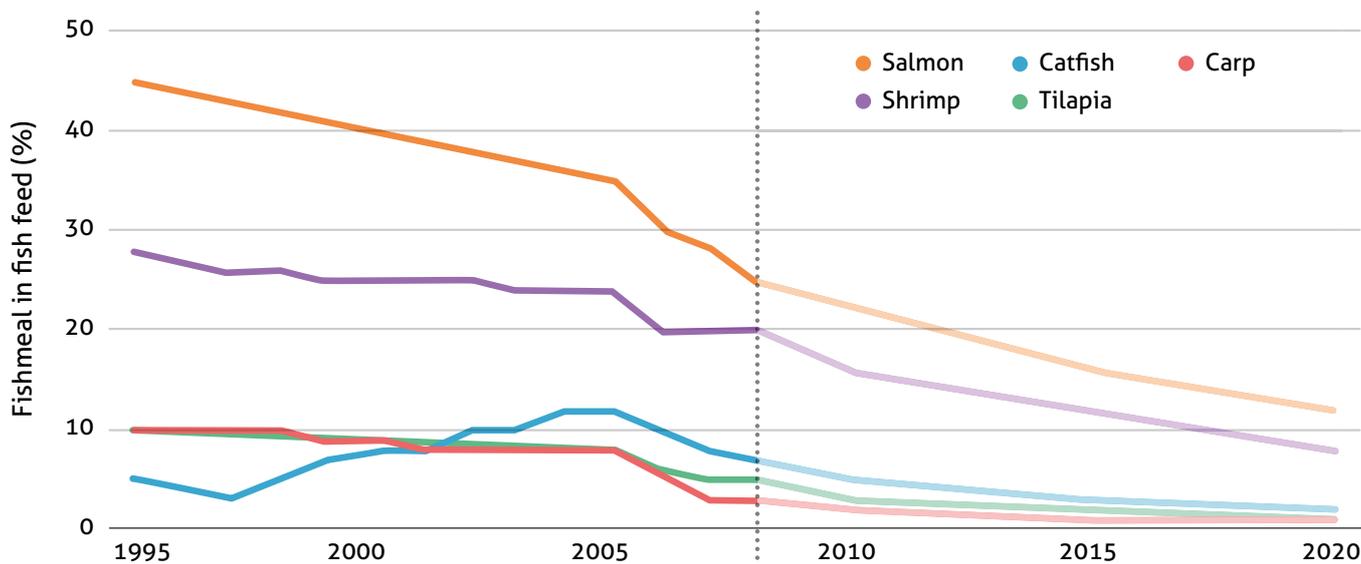
Marine-based proteins and food security

Marine-based proteins, if responsibly developed and managed, can make a significant contribution to global food security. Wild-caught and farmed fish, including shellfish and molluscs, contributed 17% of the global animal-based protein supply in 2013⁵.

Fish, molluscs, seaweed and other marine-based proteins are a vital, and sometimes the only, source of proteins in developing countries, where more than 75% of the world's fish consumption occurs⁵. These marine proteins are a key source of essential micronutrients (Vitamins A, B and D, and minerals including calcium, iodine, zinc, iron and selenium) and omega-3 fatty acids. In addition, they provide health benefits protecting against obesity and cardiovascular disease.



Four of the United Nations Sustainable Development Goals (SDGs) are directly relevant to marine protein production.



The aquaculture industry has substantially reduced the share of fishmeal used in feeds for farmed fish. Fishmeal use varies within and between countries; the figures presented here are global means. Data represent observations between 1995-2008, and projections for 2009-2020. Adapted from Waite *et al.* 2014 [6].

Addressing the challenge of sustainable feeds

The use of small pelagic fish in feeds raises important global conservation and equity issues. For instance, how to balance fishing for small pelagics versus conserving such species for the benefit of ecosystems (including seabirds and marine mammals), or how to prioritise between demands in the developed versus the developing world? These issues will increasingly take centre stage in the food security debate⁶.

Major progress has been made in reducing the use of wild-caught fish as feed, primarily by using soybean meal as an alternative. But soybean production systems are themselves a cause of substantial environmental concern, particularly in Brazil and Argentina. If soybean meal is used as the principal source of plant-based protein for the projected increases in aquaculture, the implications for ecosystems and for the nutritional content of farmed seafood will be very challenging.

For these reasons, there are fewer issues associated with aquaculture focusing on both species with low trophic levels (such as tilapia, carp and filter-feeding catfish), and on mussels and molluscs, which usually require no additional feed inputs. Half of the world's aquaculture production in 2014, including seaweeds, microalgae and filter-feeding animal species, was produced without feed inputs, which explains why aquatic plant farming (mainly protein-rich seaweeds) continues to grow rapidly.

Current state of play

Governments, businesses and civil society organisations are working to improve marine-based food security outcomes through a range of actions, including the strengthening of regulatory frameworks to reduce Illegal, Unreported and Unregulated (IUU) fishing and rebuild depleted fisheries (e.g. through tighter

quota setting), as well as the introduction of more sophisticated aquaculture zoning to minimise environmental risks.

There is also a lot being done to support small-scale aquaculture producers by providing adequate access to finance, increasing feed formulation knowledge, improving manufacturing capacity, and working to improve human rights outcomes. For instance, Thailand now provides additional resources to shrimp farmers that operate legally within aquaculture zones, including free training, water supply and special financing⁷.

Business-led innovation to increase the use of alternatives to animal-based protein, both for human consumption and as feed for the livestock and aquaculture industries, is also playing a much bigger role. Examples include algae-based protein for the food and feed industries, insect-based alternatives, bacteria that convert methane to microbial protein, and protein derived from blowfly maggots raised on food waste.

Continued research and funding to develop animal protein alternatives, and scale them for commercial markets, remain important. Globally-operating keystone actor companies could potentially collaborate to develop such innovation, pooling financial and technical resources for high-risk investments with possible high returns.

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