

Blue foods: The role of sustainable fishing in feeding a growing population

June 2023

Tackling over-fishing is a 'win-win': conserving our rich marine resources will enable more people to get the nutrients they need to live healthily, helping to improve livelihoods, safeguard marine ecosystems and reduce the environmental impacts of food production. This briefing gives an overview of the role of wild capture seafood in feeding a growing global population as part of the United Nations (UN) 'blue transformation' strategy.

Key messages

- With the global population set to reach more than eight billion by 2030, as well as the potentially catastrophic impacts of climate change, we are facing unprecedented pressure on the world's food production systems.
- Seafood is one of the most nutrient rich foods, packed with protein, vitamins and nutrients.
- Compared with other protein sources, aquatic foods are low carbon and have low environmental impacts.
- Fishing and seafood are also essential to national economies, providing livelihoods to 600 million people and global trade worth US\$151 billion.
- Over a third of fish stocks are currently fished at unsustainable levels - but when fisheries are managed sustainably, it's possible to catch more fish. Fishing sustainably could ensure more vital nutrients and employment for millions of people, helping to prevent serious and life-threatening health conditions and supporting national economies.
- New calculations show that if all global fisheries were managed sustainably, the resulting total seafood catch could prevent iron deficiencies in four million people, calcium deficiencies in 24 million people and provide enough omega-3 fatty acids to meet the daily requirements of 38 million people.
- Policy-makers must put the management of the ocean at the heart of national food strategies. They need to set enabling rules, to ensure that fishers who are managing the ocean sustainably are recognised, consulted and supported.
- Fisheries responsible for nearly 20% of the world's wild capture fisheries are certified or working towards the Marine Stewardship Council's (MSC) standard for sustainable fishing. This standard offers a framework for wild capture fisheries, governments and seafood companies to respond to growing demand for sustainable seafood.

The challenge: Feeding a growing population

With the world's population set to reach 10 billion by 2050, but with hundreds of millions of people already undernourished and food systems under strain, meeting our future food needs will be deeply challenging.

The global food system is a major driver of environmental change, emitting a quarter of all greenhouse gas emissions, occupying half of all ice-free land and responsible for three quarters of global consumptive water use and eutrophication^{1*}. Yet it fails to meet global nutritional needs, with 820 million people lacking sufficient food and a third of people globally overweight or obese².

The number of people who are chronically undernourished is rising, with one in nine people around the world suffering severe hunger³, a quarter suffering food insecurity⁴ and more than a third (almost 3.1 billion people) unable to afford a healthy diet⁵.

The ocean covers more than 70% of our planet and provides a major source of protein for over three billion people across the globe⁶, yet the role of food from the ocean in helping to feed our population, has been overlooked by governments, in favour of land-based solutions, such as starchy vegetables and red meat⁷.

The consequence of these policies is stark. According to the UN⁸, health risks caused by calorie-rich nutrient-poor foods has led to millions more early deaths. Over-consumption of red meat contributes to serious but preventable illnesses, such as heart disease – now a leading cause of death globally⁹.

A re-evaluation is underway, with the UN and leading scientists now urging governments to make aquatic foods central to their food policies¹⁰ and for good reason. According to the scientists behind [the Blue Food Assessment](#) – the work of over 100 professionals from 25 universities - aquatic foods are under-utilised even though they are some of the most nutrient-rich foods on earth. In June 2022, the UN Food and Agriculture Organisation (FAO) published its [blue transformation roadmap](#), a strategy to support policy makers, investors, producers, and businesses to meet growing demand for aquatic food while helping to achieve multiple Sustainable Development Goals.

The importance of blue foods

The contribution that fish and seafood make to the livelihoods of individuals and the economies of countries and regions is huge. Today around 600 million people depend on aquatic foods for their livelihoods¹¹.

Fish and seafood are among the most traded food commodities in the world with an annual international trade estimated to be worth US\$151 billion¹². Seafood also provides an important local source of affordable protein. More than a third of the world's population (3.3 billion people) depend on seafood for at least 20% of their protein intake¹³.

Scaling up production of sustainable food from oceans, rivers and lakes, known as 'blue foods', is therefore increasingly recognised as one of the most effective ways to feed a growing global population while supporting economic development and reducing the environmental impacts of food production.

Demand for aquatic foods is expected to double from 2015 levels by 2050¹⁴. While much of the growth in the production of blue foods will come from aquaculture, sustainable wild-capture fisheries also have an essential role to play.

“ There is now wide acceptance across governments that aquatic foods will play a fundamental role in feeding a growing population while reducing carbon emissions and pressure on land-based sources of food – but only if it is produced in a sustainable way. Emerging policies, investment and support for aquatic foods offer new opportunities for seafood businesses to transform the way they operate.

Professor Manuel Barange, Director of Aquaculture and Fisheries at the UN FAO

”

* Eutrophication is over-enrichment of water bodies, such as rivers and lakes, by nutrients resulting in depletion of dissolved oxygen.

Sustainable fishing and nutritious diets

Sustainably caught seafood is one of the most-nutrient rich foods, packed with protein, vitamins, and nutrients that are vital for health and development.

Nutrients, such as zinc, iron and vitamins A and B12, from seafood are better absorbed and utilised by the body than nutrients from vegetables and food supplements, helping to deliver more nutrients per pound¹⁵. Deficiencies in these nutrients have life-long impacts, causing serious health problems, reducing life expectancy and slowing economic growth in emerging economies¹⁶.

Fisheries that are managed sustainably are also more productive in the long-term¹⁷ and, by providing a more stable food source, they are ensuring seafood will be available for future generations.

Latest estimates suggest if all global fisheries were managed sustainably, 16 million tonnes more seafood could be harvested every year¹⁸. New analysis by the Marine Stewardship Council (see appendix) shows that this additional catch together with the 96 million tonnes of wild seafood catch currently projected for 2030 could deliver nutrients to help prevent some of the most serious and life-threatening health conditions caused by malnourishment.

The total increased catch could, for instance, reduce iron deficiencies in four million people and vitamin B12 deficiencies in 18 million people, helping to alleviate anaemia, a global public health problem that affects nearly half of young children under five and 40% of pregnant women globally¹⁹.

The higher volumes of catch could help eliminate zinc and calcium deficiencies in more than two and a half million and 24 million people respectively, while increasing vitamin A intakes for five million people. Deficiency in vitamin A alone is the leading cause of preventable blindness in children²⁰.

38 million people missing out on healthy levels of essential omega-3 fatty acids (DHA and EPA), which are mainly found in seafood, could also have their daily requirements met by an increase in sustainable fishing, helping to reduce deaths from heart disease and strokes.

**112 million tonnes
of wild seafood catch
could prevent:**

4 million
people from having iron deficiencies

18 million
people from having vitamin B12
deficiencies

2.5 million
people from having zinc deficiencies

24 million
people from having calcium
deficiencies

38 million
people from having omega-3 fatty
acids (DHA and EPA) deficiencies

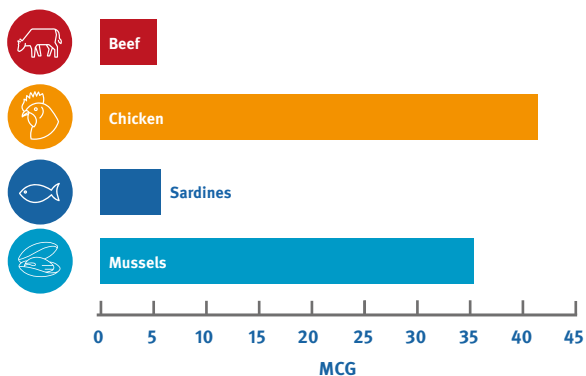
...and increase:
vitamin A intakes for

5 million

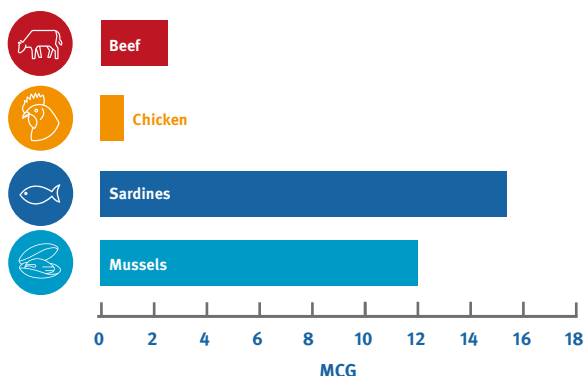


Figure 1: Nutrient content of mussels and sardines compared with chicken and beef

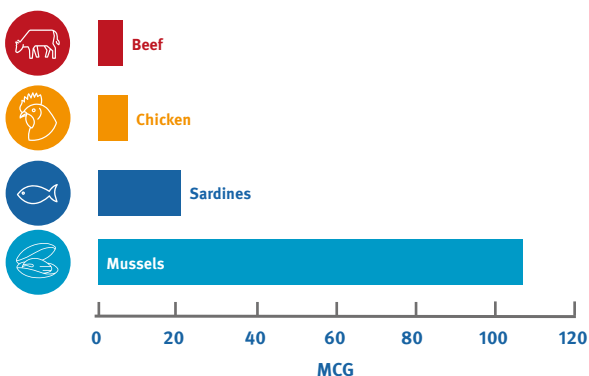
Vitamin A (micrograms per 100g serving)



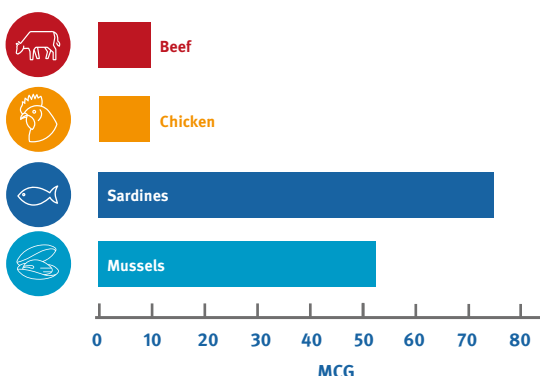
Vitamin B12 (micrograms per 100g serving)



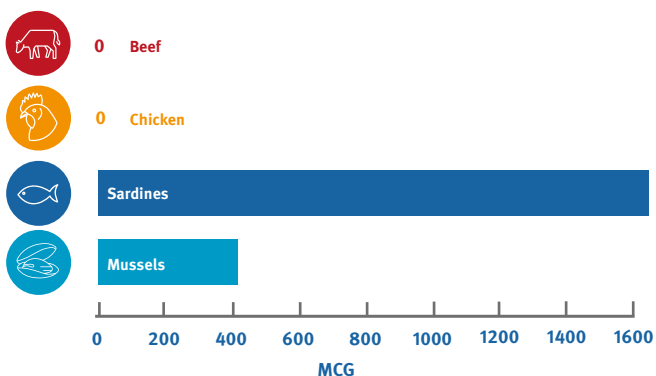
Iodine (micrograms per 100g serving)



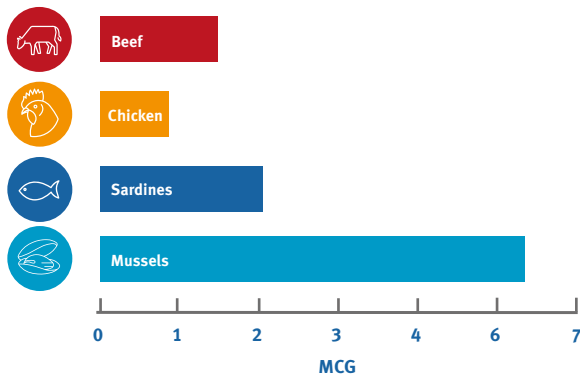
Calcium (micrograms per 100g serving)



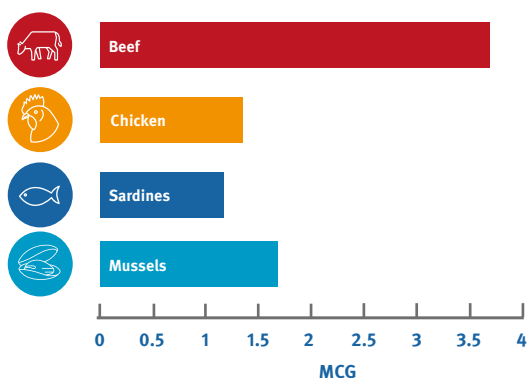
Omega-3 fatty acids (micrograms per 100g serving, EPA and DHA only)



Iron (micrograms per 100g serving)



Zinc (micrograms per 100g serving)



Source: Golden et al. Nature 2021; United Nations FAO presentation at Seafood Futures Forum 2023

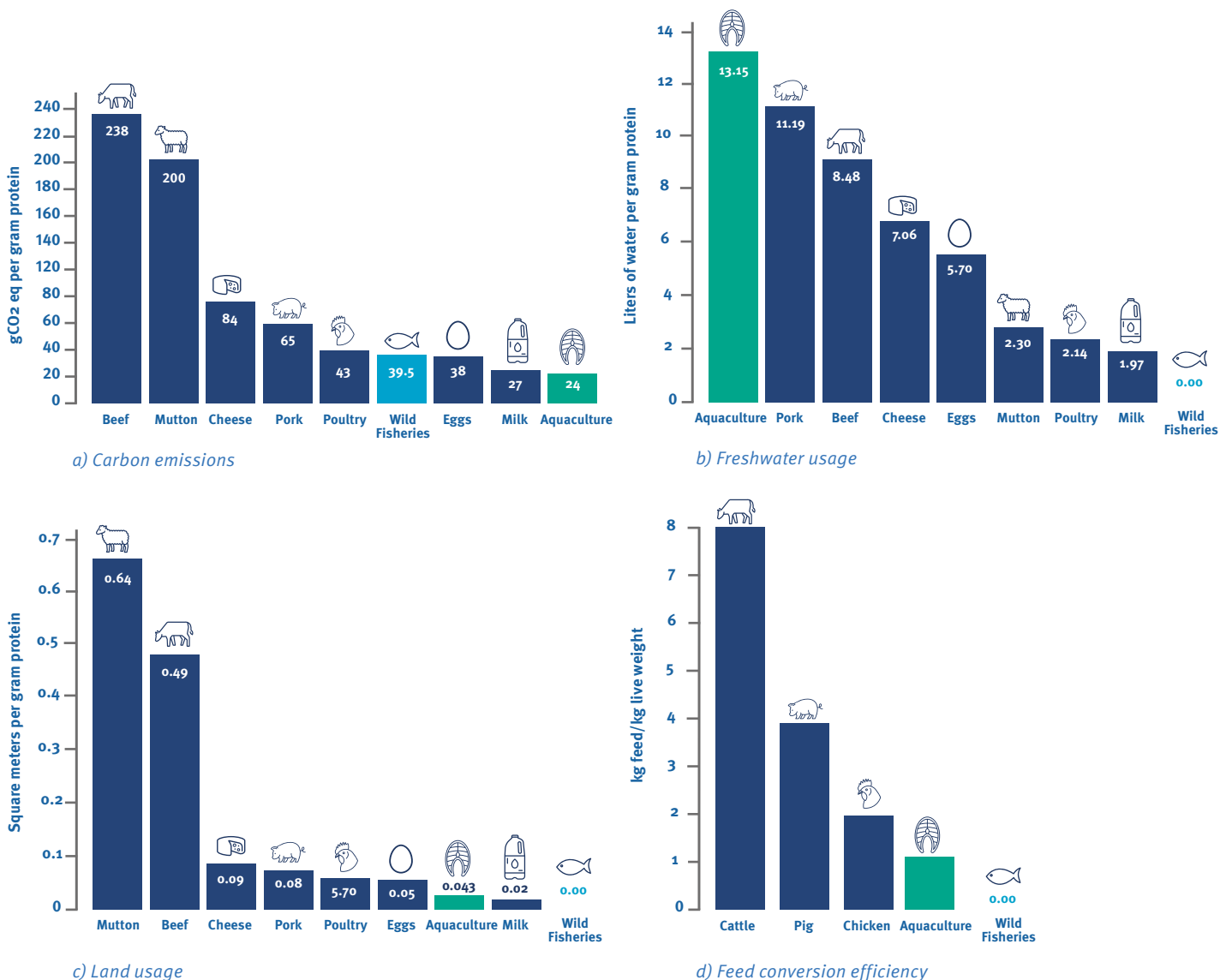
Environmental impacts of blue foods

Scientists working on the Blue Food Assessment found that the production of aquatic foods is generally less environmentally harmful than the production of most land-based animal foods. Seaweeds and bivalves, and wild caught small pelagic fish like sardines, mackerel and herring, have among the lowest impacts²¹. Wild capture seafood production requires no land, fresh water, fertilizers or feed²² (figure 2).

Overall carbon emissions from seafood are also significantly lower than from red meat production²³. Across wild-capture species, greenhouse gas emissions range from relatively low, such as for sardines and cod, to relatively high for flatfish and lobsters²⁴. Importantly, the wild capture of small pelagic species, bivalves and salmon, with the lowest carbon emissions, also provide the highest nutritional benefits²⁵.

For higher carbon wild capture fisheries, reducing fuel use by optimizing fishing gear and improving fisheries management represent the biggest opportunities for reducing carbon emissions²⁶.

Figure 2: Environmental performance of wild fisheries compared with other sources of protein



Sources: a), b) and c): Wild seafood has a lower carbon footprint than red meat, cheese, and chicken, according to latest data, Oceana. d): Fry et al, 2018: Feed conversion efficiency in aquaculture: do we measure it correctly? – IOP science, United Nations FAO presentation at Seafood Futures Forum 2023

Ending overfishing

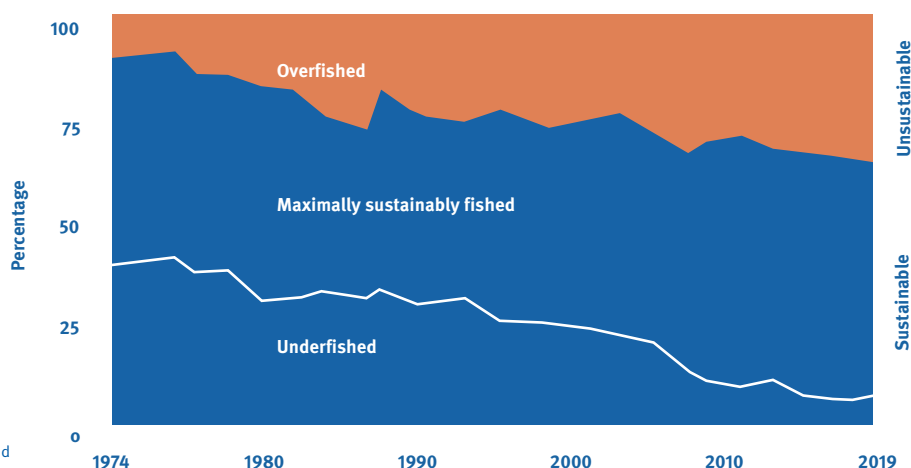
Significant strides towards sustainable fishing have been made in the last 25 years. Better management of our ocean resources is beginning to pay off. Many of the world’s largest commercial fish stocks have seen significant health improvements, with 82.5% of 2019 landings from biologically sustainable stocks, a 3.8% improvement from 2017.²⁷ The UN suggests that the recovery of 98% of currently overfished stocks is possible by the middle of the century if the appropriate governance were in place²⁸.

But the percentage of fish stocks that are overfished continues to increase – from around 10% in the 1970s to more than 35% today (figure 3)²⁹, with detrimental impacts on ocean ecosystems and fishing communities. Small-scale fisheries, often operated by a few individuals in small coastal villages, are bearing the brunt of these impacts and now urgently need support to become sustainable³⁰. Their vulnerability to shocks from food insecurity and the impact of climate change could threaten their ability to provide food and security for millions worldwide.

The collective impact of small-scale fisheries in delivering sustainable development is critical. Small-scale fisheries produce 37 million tonnes of nutrient-rich aquatic foods each year, roughly 40% of the global catch, while jobs in small-scale fisheries account for 90% total fisheries employment worldwide.³¹ Food caught by these fisheries is also more likely to be consumed locally, offering greater potential to domestic food strategies³².

But better sustainable fisheries management helps build resilience to these shocks. Fish stocks can recover and replenish if they are managed carefully³³.

Figure 3: Marine fisheries sustainability (global average for all stocks)



Source: UN FAO State of Fisheries and Aquaculture (SOFIA) Report 2022



Case Study:

The Philippine Tuna Handline Partnership

The [Philippine Tuna Handline Partnership](#) became the first fishers' organisation in the Philippines to achieve certification to the MSC's standard for sustainable fishing. It is made up of 500 artisanal fishing boats harvesting yellowfin tuna using traditional handline fishing gear along the Occidental Mindoro Straight and Gulf of Lagonoy. The Partnership includes around 2,000 fishers in one of the Philippines' most productive fishing areas.

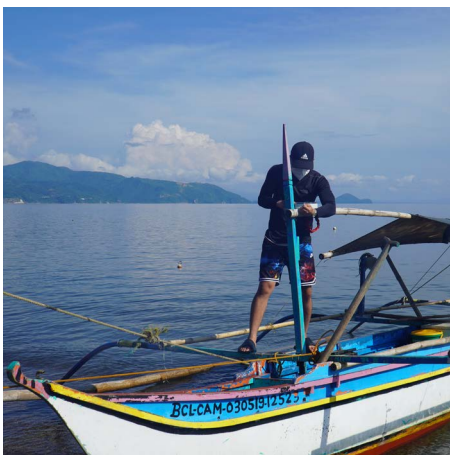
This is a microcosm of the threats facing small-scale fisheries globally. Within just a few decades of overfishing in the 1960s and 1970s, the fish stocks on which this artisanal fishery depended were close to collapse, putting at risk the health and livelihoods of the villagers who depended on it. It took coordinated support from organisations including the German Development Bank and WWF to help the fishery back to sustainability through a 10-year credible Fisheries Improvement Programme.

But the challenges are far from over. Despite 85% of Filipino fishers being registered as small-scale fishers, the Philippines Bureau of Fisheries estimates that 10 of the country's 13 major fishing grounds are overfished²⁴, while climate change is forcing tuna into deeper ocean waters making fishing trips longer, more dangerous and resulting in fewer catches.

In numbers:

500
artisanal fishing boats harvesting yellowfin tuna

2,000
fishers included in the partnership



Making sustainable fishing a global reality

Sustainable fishing is an attainable goal and one which is supported by the public. Independent consumer research also shows that alongside growing anxiety about the future of our ocean, there is greater than ever public demand for sustainably produced seafood³⁵.

Effective change to improve health and livelihoods around the world is only possible if policy makers put the management of ocean at the heart of their food strategies. They need to set enabling rules, to ensure that the fishers who are managing the ocean sustainably are recognised, consulted and supported.

The involvement of scientists, investors, fisheries, processors, retailers, brands, and conservationists will also be essential to delivering a systemic change in the way seafood is produced globally. Those who support sustainable seafood stand to benefit from growing public demand for sustainably produced seafood.

As the world's most recognised and credible certification program for sustainable wild capture fisheries, the MSC incentivizes and recognises sustainable fishing throughout the world.

- The [MSC Fisheries Standard](#) codifies the United Nations' guidelines for sustainable fishing, setting requirements on stock health, minimising impact on the wider ocean environment and excellent fishery management practices. Fisheries are independently assessed to verify that they meet these requirements, in order to be certified as sustainable, and their catch eligible for the MSC ecolabel. Stocks which are targeted by MSC certified fisheries score higher on key sustainability criteria including abundance of fish, than those which are targeted by non-certified fisheries³⁶.
- Market demand for sustainable seafood with the [blue MSC ecolabel](#) provides an economic incentive for fisheries and their stakeholders to improve their practices in order to access new markets where MSC certified seafood is in high demand, particularly those in Europe and North America.
- Where improvement is needed, the MSC's [in-transition program](#) provides a framework for measurable, independently verified improvements together with [fisheries improvement tools](#), training and funding through its [Ocean Stewardship Fund](#). Together, these tools are supporting fisheries on their journey to MSC certification, with a particular focus on increasing access to certification for small-scale fisheries and those in developing countries.
- The MSC also provides [guidance to financial institutions](#) in identifying and investing in sustainable fishing companies.

More than 650 fisheries, representing around 19% of global wild seafood catch, are certified or in assessment to the MSC Fisheries Standard. So far, more than 5,000 supply chain partners have gained certification to sell and trade MSC certified seafood, supplying consumers with sustainable seafood with the MSC ecolabel worth more than US\$12 billion in 2022/23. Fisheries involved in the MSC's programme have also undertaken thousands of improvements to their practices, to ensure they remain world-leaders in sustainable fishing.

With so much to be gained from fishing in a way which ensures the future health of our planet, marine life, seafood supplies and communities, the MSC has set an ambitious target for fisheries responsible for a third of wild seafood to be engaged in its programme by 2030. To help achieve this target, the MSC is calling on governments to do more to support wild fisheries in the blue transformation.

“ If more global fisheries are managed sustainably, we will provide even more of the nutrition needed to feed a growing population. But this requires urgent action. Consumers, fishers and businesses are already supporting this shift. But we need governments to do more, ensuring the urgent transformation of our food systems globally.

Rupert Howes, Chief Executive, Marine Stewardship Council

”

The MSC programme in numbers

> 19%
of wild marine catch

> 650
fisheries engaged*

> 2,000
fishery improvements

> 5,000
certified supply chain partners

20,000
products with the MSC label sold in 70+ countries

US\$12.6 billion
retail sales with the MSC label in 2022-23

* Engaged means fisheries certified or in assessment to the MSC Fisheries Standard.

Appendix

MSC's analysis: How the nutrition figures were calculated

The estimates are derived from the [Aquatic Foods Composition Database](#), a product of the [Golden Lab](#) at the Harvard TH Chan School of Public Health, that presents the most comprehensive global database of more than three and a half thousand aquatic food species and hundreds of nutrients, created to increase the understanding of the nutritional benefits of aquatic foods.

The report [Aquatic Foods to Nourish Nations 2021](#) found that by 2030, the combined production of seafood by wild caught capture and aquaculture will lead to reductions in inadequate intake across most assessed nutrients (reduction of 8.1 million iron, 5.5 million zinc, 49.3 million calcium, 36 million vitamin B12, and 76.8 million DHA+EPA inadequate intakes), while potentially increasing 10.1 million vitamin A inadequate intakes.

To work out these nutritional values for the year 2030 the above report relied on the fish production projections for 2030 taken from the [SOFIA report 2020](#)³⁷. SOFIA breaks down fish production projections for 2030 between aquaculture (109 million tonnes) and wild capture (96 million tonnes). This gives wild capture a 47% share of fish production by 2030 and thus will contribute 47% of the above nutrients (this percentage is the same for SOFIA 2022).

However, if sustainable fisheries were better managed, another 16 million tonnes ([Costello et al, 2016](#)³⁸) or 16.5 million tonnes ([Ye et al, 2012](#)³⁹) of fish could be harvested. If 16 million tonnes were added to the 96 million tonnes of wild capture that SOFIA estimates will be produced by 2030, then wild capture fisheries' share of production increases from 96 million tonnes to 112 million tonnes. This would give wild capture fisheries a 50% share of total fish production by 2030: 112 million tonnes (96 million added to 16 million tonnes) is 50% of the combined total production of wild fisheries and aquaculture of 221 million tonnes (96 million tonnes, plus 16 million tonnes, plus 109 million tonnes).

Consequently, wild capture fisheries could contribute a 50% share of the nutrients above.

50% of the nutrients above work out as: decreasing nutrients deficiencies by 4 million for iron, 2.7 million for zinc, 24.6 million for calcium, 18 million for vitamin B12, and 38.4 million for DHA+EPA, while increasing the intake of 5 million for vitamin A.

References

- Gephart, J.A et al. Blue Food Assessment (2021), Environmental performance of blue foods, *Nature* 597, 360–365 <https://www.nature.com/articles/s41586-021-03889-2>
- Gephart, J.A et al. Blue Food Assessment (2021), Environmental performance of blue foods, *Nature* 597, 360–365
- New Internationalist (2020) Hunger: the facts <https://newint.org/features/2020/09/30/hunger-facts>
- FAO (2020) The State of World Fisheries and Aquaculture 2020, <https://www.fao.org/3/ca9229en/online/ca9229en.html>
- FAO (2022) The State of Food Security and Nutrition in the World <https://www.fao.org/3/cc0639en/online/cc0639en.html>
- UN FAO State of Fisheries and Aquaculture (2022) (SOFIA) Report <https://www.fao.org/3/cc0461en/online/cc0461en.html>
- Allegretti, A. and Hicks, C.C. (2022) 'Getting the Right Nutrients to Those Who Need Them Most': towards nutrition-sensitive governance of fisheries in the Global South. *Reviews in Fish Biology and Fisheries* <https://link.springer.com/article/10.1007/s11160-022-09743-6>
- UN FAO (2022) The State of Food Security and Nutrition in the World
- World Health Organization
- FAO (2022) Blue Transformation Roadmap 2022-2030: A vision for FAO's work on aquatic food systems <https://www.fao.org/documents/card/en?details=cc0459en/>
- UN FAO (2022) The State of Food Security and Nutrition in the World
- UN FAO State of Fisheries and Aquaculture (2022) (SOFIA) Report
- UN FAO State of Fisheries and Aquaculture (2022) (SOFIA) Report
- Naylor, R.L., Kishore, A., Sumaila, U.R., Issifu, I., Hunter, B.P., Belton, B., Bush, S.R., Cao, L., Gelcich, S., Gephart, J.A., Golden, C.D., Jonell, M., Koehn, J.Z., Little, D.C., Thilsted, S.H., Tigchelaar, M. and Crona, B. (2021) Blue food demand across geographic and temporal scales. *Nature Communications*, 12(1) <https://www.nature.com/articles/s41467-021-25516-4>
- Bogard J R, Thilsted S H, Marks G C, Wahab M A, Hossain M A R, Jakobsen J and Stangoulis J (2015) Nutrient composition of important fish species in Bangladesh and potential contribution to recommended nutrient intakes *J. Food Compos. Anal.* 42 120–33, and Thilsted S H, Thorne-Lyman A, Webb P, Bogard J R, Subasinghe R, Phillips M J and Allison E H (2016) Sustaining healthy diets: the role of capture fisheries and aquaculture for improving nutrition in the post-2015 era *Food Policy* 61 126–31
- Peter, et al, *Selected Nutrients and Their Implications for Health and Disease across the Lifespan: A Roadmap*, Nutrients, 2014
- Hilborn et al (2020) Effective fisheries management instrumental in improving fish stock status, *PNAS* https://www.researchgate.net/publication/338575514_Effective_fisheries_management_instrumental_in_improving_fish_stock_status
- Costello, C et al. (2016), Global fishery prospects under contrasting management regimes. *Proceedings of the National Academy of Sciences*, 113, 13 0.1073/pnas.1520420113
- World Health Organization
- World Health Organization
- Gephart, J.A. et al. (2021). Environmental performance of blue foods. *Nature*, 597(7876), pp.360–365. <https://www.nature.com/articles/s41586-021-03889-2>
- Petsko, E. (2021) Wild seafood has a lower carbon footprint than red meat, cheese, and chicken, according to latest data *Oceana* <https://oceana.org/blog/wild-seafood-has-lower-carbon-footprint-red-meat-cheese-and-chicken-according-latest-data/>
- Wild seafood has a lower carbon footprint than red meat, cheese, and chicken, according to latest data, *Oceana*
- Gephart et al (2021) Environmental performance of blue foods, *Nature*
- Coleman, J (2022) Eat more fish: when switching to seafood helps — and when it doesn't <https://www.nature.com/articles/d41586-022-02928-w>
- Gephart et al (2021) Environmental performance of blue foods, *Nature*
- UN FAO (2022) The State of Food Security and Nutrition in the World
- UN Second World Ocean Assessment page 18
- UN FAO. (2022) The State of Food Security and Nutrition in the World
- UN FAO, Duke University and World Fish (2023) Illuminating Hidden Harvests The contributions of small-scale fisheries to sustainable development. <https://www.fao.org/documents/card/en/c/cc4576en>
- UN FAO, Duke University and World Fish (2023) Illuminating Hidden Harvests Report
- Arther R, Skerritt D, Schuhbauer A, Ebrahim H, Friend R and Sumaila U (2021) Small-scale fisheries and local food systems: Transformations, threats and opportunities. *Fish and Fisheries* <https://doi.org/10.1111/faf.12602>
- Hilborn et al (2020) Effective fisheries management instrumental in improving fish stock status *PNAS*. Melnychuk, M et al. (2022) Wild-caught fish populations targeted by MSC-certified fisheries have higher relative abundance than non-MS-C populations, *Frontiers* <https://www.frontiersin.org/articles/10.3389/fmars.2022.818772/full>
- Philippines Bureau of Fisheries
- Marine Stewardship Council (2022) Shoppers change buying habits amid rising eco-anxiety about the future of oceans – global survey <https://www.msc.org/media-centre/press-releases/press-release/shoppers-change-buying-habits-amid-rising-eco-anxiety-about-the-future-of-oceans-global-survey>
- Melnychuk et al. (2022) Wild-caught fish populations targeted by MSC-certified fisheries have higher relative abundance than non-MS-C populations *Frontiers*
- SOFIA 2022 hadn't been published at the time but the breakdowns by percentage for wild capture and aquaculture are exactly the same in both SOFIA 2020 and 2022.
- Costello et al. (2016) Global fishery prospects under contracting management regimes, *PNAS*
- Ye et al. (2012) Rebuilding global fisheries: the World Summit Goal, costs and benefits, *Fish and Fisheries* <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-2979.2012.00460.x>

Find out more

[msc.org](https://www.msc.org)
info@msc.org



@MSCecolabel



/MSCecolabel



/marine-stewardship-council

© Marine Stewardship Council 2023