8 Fish

This chapter describes market developments and medium-term projections for world fish markets for the period 2022-31. Projections cover consumption, production, trade and prices for fish from catch and aquaculture. The chapter concludes with a discussion of key risks and uncertainties which could have implications for world fish markets over the next decade.

8.1. Projections highlights

Steady growth and movement towards aquaculture

After decades of steady growth, fish[1] consumption was affected by the impact of COVID-19, with a slight decline in 2020 followed by a marginal increase (0.1 kg per capita) in 2021. The low growth of total food fish consumption is expected to continue for the next decade at 1.4% p.a., compared to the 2.0% p.a. rate witnessed over the previous decade. This weaker trend in consumption reflects a slowdown in demand caused by sluggish income and population growth and increased competition from lower world poultry prices compared to the first half of the previous decade. Despite this weaker trend, fish consumption is projected to keep rising at a faster rate than meat consumption over the next decade (1.4% p.a. for fish vs 1.0% p.a. for meat). Apparent[2] food fish consumption globally is projected to reach 21.4 kg per capita in 2031, up from 20.5 kg per capita in the base period (average 2019-2021). Per-capita fish consumption will increase in all continents except Africa, the region with the fastest growing population. Most fish production is projected to be consumed as food (183 Mt in 2031), with only 10% going to non-food uses (mainly as fishmeal and fish oil). Asian countries will consume about 72% of the total fish for food consumption. In 2031, aquaculture is expected to provide 59% of the fish destined to human consumption, compared with 55% in the base period.

Average nominal fish prices will increase at a rate of 0.8% p.a. over the 2022-2031 period, starting from a high level in 2022, reflecting a strong price recovery in 2022 from COVID driven declines in 2020 and 2021. In real terms, aquaculture prices are projected to remain unchanged by 2031 while decreases are projected for capture by 9.9%, fishmeal by 15.6% and fish oil by 17.5%.

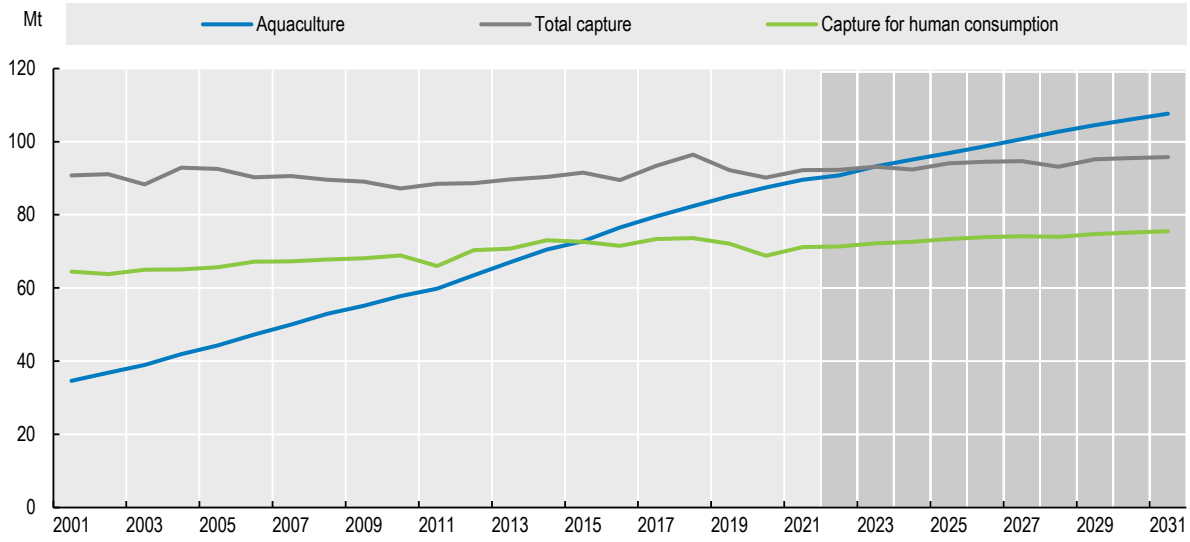
World fish production is projected to grow at 1.2% p.a. during the outlook period, a relative slowdown compared to the 2.0% p.a. growth of the previous decade. Production is expected to reach 203 Mt by 2031, an overall increase of 25 Mt (+14%) from the base period (2019-2021 average). Most of the growth will be in Asia. Aquaculture is expected to drive production growth over the outlook period, increasing 23% (20 Mt) by 2031 (at +1.9% p.a.). Despite slowing when compared to the previous decade (+1.9% p.a. vs. 3.8% p.a.), growth in aquaculture production will be significantly larger than in capture production (4.6% by 2031 at +0.4% p.a.). Consequently, aquaculture is expected to overtake capture fisheries production in 2023. Lower growth rates in aquaculture production are the consequence of large increases in the cost of feed at the beginning of the outlook period and the impact of policy changes in The People's Republic of China (hereafter "China") slowing the expansion of aquaculture. These changes are focused on environmental protection and diversification of production, with an increased emphasis on producing species for the domestic market. By 2031, global aquaculture production is expected to reach 108 Mt, 12 Mt more than the capture sector.

Despite the increasing prominence of aquaculture in total fish supply (53% in 2031 vs 49% in the base period) (Figure 8.1), the capture fisheries sector is expected to remain dominant for several species and vital for domestic and international food security. Capture fisheries production should increase by 4.6% by 2031 and reach 96 Mt due to improved catches in some fishing areas and better management. Some fluctuations will occur in the years of the *El Niño* (assumed in 2024 and 2028), which will also negatively affect production of fishmeal and fish oil. In 2031, world production of fishmeal is expected to reach 5.6 Mt, increasing 1.3% p.a. over the 2022-2031 period, while fish oil production should grow by 1.2% p.a. and reach 1.3 Mt during the same period. By 2031, approximately 29% of fishmeal and 47% of fish oil will be obtained from fish waste.

Exports of fisheries and aquaculture products are expected to be buoyant in various forms for food and non-food purposes. About 35% of total fish production (31% excluding intra-EU trade) is expected to be exported in 2031. After contracting in 2020 (- 3.9%), and with only a slight recovery in 2021, world trade of fish for food is projected to increase, at 0.8% p.a. over the 2022-2031 period. This rate is lower than was

observed in the past decade (1.1% p.a.), reflecting the slowdown in production growth, and the diversification of aquaculture production in China. Asian countries will continue to be the main exporters of fish for food, with their share of all exports remaining stable at 47%. Europe and North America will remain the main importers, accounting for 25% and 15% of all imports in 2031.

Figure 8.1. Aquaculture to continue leading the growth in production



Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

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Many factors influence the evolution and dynamics of world fish markets and, therefore, a range of uncertainties exist in the future. These include climate change, which impacts the distribution and the level of fish stocks, policies to reduce GHG emissions from the sector, fisheries management and governance, trade policies and policies against illegal, unreported and unregulated fishing (IUU). The emergence of new COVID-19 variants and potential supply chain disruptions may alter the projections, especially in the first years of the projections. Two years after the start of the pandemic, the situation, while improved, is still unstable. The pandemic has impacted both supply and demand, which could lead to long-term transformations of the sector. Furthermore, given the importance of the Russian Federation (hereafter "Russia") as one of the top fish producers and exporters, the current Russian war against Ukraine and the reduced export availability from Russia creates major uncertainty. In addition, the significant change in the inflation rates in most countries partly resulting from the war creates additional uncertainty.

8.2. Current market trends

Responses to the pandemic may have lasting structural effects on the sector

The consequences of the COVID-19 pandemic on the fisheries and aquaculture sector had varying effects on individual countries and products. The efforts to mitigate the spread of COVID-19 have resulted in reduced demand for aquatic foods, and disruptions to production, supply chains and markets. In some countries, the decline in demand led to lower prices. Consequently, many fishing fleets stopped operating or reduced their activities, as work became unprofitable during periods in 2020 and 2021. In some cases,

quotas were not filled due to low demand and lack of storage for perishable products. Aquaculture production also faced reduced availability of necessary equipment and inputs (including feed, fingerlings, and ice), and issues with distribution and marketing, while sanitary measures also impacted the sector. Fish production relying on export markets faced more severe consequences than those serving domestic markets in particular in 2020, but in 2021 exports rebounded. Overall, large-scale vertically integrated supply chains have been less affected than the small-scale sector, due to their greater control over input and output delivery. The labour-intensive small-scale sector, very relevant for both fisheries and aquaculture, was more vulnerable to restrictions on movement affecting workers and to disruptions in input provisioning and transportation.

The last two years saw a major shift in consumer patterns. Habits and innovations developed during the lockdowns, such as a renewed interest in home cooking, a general pivoting towards retail, the proliferation of home delivery services, a strong focus on digital marketing and an increase in e-commerce sales, may have major long-term structural impacts on the sector. These new market features have not gone away post pandemic and have instead made a permanent contribution to the dynamics and opportunities for transforming the global fisheries and aquaculture sector. However, for some products, such as canned tuna which recorded a significant increase in consumption during periods of lockdown, the levels of demand they experienced are unlikely to be maintained as normality returns. In late 2021 and early 2022, fish prices started to increase with a negative impact on consumption in the context of an unstable economic and geopolitical situation. According to the FAO Fish Price Index,[3] international fish prices were 7.0% higher on average in 2021 compared to 2020. The key drivers influencing the current market situation in the fisheries and aquaculture sectors include a high and rising inflation, increasing energy costs and the rapid reopening of economies after lockdowns.

8.3. Market projections

8.3.1. Consumption

Buoyant prospects for consumption as fish are nutritious foods that contribute to healthy diets

Fisheries and aquaculture products will continue to play a crucial role in nutrition and global food security as they represent an important source of macronutrients and micronutrients. Even small quantities of fish and aquatic food can have a significant positive nutritional impact on plant-based diets. Consuming aquatic foods together with plants can help to improve the uptake of various nutrients from plants, which is the case in many low-income food-deficit countries (LIFDCs) and least-developed countries, in particular for coastal and inland communities highly dependent on fish for their diets.

By 2031, a growing share of fisheries and aquaculture production is expected to be directed to human consumption. Of the 203 Mt anticipated to be produced in 2031, about 90% will likely be consumed as food, 8% reduced into fishmeal and fish oil, and the remaining 2% as other non-food uses. World fish food consumption is projected to reach 183 Mt in 2031 representing an overall increase of 24 Mt (or +15%) compared to the base period (average 2019-2021). A growing share of fish available for human consumption is expected to originate from aquaculture, rising from 55% in the base period to 59% by 2031.

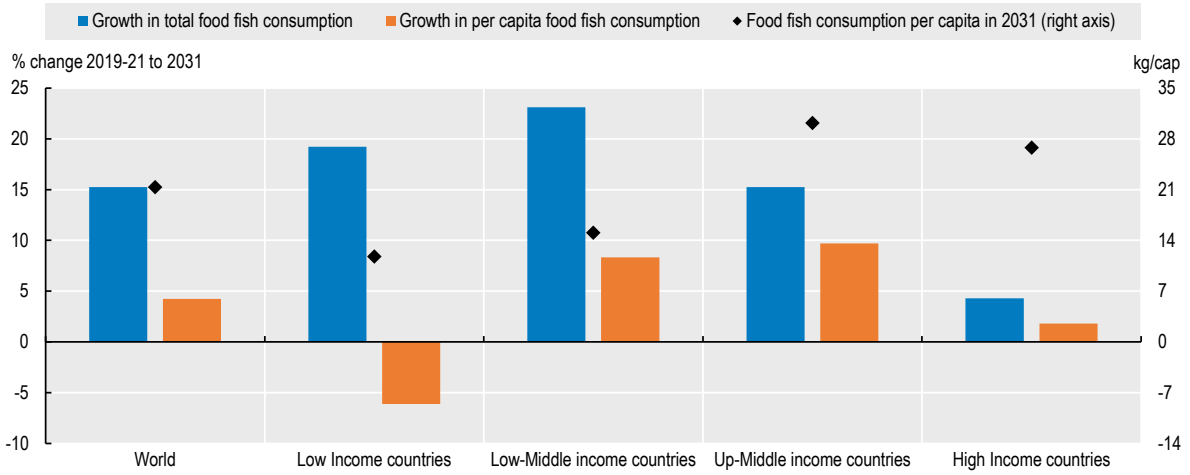
The driving force behind the growth in food fish consumption will be a combination of rising incomes and urbanisation, expansion of fish production, improved distribution channels, and product innovation. Together with a growing recognition that fish is a nutritious food. Demand is expected to grow in next decade. However, the pace of the increase of food fish consumption will slow, falling from 2.0% p.a. during 2012-2021 to 1.4% p.a. in 2022-2031. This slowdown is mainly due to lower production growth, rather high fish prices relative to some lower meats prices and a deceleration in population growth.

Total fish food consumption should rise in all continents, except Europe (-0.4%) where an initial decline in consumption in Ukraine and Russia due to the war is expected. Major growth is expected in Africa (+28%), Oceania (+19%), Asia (+16%) and America (+14%, with +15% in Latin America). Despite the overall increase in the availability of fish to most consumers, marked differences will continue to exist among countries and within countries and regions in terms of quantity and variety consumed and the subsequent contribution to nutritional intake. Availability and incomes are not the only factors boosting fish consumption. It is evident that socio-economic and cultural factors including food traditions, tastes, seasonality, and prices also strongly influence the level and the type of fish consumed.

As the most populous continent and major producer, Asia is anticipated to account for 76% of the additional fish consumed by 2031 as well as the largest share (72%) of the available total food fish in 2031. Africa, America and Europe will each account for 9% of total food fish consumed by 2031, while only 1% will be consumed in Oceania. Being the largest fish producer, China will also remain by far the world's largest fish consuming country, projected to account for 37% of the total food fish consumed in 2031.

In per capita terms, fish consumption is anticipated to reach 21.4 kg in 2031, slightly up from an average of 20.5 kg in 2019-2021, but its rate of growth will slow compared with the previous decade (0.5% p.a. against 0.9% p.a.). Fish consumption will continue to be higher in "upper-middle income" and high-income countries (30.2 kg and 26.8, respectively, in 2031) than in "low income" and "lower-middle income" countries (11.8 kg and 15.1 kg, respectively). Yet, growth rates during next decade, show major differences (Figure 8.2) with large increases experienced by middle-income countries, while a 6.1% decline is expected for low-income countries.

Figure 8.2. Growth in total and per capita food fish consumption



Note: The 38 individual countries and 11 regional aggregates in the baseline are classified into the four income groups according to their respective per-capita income in 2018. The applied thresholds are: low: < USD 1 550, lower middle: < USD 3 895, upper middle: < USD 13 000, high > USD 13 000.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

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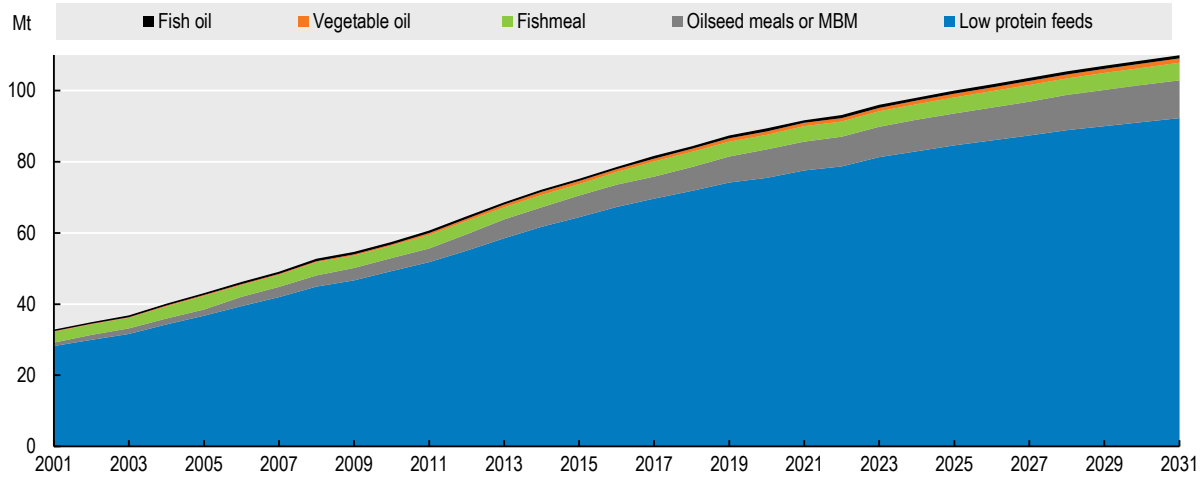
Per capita fish consumption will increase in all continents except Africa, where it is projected to decline from 10.0 kg in 2019-2021 to 9.9 kg in 2031, with a more substantial decrease in Sub-Saharan Africa (from 8.8 kg to 8.5 kg). This decrease is mainly caused by population growing faster than fish supply. Between 2022-2031, the population in Sub-Saharan Africa should grow by 2.4% p.a., while food fish supply by 2.0% p.a.

The decline in per capita fish consumption in Africa, with the subsequent reduction in the intake of fish proteins and micronutrients raises concern in terms of food security due to the high prevalence of undernourishment in Africa.[4] Fish play an important role in diets in the region representing about 22% of total animal-source protein intake on average and rising to more than 50% in some African countries, in particular in West Africa. Overall, the decline in fish consumption may thus weaken the ability of more fish-dependent countries to meet nutrition targets (2.1 and 2.2) of SDG 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture).

Fisheries and aquaculture production utilised for non-food purposes is either converted into fishmeal and fish oil or put to other non-food uses.[5] Consumption of fishmeal and fish oil is expected to continue to be characterised by the traditional competition between aquaculture and livestock for fishmeal, and between aquaculture and dietary supplements for direct human consumption for fish oil, but overall is constrained by stable production growth. Due to their high prices and major innovation efforts, the use of fishmeal and fish oil in aquaculture feeds is likely to decrease, with more frequent usage as strategic ingredients to enhance growth at specific stages of fish production. By 2031 it is expected that the share of fishmeal used in feeds for fish farming will decrease from 5% in 2019-21 to 4% in 2031. The reduction in fishmeal use will be accompanied by the expansion of the market for oilseed meals in aquaculture, where oilseed meal use is anticipated to reach about 10.6 Mt in 2031 (Figure 8.3), reaching 10% of the total feed used for fish farming (9% in 2019-21). China will be the country to utilise the highest quantity of fishmeal as feed with a share of 51% of the total in 2031. Concerning fish oil, aquaculture is expected to remain the major user. However, direct human consumption of processed fish oil will remain important as it is rich in omega-3 fatty acids, which are considered beneficial for a wide range of human biological functions. The European Union and Norway will remain the main consumers of global fish oil supplies.

Figure 8.3. Feed consumption by type in the aquaculture sector



Note: MBM refers to Meat and Bone Meal
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

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8.4. Production

Aquaculture to overtake capture fisheries production in 2023

Global fish production (capture and aquaculture) is expected to grow from 179 Mt (2019-21 average) to 203 Mt by 2031, an increase of 14% (+1.2% p.a.). While this is an increase of 25 Mt in the projection period, this is smaller than the previous decade (2011-2021) when production grew by 33 Mt. The increase in fish production is driven primarily by the continued growth of aquaculture production, which will grow by 20 Mt (+23%) at 1.9% p.a. and is expected to reach 108 Mt p.a. by 2031. Despite this expected continued growth, it represents a significant slowing from the previous decade when aquaculture production grew by 30 Mt (+56%) at 3.8% p.a. Aquaculture production is expected to overtake capture production in 2023 and account for 53% of all fish production by 2031.

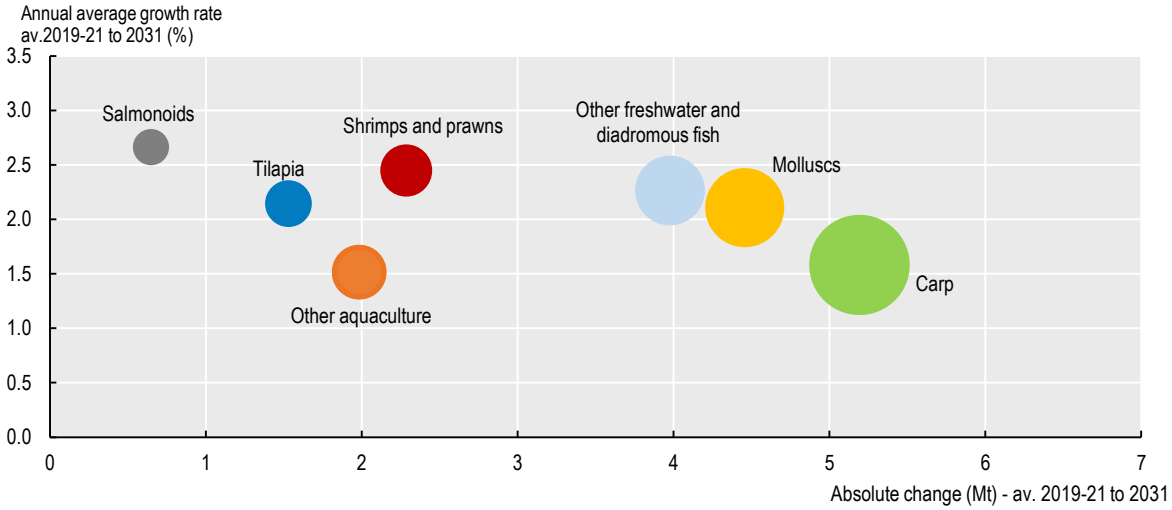
Several factors are driving the slower projected growth in aquaculture production. Firstly, the cost of feed was relatively low from 2013 to 2019 leading to higher profits for producers. Secondly, the aquaculture to feed price ratio will remain below 2019 levels until 2025 due to the high price of feed during the first half of this coming decade. From 2025 onwards, that feed price ratio is expected to remain at profitable levels for producers leading to a new period of growth for aquaculture production in the second half of the decade. There are several other factors contributing to the slower aquaculture production growth including slower gains in productivity; more stringent environmental regulations in the world's largest producers, most notably China; and challenges building new production facilities due to competition for land.

In China, regulations aimed at increasing the sustainability of the sector and targeting growth in species for domestic consumers are expected to limit production growth. Nevertheless, China's share of global aquaculture production is expected to decline slightly from 57% in the base year to 56% in 2031. Regionally, Asia is expected to maintain its position as the largest producer, with the share of global production from the region accounting for 88% in 2031. Strong production growth is expected in other major Asian producers: India (+39%), Thailand (+25%), Indonesia (+24%), Philippines (22%) and Viet Nam (+11%).

From a species perspective strong production growth is expected for shrimps and prawns (+31%) and tilapia (+25%) (Figure 8.4). However, for most species production growth is significantly slower than experienced during the previous decade. Carp will remain the most widely produced species, with 36 Mt expected to be produced in 2031. However, the projected 17% growth in carp production is modest, and lower than other species groups, reflecting policy changes in China, the primary producer of carp.

By comparison, continued improvements in fisheries management and improved technology reducing discards and waste are expected to drive a relatively modest growth of 4.2 Mt or 4.6% (+0.4% p.a.) in capture production over the projection period, reaching 96 Mt in 2031. The growth in capture fisheries production is expected to be similar to the previous decade. More specifically, while Africa is still expected to experience the strongest growth rate, +11% (+1.1 Mt), this is significantly slower growth than experienced in the previous decade (+32%). Capture fisheries production in Asia is expected to increase by 1.2 Mt, but this growth (+2.4%) will be slower than in Africa (+11%) and Europe (+6.3%). Consequently, the share of Asia in global capture production is projected to decline slightly to 51% in 2031 compared to 52% in the base period. After decreasing in the previous decade (-6.9%) capture fisheries production in America is projected to return to growth with an increase of 5.7% (+0.2% p.a.) over the outlook period. From a country perspective, the largest increases in capture production to 2031 are projected in Viet Nam (+0.6 Mt), Russia (+0.5 Mt), Peru (+0.4 Mt), the Philippines (+0.3 Mt) and India (+0.3 Mt). However, the extent to which growth in Russian production is impacted by the ongoing war remains to be seen.

Figure 8.4. Growth in world aquaculture production by species



Note: The size of the bubble represents the world total production (tonnes) in 2031.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

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The popularity of fishmeal and fish oil for use in animal feed is expected to drive production. Production of fish oil and fishmeal is expected to increase during the outlook period reaching 1.3 Mt and 5.6 Mt, respectively, by 2031, compared to 1.1 Mt and 4.9 Mt in the base period. However, production growth will be faster than the previous decade for fishmeal (1.3% p.a. vs 1.1% p.a.), nevertheless total production will remain below pre-2005 levels. Both fishmeal and fish oil can be produced from whole fish or as a by-product of fish processing (so-called fish residue). The share of fishmeal and fish oil produced from fish residue is expected to remain broadly stable, at about 47% and 29%, respectively, by 2031.

8.4.1. Trade

Trade in fish and fish products will be sluggish

Trade plays a major role in the capture fisheries and aquaculture sectors, with supply chains operating at a global scale. Fish can be produced in a country, exported for processing in another country and reimported for consumption somewhere else. As a result, fish trade plays an important role in many economies as a source of nutrients, income, and employment. About 35% (31% excluding EU intra-trade) of production is projected to be exported in 2031 in different products forms and species. Aquaculture will contribute to a growing share of international trade in fishery commodities for human consumption.

Global trade in fish and fish products was marginally down in 2019 due to lower production. In 2020, it contracted due to the COVID-19 pandemic. A decline in trade was recorded across all continents, reflecting the global nature of the pandemic. Fish trade was substantially disrupted with the implementation of control measures responding to uncertainty regarding the source of the disease and transmission paths and the overall deterioration of the market environment. However, there was a recovery in 2021, with players adapting to the new operational constraints and demand boosted by the reopening of the hospitality sector. Over the projection period, international fish trade is expected to expand but at a rate significantly lower than the one observed in the previous decade. This slowdown reflects relatively fewer opportunities for expansion into new markets and stronger domestic demand in some of the major producing countries who traditionally supplied affluent economies. World exports of fish for human consumption are projected to reach almost 46 Mt live weight in 2031, 3 Mt more (+0.8% p.a.) compared to the average 2019-21 level.

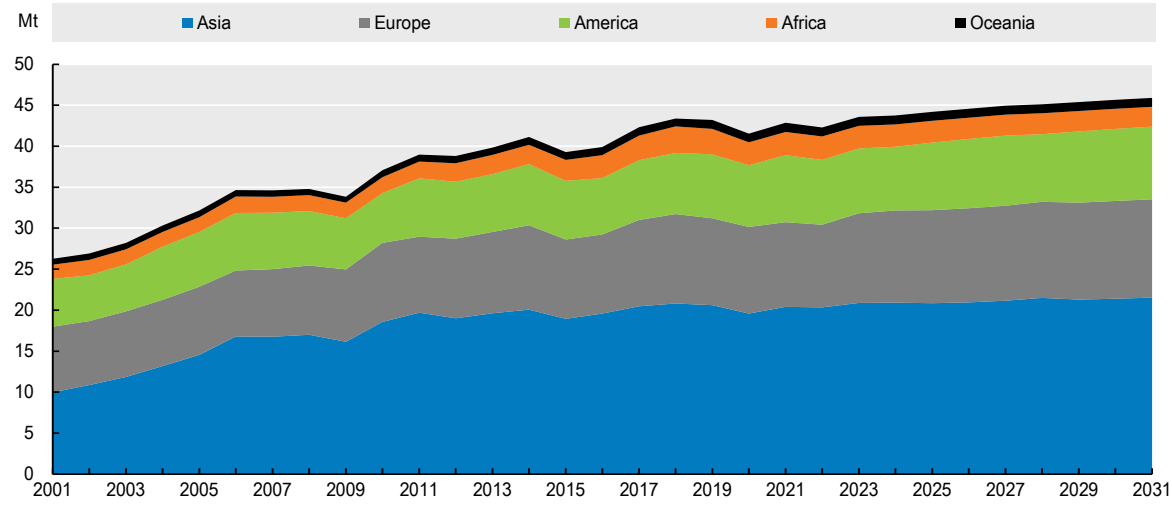
Asian countries are expected to remain the key suppliers to world markets (Figure 8.5). By 2031, they are expected to account for 47% of total trade of fish for human consumption, a share broadly unchanged since the base period. China alone will be the largest exporter with a share of 17% by 2031. Among non-Asian countries, Norway, the EU27 and Russia will remain significant fish exporters. However, with the numerous sanctions imposed on Russian products in response to the invasion of Ukraine, Russian exports might be much lower than projected if more countries impose sanctions in 2022 and if these sanctions are maintained after 2022. Despite the predominance of Asian countries in world fish exports, additional growth is mainly expected to originate from Europe over the next decade. This reflects the diversification of Chinese aquaculture, which increasingly focuses on the domestic market. The pandemic has accelerated this shift due to the numerous logistical difficulties associated with trade.

OECD countries will maintain their position as the leading importers of fish for human consumption, accounting for 52% of world imports by 2031. The EU27 will represent the largest single market with a share of 18%, followed by the United States (14%) and China (10%). Japan used to be the second largest importer until the early 2000s, but its imports have been on a downward trend for nearly 20 years reflecting changing diets and a declining population. By 2031, Japan is projected to account for only 6% of world fish imports, compared with a record share of 21% in 1992. While Africa only represents 14% of world imports of fish for human consumption, most of the growth in world imports is projected to originate from Africa. With much stronger growth projected in imports than in production, Africa is expected to become increasingly dependent on fish food imports, with an overall increase of 34% at 2.7% p.a. The share of imports in its fish food supply is projected to reach 37% by 2031, compared with 35% in the base period

Trade of fishmeal is projected to experience relatively modest growth of 7.1% (or +1.0% p.a.) to reach 3.5 Mt product weight in 2031. Fishmeal production and trade are subject to the *El Niño* weather phenomenon in Peru, which makes forecasting difficult. Peru is and is expected to remain the largest producer and exporter of fishmeal in the world, with domestic fishmeal consumption being insignificant. China will remain the leading fishmeal import market over the projection period, absorbing 54% of global imports by 2031, up from 46% in the base period. Chinese demand for fishmeal originates from the aquaculture sector, despite efforts to reduce the share of fishmeal in aquafeeds, and from the pig rearing industry, for which fishmeal is in demand as an ingredient in the feed for piglets. Other large importers

include Japan, Norway, and Viet Nam. Fish oil exports are projected to increase by 8.5% over the period. Norway will remain the main fish oil importer, where it is used as an ingredient for feeding salmon. Followed by the EU27, where fish oil is a popular dietary supplement thanks to its rich content in omega-3 fatty acids. Norway and the EU27 are expected to absorb 25% and 24%, respectively, of global fish oil imports by 2031.

Figure 8.5. Exports of fish for human consumption



Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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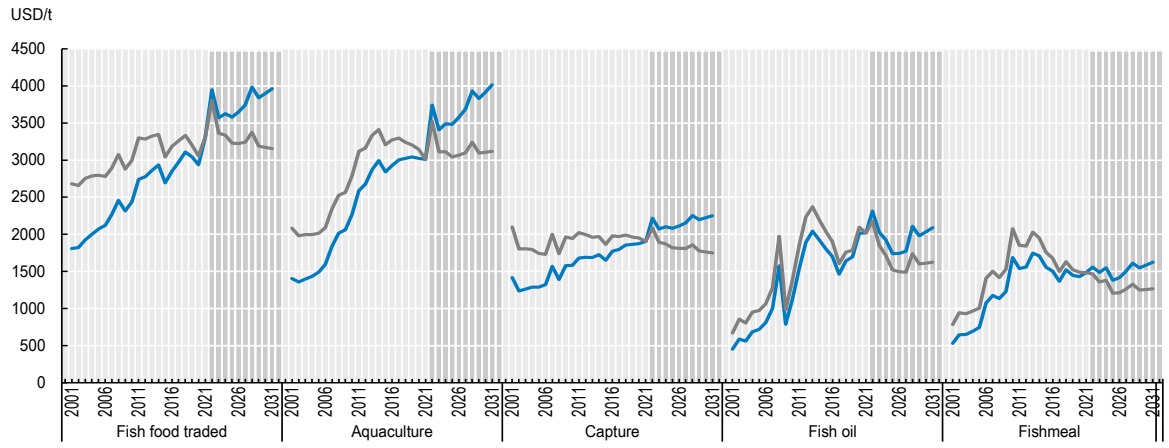
8.4.2. Prices

Prices expected to remain high during the coming decade

In 2021, fish prices rose in response to the increase in demand caused by the strong economic recovery from COVID-19 and the re-opening of restaurants and hotels, combined with only a small increase in production of fish. International fish prices were 7.0% higher in 2021 than 2020 according to the FAO Fish Price Index. More generally, fish prices are expected to grow in nominal terms over the projection period and remain high relative to historic levels. However, in real terms the prices of all categories are expected to decline except for aquaculture, where a stagnation is projected (Figure 8.6). The economic impacts of the COVID-19 pandemic are expected to cause some volatility in the prices of aquaculture, capture and fish food traded in real terms, as reduced prices from decreased demand are followed by a strong price growth (as demand increases following re-opening of the hospitality sector) and subsequent declines in 2023 onwards. Fishmeal and fish oil prices are expected to decline steadily over the period due to the expected evolution of the oilseed products prices, with fluctuations as *El Niño* influences supply.

Figure 8.6. World Fish Prices



Note: Fish food traded: world unit value of trade (sum of exports and imports) of fish for human consumption. Aquaculture: FAO world unit value of aquaculture fisheries production (live weight basis). Capture: FAO estimated value of world ex-vessel value of capture fisheries production excluding for reduction. Fishmeal: 64-65% protein, Hamburg, Germany. Fish oil: N.W. Europe. Real prices are nominal world prices deflated by the US GDP deflator (2021=1).
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

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Prices of wild captured fish are expected to grow 19% (+0.7% p.a.) over the projection period in nominal terms. In real terms, however, this equates to an expected decline of 9.9% (-1.4% p.a.) over the projection period, similar to the trend experienced in the previous decade (+18% in nominal terms and -3.6% in real terms). The detailed trend in the prices of wild-capture fish in real terms shows a strong price recovery in 2022 from COVID driven declines in 2020 and 2021 and because of the impact of the war. This trend is then followed by a steady decline from 2023. As highlighted earlier, this decline reflects increasing competition from other protein sources, notably poultry meat, and the increased rate of growth in aquaculture production in China from 2023 onwards. It may also reflect a change in the production mix in favour of less valuable species. In the same period, aquaculture prices are projected to increase by 33% (+1.5% p.a.) in nominal terms, while in real terms they are expected to remain unchanged. P After an initial spike in 2022, prices of food fish traded are expected to remain almost the same over the projection period (in real terms), and despite some volatility, decline by a modest 3.4% (-1.3% p.a.).

Fishmeal will experience a decline in real prices of 16% (-1.2% p.a.). The price of oilseed meals, a direct competitor in the feed market, will decline more than fishmeal resulting in a small increase in the relative price of fishmeal when compared to 2021 but will remain significantly lower than in the previous decade. The price of fish oil is projected to decrease by 17% (-2.2% p.a.) in real terms. This decline stands in contrast to the previous decade when the price of fish oil grew by 44%, driven mostly by the huge increase in the price of vegetable oil, a direct substitute. Several factors are contributing to the expected decline in real prices of fish oil over the projection period including an expected decline in the vegetable oil price; slower aquaculture production growth; more efficient use of fish oil-based feeds in the production cycle; and a stabilisation of the Omega-3 demand (of which fish oil has a high content) as a dietary supplement from the food sector. In the case of aquaculture, the relatively high price of fish oil-based feeds has resulted in their use being restricted to specific stages of production cycle where high nutrient feeds are required (e.g. hatching and finishing). The price of fish oil relative to vegetable oil is expected to gradually return

close to the average recorded since the arrival of the new plateau started in 2012. Overall, the real price of fish oil and fishmeal will remain high compared to pre-2005 levels.

8.5. Risks and uncertainties

Volatility in energy markets, management practices, and environmental policies could have significant impacts on the fisheries sector

Many factors will influence the evolution and dynamics of the world's fishery and aquaculture sectors. Some uncertainties, discussed in previous editions of the *Outlook* such as stock status, and domestic fisheries policies, remain relevant. However, in this *Outlook*, one of the major uncertainties is Russia's war against Ukraine that impacts on global value chains and trade, which are still recovering from the COVID-19 pandemic. A major unknown factor for the projections is the magnitude of the rise in production and distribution costs over the next decade and their effect on overall inflation. Wars, shocks to oil prices, pandemics, trade sanctions, pollution and climate change and extreme weather events all point to higher production costs in the fisheries sector as a whole.

The cost of fuel and other energy sources has become increasingly volatile, as illustrated by the price variations observed since early 2020. The COVID-19 pandemic led to a historic plunge in global energy consumption in early 2020 driving the prices of many fuels to their lowest levels in decades. However, since then, prices have rebounded strongly, mainly reflecting a rapid global economic recovery, a weaker than expected increase in supply, and a cold winter in the Northern Hemisphere. The war has further pushed up prices for oil and natural gas in Europe. Expenditures on fuel represent the largest variable cost in modern capture fishing operations. While fuel use varies widely with gear type, the profitability of the capture fisheries sector and effort levels are highly sensitive to energy costs. Although aquaculture is less directly dependent on fuel, its energy demands are important for feed production but also for pumping, aeration, temperature control and wastewater treatment. Post-harvest and processing activities are also heavily dependent on fuel. The great increase in fish trade in recent decades, which enabled wider distribution of fish, more sophisticated value-added products and more geographically dispersed supply chains also contributed to increased energy needs. Considering all of this, the profitability of the fisheries and aquaculture sectors will be reduced by high oil prices in the short term, but volatile energy markets are likely to remain one of the main challenges the sector will need to deal with over the next decade.

From a trade perspective, unexpected policy decisions could also affect the projections. A trade war between China and the United States, or the sanctions imposed on Russian imports by a number of countries following the invasion of Ukraine are examples of the numerous cases of trade related uncertainty over the projection period. It remains unclear whether these sanctions will be relaxed, reinforced or maintained over the entire outlook period. In any case, these bans are likely to imply at least short-term changes in some trade relationships and flows.

Overall, the fisheries and aquaculture sectors are expected to continue to face many challenges including environmental change, resource availability, and concerns over ineffective governance. In particular, climate change presents a significant source of uncertainty which is difficult to capture in the projections. For capture fisheries, climate change can impact the location, abundance, and species composition of stocks, with uncertain consequences for both the fishers looking to exploit resources and policy makers aiming to manage them. Further, as a large consumer of fuel and energy more generally, capture fisheries and aquaculture potentially face new sources of regulatory risk as governments look to reduce greenhouse gas emissions that may further impact the costs of energy. Conversely, climate policies may favour aquaculture and capture production, given their relatively low emissions intensities when compared to other protein production systems. Given international and domestic commitments to reduce greenhouse gas emissions (e.g. net-zero pledges, International Maritime Organization (IMO) emissions regulations,

and the Paris Agreement) it seems likely future regulations will impact both aquaculture and capture production in unpredictable ways.

Despite the progress made by several countries and regions, with fish stocks consistently above target levels of rebuilding when fisheries are properly managed, there are still many areas where good fisheries management is not in place or is ineffective and the status of fish stocks is poor and deteriorating. This unequal progress is expected to persist unless successful and adequate policies and measures are implemented. Aquaculture will be the main driver for the increase of fish production globally, but its growth is hampered by different constraints including equitable distribution, competition for land, rights to water, diversity of species produced, and access to credit, seeds, and expertise. Such constraints will need to be adequately addressed through responsive and effective governance, increased investment, improvements in technology, innovations and research, and more efficient production and profitability. Ensuring long term biosecurity will be crucial as well as the targeted support of environmentally friendly and sustainable production systems. On these aspects, one of the new priority areas of the Strategic Framework of FAO for 2022-2031 is the Blue Transformation, that focuses on more efficient, inclusive, resilient and sustainable blue food systems, from both capture fisheries and aquaculture, promoted through improved policies and programmes for integrated science-based management, technological innovation, and private-sector engagement. The Blue Transformation provides a pathway for hunger reduction and sustainable management of oceans, seas, and marine resources through reconciling environmental sustainability, food security and livelihood priorities to help vulnerable states mitigate the often-devastating effects of climate change.

Notes

[1] In this chapter and publication the term “fish” and “seafood” are used to indicate fish, crustaceans, molluscs and other aquatic animals, but exclude aquatic mammals, crocodiles, caimans, alligators and aquatic plants. All quantities are expressed in live weight equivalent, except those of fishmeal and fish oil.

[2] The term “apparent” refers to the amount of food available for consumption, which is not equal to the edible average food intake. The amount is calculated as production + imports – exports - non-food uses, +/- stocks variations, all expressed in live weight equivalent.

[3] Calculated in nominal terms, and covering fish and fish products.

[4] FAO, IFAD, UNICEF, WFP and WHO (2021), *The State of Food Security and Nutrition in the World 2021*. Transforming food systems for food security, improved nutrition and affordable healthy diets for all. Rome, FAO. https://doi.org/10.4060/cb4474en.

[5] Other non-food uses include ornamental fish, culturing, fingerlings and fry, bait, pharmaceutical inputs, and as direct feed for aquaculture, livestock and other animals.

ANNEX C

Table C.7. World fish and seafood projections

Calendar year

		Average 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
FISH[1]												
World												
Production	kt	178 900	183 046	186 400	187 440	190 940	193 198	195 304	195 821	199 653	201 646	203 403
of which aquaculture	kt	87 389	91	93	95	97	99	101	103	104	106	108
Consumption	kt	179 726	182 421	186 329	187 546	190 930	193 192	195 302	195 933	199 648	201 646	203 407
of which for food	kt	158 897	161 484	165 396	167 841	170 275	172 613	174 769	176 801	179 256	181 296	183 136
of which for reduction	kt	15 959	16 313	16 425	15 313	16 378	16 394	16 430	15 109	16 452	16 491	16 492
Price												
Aquaculture[2]	USD/t	3 026.0	3 740.8	3 407.6	3 490.3	3 481.9	3 577.0	3 689.3	3 932.5	3 829.7	3 919.9	4 012.7
Capture[3]	USD/t	1 881.7	2 216.4	2 072.7	2 099.9	2 082.4	2 112.4	2 153.5	2 254.0	2 197.1	2 221.7	2 248.4
Product traded[4]	USD/t	3 095.5	3 947.9	3 570.0	3 624.7	3 580.5	3 649.7	3 745.2	3 984.9	3 840.4	3 897.7	3 960.1
Developed countries												
Production	kt	28 909	28 864	29 192	29 671	29 656	29 895	29 907	30 232	30 284	30 404	30 473
of which aquaculture	kt	4 894	4 980	5 048	5 157	5 209	5 277	5 351	5 426	5 519	5 573	5 616
Consumption	kt	36 798	36 509	36 715	36 891	36 810	36 936	37 007	37 194	37 037	37 043	37 019
of which for food	kt	31 262	31 155	31 350	31 536	31 510	31 656	31 735	31 926	31 781	31 795	31 781
of which for reduction	kt	4 589	4 392	4 415	4 417	4 374	4 367	4 371	4 379	4 379	4 383	4 385
Developing countries												
Production	kt	149 991	154 182	157 209	157 769	161 284	163 303	165 397	165 589	169 369	171 242	172 930
of which aquaculture	kt	82 495	85 798	88 193	89 954	91 683	93 426	95 313	97 292	98 979	100 546	102 042
Consumption	kt	142 964	145 987	149 684	150 719	154 180	156 310	158 345	158 783	162 651	164 638	166 418
of which for food	kt	127 671	130 404	134 116	136 369	138 826	141 012	143 084	144 921	147 514	149 536	151 385
of which for reduction	kt	11 371	11 921	12 010	10 896	12 004	12 027	12 059	10 730	12 073	12 107	12 107
OECD[5]												
Production	kt	28 653	29 153	29 269	29 235	29 544	29 876	29 892	29 709	30 128	30 351	30 470
of which aquaculture	kt	7 198	7 361	7 459	7 639	7 767	7 892	8 027	8 177	8 323	8 452	8 566
Consumption	kt	38 419	38 412	39 001	38 958	39 076	39 241	39 323	39 279	39 297	39 369	39 392
of which for food	kt	32 179	32 304	32 923	33 132	33 116	33 310	33 426	33 664	33 490	33 586	33 647
of which for reduction	kt	5 058	4 964	4 952	4 717	4 868	4 856	4 839	4 574	4 784	4 778	4 757
FISHMEAL[6]												
World												
Production	kt	4 931.0	4 974.2	5 131.0	4 947.7	5 275.0	5 334.4	5 395.7	5 114.6	5 499.3	5 553.5	5 599.7
from whole fish	kt	3 516.8	3 553.8	3 685.5	3 475.5	3 773.7	3 807.5	3 845.5	3 543.8	3 904.5	3 936.5	3 960.6
Consumption	kt	4 997.4	5 001.8	5 122.7	5 081.8	5 183.2	5 286.8	5 401.3	5 252.2	5 410.4	5 495.2	5 595.6
Variation in stocks	kt	-75.2	-26.6	8.8	-134.1	91.4	46.5	-7.1	-139.6	86.3	55.3	0.6
Price[7]	USD/t	1 453.1	1 558.3	1 484.4	1 548.6	1 381.1	1 415.5	1 502.2	1 611.9	1 546.7	1 585.5	1 625.6
Developed countries												
Production	kt	1 558.7	1 472.9	1 523.4	1 555.6	1 563.5	1 579.1	1 597.3	1 616.5	1 627.0	1 638.5	1 649.3
from whole fish	kt	983.6	901.1	943.5	968.1	968.3	976.4	987.1	998.7	1 001.5	1 005.6	1 009.0
Consumption	kt	1 611.4	1 516.2	1 528.8	1 480.8	1 496.3	1 493.7	1 490.2	1 431.3	1 456.7	1 454.5	1 453.3
Variation in stocks	kt	21.5	-17.6	7.8	-26.1	30.9	3.0	-8.1	-32.6	24.8	10.8	-0.4
Developing countries												
Production	kt	3 372.3	3 501.2	3 607.6	3 392.2	3 711.5	3 755.2	3 798.4	3 498.1	3 872.3	3 915.0	3 950.4
from whole fish	kt	2 533.2	2 652.7	2 742.0	2 507.3	2 805.4	2 831.1	2 858.4	2 545.1	2 903.0	2 930.9	2 951.6
Consumption	kt	3 584.2	3 785.6	3 883.9	3 881.0	3 956.9	4 053.1	4 161.1	4 060.9	4 183.8	4 260.6	4 352.4
Variation in stocks	kt	-96.7	-9.0	1.0	-108.0	60.5	43.5	1.0	-107.0	61.5	44.5	1.0
OECD[5]												
Production	kt	1 515.0	1 457.9	1 508.9	1 483.5	1 534.6	1 546.2	1 556.5	1 511.1	1 568.7	1 576.8	1 581.7
from whole fish	kt	1 054.0	1 004.4	1 047.9	1 015.2	1 058.9	1 063.5	1 066.7	1 014.1	1 064.4	1 065.5	1 063.4
Consumption	kt	1 715.6	1 652.4	1 676.5	1 621.3	1 624.6	1 614.0	1 604.3	1 539.1	1 563.5	1 564.3	1 566.2
Variation in stocks	kt	-11.9	-18.6	6.8	-27.1	34.9	-3.0	-8.1	-32.6	29.8	5.8	-0.4

Table C.7. World fish and seafood projections *(cont.)*

Calendar year

		Average 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
FISH OIL[6]												
World												
Production	kt	1 091.8	1 169.1	1 214.3	1 187.7	1 244.0	1 260.7	1 270.7	1 227.5	1 299.2	1 308.0	1 315.8
from whole fish	kt	567.4	609.4	646.1	605.2	661.7	668.8	676.5	619.3	690.0	693.2	695.3
Consumption	kt	1 120.7	1 181.9	1 216.7	1 216.3	1 220.7	1 255.9	1 271.9	1 259.2	1 275.6	1 301.6	1 316.0
Variation in stocks	kt	-27.6	-2.8	2.6	-28.6	23.3	4.8	-1.2	-31.7	23.7	6.3	-0.1
Price[8]	USD/t	1 910.3	2 312.5	2 028.6	1 922.0	1 738.8	1 744.1	1 773.3	2 108.8	1 979.2	2 033.1	2 088.2
Developed countries												
Production	kt	439.1	435.8	454.7	466.7	462.7	469.0	468.4	479.7	477.6	480.2	483.1
from whole fish	kt	167.7	158.2	172.2	173.5	173.2	173.2	173.4	173.7	173.8	174.0	174.2
Consumption	kt	581.9	650.3	662.1	662.3	645.7	672.4	687.6	721.0	712.3	731.7	742.9
Variation in stocks	kt	-2.1	-2.8	2.6	-10.6	7.3	2.8	-1.2	-13.7	7.7	4.3	-0.1
Developing countries												
Production	kt	653.0	733.3	759.6	721.0	781.4	791.7	802.3	747.8	821.6	827.7	832.7
from whole fish	kt	400.1	451.2	473.9	431.8	488.4	495.7	503.1	445.6	516.3	519.2	521.1
Consumption	kt	479.9	481.6	509.6	514.0	540.0	553.5	559.3	518.2	548.3	559.9	568.0
Variation in stocks	kt	-25.5	0.0	0.0	-18.0	16.0	2.0	0.0	-18.0	16.0	2.0	0.0
OECD[5]												
Production	kt	593.8	613.0	636.8	639.3	643.1	649.2	647.8	647.5	654.6	656.9	658.9
from whole fish	kt	199.0	188.4	206.2	197.1	203.6	202.9	201.8	190.1	198.7	198.1	197.0
Consumption	kt	770.6	797.9	827.5	826.2	825.8	854.9	867.4	857.6	868.0	889.6	901.6
Variation in stocks	kt	-3.4	-2.3	2.6	-15.6	12.3	2.8	-1.2	-18.7	12.7	4.3	-0.1

Note: The term "fish" indicates fish, crustaceans, molluscs and other aquatic animals, but excludes aquatic mammals, crocodiles, caimans, alligators and aquatic plants. Average 2019-21est: Data for 2021 are estimated. Prices are in nominal terms.

1. Data are in live weight equivalent.
2. World unit value of aquaculture fisheries production (live weight basis).
3. FAO estimated value of world ex vessel value of capture fisheries production excluding for reduction.
4. World unit value of trade (sum of exports and imports).
5. Excludes Costa Rica.
6. Data are in product weight.
7. Fishmeal, 64-65% protein, Hamburg, Germany.
8. Fish oil, any origin, N.W. Europe.

Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

ANNEX C

Table C.39.1. Fish and seafood projections: Production and trade

Calendar year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**178 900**	**203 403**	**2.00**	**1.16**	**43 363**	**45 902**	**1.27**	**0.80**	**42 540**	**45 902**	**1.09**	**0.80**
NORTH AMERICA	5 961	6 362	-1.16	0.51	6 271	6 968	1.87	0.83	2 520	2 661	-1.85	1.14
Canada	931	1 070	-1.24	1.58	677	638	0.72	-0.66	791	815	-0.14	0.94
United States	5 030	5 292	-1.14	0.31	5 594	6 330	2.02	1.00	1 729	1 846	-2.55	1.24
LATIN AMERICA	16 255	18 151	2.10	0.80	2 299	2 675	-0.23	1.11	5 310	6 201	3.32	1.58
Argentina	839	900	0.65	0.74	62	69	0.93	-0.70	595	680	-0.03	1.34
Brazil	1 334	1 521	0.48	1.22	537	560	-5.25	-0.58	58	67	4.05	0.82
Chile	3 336	4 328	0.68	2.22	132	135	3.80	0.00	1 666	2 771	2.74	4.69
Colombia	266	303	6.51	0.62	263	400	2.10	3.75	53	48	-4.94	-1.78
Mexico	1 825	1 925	1.09	0.33	481	521	3.52	2.01	369	299	11.03	-1.90
Paraguay	31	37	4.00	1.45	5	5	3.67	0.00	0	0	..	..
Peru	5 801	6 201	3.23	0.23	159	169	5.47	0.61	788	629	1.34	-1.79
EUROPE	17 405	18 757	0.82	0.88	11 586	11 612	0.22	0.35	10 505	12 011	0.97	1.55
European Union[1]	5 182	5 564	-0.18	0.66	8 166	8 370	1.05	-0.07	2 558	2 886	0.21	0.43
United Kingdom	855	976	-0.37	0.73	1 158	1 183	-1.65	-0.01	787	840	-1.59	-0.02
Norway	3 893	4 011	1.72	0.40	258	260	0.61	-0.38	2 918	2 997	0.37	0.41
Russia	5 247	5 923	2.31	1.56	844	813	-4.81	2.87	2 392	3 387	3.00	5.45
Ukraine	93	69	-9.46	10.03	553	405	1.10	11.53	33	19	-9.71	14.70
AFRICA	12 281	13 926	2.81	1.07	4 642	6 232	0.58	2.69	2 924	2 409	3.46	-1.86
Egypt	2 027	2 384	5.10	1.75	638	998	1.44	5.60	31	11	1.04	0.00
Ethiopia	61	73	7.29	1.64	3	5	3.21	4.81	1	0	-18.22	..
Nigeria	1 075	1 219	1.42	1.13	669	861	-7.88	0.41	4	4	-24.53	0.00
South Africa	519	554	-1.31	0.17	286	323	3.73	0.98	77	122	-15.55	0.83
ASIA	125 168	144 277	2.24	1.29	17 949	17 726	2.33	0.43	20 194	21 512	0.66	0.53
China[2]	62 829	73 892	1.73	1.51	5 459	4 643	5.79	-0.08	7 347	7 696	-0.40	0.84
India	13 999	17 589	5.91	1.87	80	197	17.40	9.94	1 398	1 165	5.60	-3.35
Indonesia	12 456	13 820	3.49	1.17	150	275	-1.80	2.66	1 339	1 882	0.02	3.40
Iran	1 292	1 451	5.69	0.85	42	50	-6.36	1.51	134	106	9.13	-1.53
Japan	3 742	3 407	-1.83	-0.88	3 317	2 885	-1.57	-0.64	743	825	1.85	0.19
Kazakhstan	53	57	4.70	0.73	63	71	-2.66	1.53	40	41	0.58	0.00
Korea	1 963	1 932	-1.11	0.05	1 859	1 979	2.67	1.00	675	664	-0.14	0.48
Malaysia	1 659	1 809	-0.85	0.60	674	703	2.39	-0.36	421	425	5.37	-0.82
Pakistan	656	695	0.63	0.49	8	9	5.38	0.00	228	207	3.92	0.17
Philippines	2 767	3 307	-1.21	1.29	522	634	7.71	2.85	308	265	-2.34	-2.56
Saudi Arabia	161	204	9.92	1.69	302	334	-1.01	0.86	37	36	2.43	-1.32
Thailand	2 583	2 842	-1.10	0.87	2 017	1 974	2.35	-0.52	1 809	1 892	-3.46	0.61
Turkey	821	790	3.86	-1.17	115	104	4.20	1.16	300	323	11.88	-2.09
Viet Nam	8 033	9 120	4.65	1.20	500	590	9.40	1.98	2 978	3 370	2.63	1.12
OCEANIA	1 830	1 930	3.09	0.24	626	690	-1.25	0.97	1 088	1 108	2.44	0.09
Australia	278	306	2.23	0.92	448	513	-0.65	1.28	78	52	5.20	-2.10
New Zealand	510	546	-0.86	0.31	59	60	0.96	0.00	408	437	-0.94	0.43
DEVELOPED COUNTRIES	**28 909**	**30 473**	**0.12**	**0.57**	**22 277**	**22 705**	**0.39**	**0.40**	**14 390**	**16 160**	**0.34**	**1.35**
DEVELOPING COUNTRIES	**149 991**	**172 930**	**2.39**	**1.27**	**21 097**	**23 198**	**2.30**	**1.21**	**28 150**	**29 742**	**1.50**	**0.51**
LEAST DEVELOPED COUNTRIES (LDC)	13 884	15 740	3.15	1.10	1 257	1 588	3.05	1.70	2 068	1 941	8.38	-0.63
OECD[3]	**28 653**	**30 470**	**-0.14**	**0.50**	**22 839**	**23 723**	**0.87**	**0.35**	**13 076**	**14 804**	**0.42**	**1.05**
BRICS	**83 928**	**99 479**	**2.33**	**1.56**	**7 205**	**6 537**	**2.74**	**0.41**	**11 272**	**12 436**	**0.81**	**1.34**

.. Not available

Note: Fish: The term "fish" indicates fish, crustaceans, molluscs and other aquatic animals, but excludes aquatic mammals, crocodiles, caimans, alligators and aquatic plants. Imports and exports refer to trade of food fish i.e. for human consumption. All data are in live weight equivalent. Average 2019-21est: Data for 2021 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Costa Rica.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.39.2. Fish and seafood projections: Reduction, food consumption

Calendar year

	REDUCTION (kt)		Growth (%)[4]		FOOD CONS. (kt)		Growth (%)[4]		FOOD CONS. (kg/cap)		Growth (%)[4]	
	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**15 959**	**16 492**	**1.28**	**0.15**	**158 897**	**183 136**	**2.01**	**1.36**	**20.5**	**21.4**	**0.88**	**0.46**
NORTH AMERICA	911	929	-1.02	0.08	8 221	9 232	1.18	0.78	22.3	23.5	0.49	0.22
Canada	9	19	-16.78	1.18	798	865	-0.10	0.48	21.1	21.0	-1.05	-0.28
United States	902	909	-0.65	0.06	7 423	8 368	1.32	0.81	22.4	23.8	0.67	0.27
LATIN AMERICA	5 887	6 275	1.08	-0.07	6 784	7 802	1.31	1.16	10.4	11.0	0.33	0.42
Argentina	0	0	0.00	0.00	305	288	2.18	-0.89	6.8	5.8	1.19	-1.67
Brazil	81	87	-2.22	1.07	1 731	1 927	-1.58	0.69	8.1	8.6	-2.36	0.22
Chile	1 269	1 209	-2.20	-1.13	235	243	0.26	0.34	12.3	12.4	-0.92	0.18
Colombia	0	0	0.00	0.00	476	657	5.64	2.98	9.4	12.2	4.31	2.49
Mexico	213	202	-5.21	0.04	1 723	1 945	1.56	1.19	13.4	13.7	0.38	0.34
Paraguay	0	0	0.00	0.00	36	42	3.94	1.27	5.0	5.2	2.60	0.22
Peru	4 234	4 610	3.50	0.20	963	1 101	4.51	1.36	29.2	30.3	3.02	0.51
EUROPE	2 457	2 420	3.53	0.41	15 742	15 684	0.04	0.11	21.0	21.2	-0.09	0.22
European Union[1]	736	665	3.84	0.68	9 940	10 254	0.42	0.13	22.3	23.2	0.30	0.23
United Kingdom	0	0	0.00	0.00	1 226	1 318	-0.84	0.54	18.1	18.6	-1.46	0.19
Norway	908	912	10.63	-0.06	275	312	0.74	1.08	50.8	52.7	-0.20	0.28
Russia	390	414	2.19	1.35	3 225	2 876	-0.37	-1.28	22.1	20.1	-0.52	-1.06
Ukraine	0	0	0.00	0.00	612	454	-0.33	11.18	14.0	11.2	0.17	11.95
AFRICA	672	737	-0.30	0.47	13 268	16 951	1.86	2.20	10.0	9.9	-0.70	-0.10
Egypt	0	0	0.00	0.00	2 633	3 371	4.34	2.77	25.8	27.5	2.18	1.14
Ethiopia	0	0	0.00	0.00	62	77	7.85	1.84	0.5	0.5	5.01	-0.44
Nigeria	0	0	0.00	0.00	1 740	2 076	-3.58	0.77	8.4	7.7	-6.06	-1.63
South Africa	295	320	2.16	0.73	432	436	2.51	0.18	7.3	6.5	1.06	-0.83
ASIA	5 936	6 041	1.54	0.26	113 939	132 335	2.47	1.46	24.7	26.6	1.50	0.81
China[2]	1 390	1 654	-7.94	0.32	58 051	67 936	2.50	1.57	40.3	46.4	2.01	1.45
India	933	948	14.83	1.37	11 331	15 434	5.63	2.90	8.2	10.2	4.51	2.06
Indonesia	85	85	18.98	0.00	11 182	12 129	3.82	0.90	40.9	40.2	2.60	0.05
Iran	110	134	1.10	0.02	1 090	1 262	5.08	1.19	13.0	13.5	3.69	0.28
Japan	693	482	-0.63	-2.77	5 623	4 986	-1.79	-0.71	44.5	41.5	-1.59	-0.21
Kazakhstan	0	0	0.00	0.00	76	86	-0.23	1.77	4.0	4.2	-1.61	0.88
Korea	116	117	-3.52	-0.42	2 893	3 071	0.77	0.65	56.4	60.1	0.51	0.70
Malaysia	128	105	-0.20	-1.07	1 756	1 982	0.04	0.90	54.3	54.4	-1.30	-0.14
Pakistan	134	128	3.81	0.00	303	369	-2.31	0.85	1.4	1.4	-4.30	-0.84
Philippines	0	0	0.00	0.00	2 981	3 676	0.14	1.89	27.2	29.4	-1.32	0.70
Saudi Arabia	0	0	0.00	0.00	426	503	1.76	1.37	12.2	12.7	-0.36	0.23
Thailand	312	236	-5.28	-2.40	2 292	2 587	4.10	0.73	32.8	36.8	3.74	0.70
Turkey	123	151	4.31	2.51	512	419	0.97	-1.05	6.1	4.7	-0.52	-1.57
Viet Nam	1 379	1 482	13.76	1.29	3 983	4 758	3.95	1.52	40.9	45.5	2.92	0.89
OCEANIA	97	90	-4.57	0.02	978	1 162	0.08	1.38	23.4	24.5	-1.33	0.23
Australia	34	33	-3.55	0.02	614	735	0.14	1.47	24.1	25.8	-1.17	0.50
New Zealand	54	57	2.50	0.01	106	112	-0.92	-0.17	22.0	21.5	-1.84	-0.84
DEVELOPED COUNTRIES	**4 589**	**4 385**	**1.96**	**-0.06**	**31 262**	**31 781**	**0.06**	**0.22**	**21.8**	**21.7**	**-0.35**	**0.03**
DEVELOPING COUNTRIES	**11 371**	**12 107**	**1.05**	**0.23**	**127 671**	**151 385**	**2.55**	**1.61**	**20.2**	**21.3**	**1.25**	**0.56**
LEAST DEVELOPED COUNTRIES (LDC)	320	296	2.35	0.33	12 532	14 941	2.31	1.52	14.1	13.3	-0.04	-0.63
OECD[3]	**5 058**	**4 757**	**0.36**	**-0.46**	**32 179**	**33 647**	**0.29**	**0.37**	**23.1**	**23.4**	**-0.24**	**0.11**
BRICS	**3 090**	**3 422**	**-1.42**	**0.78**	**74 771**	**88 608**	**2.67**	**1.66**	**23.1**	**26.0**	**1.90**	**1.20**

Note: Fish: The term "fish" indicates fish, crustaceans, molluscs and other aquatic animals, but excludes aquatic mammals, crocodiles, caimans, alligators and aquatic plants. Imports and exports refer to trade of food fish i.e. for human consumption. All data are in live weight equivalent. Average 2019-21est: Data for 2021 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Costa Rica.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en