

Chapter 8. Fish and seafood

This chapter describes the market situation and highlights the medium-term projections for world fish and seafood markets for the period 2019-28. Price, production, consumption and trade developments for fish and seafood from catch and aquaculture are discussed. The chapter concludes with a discussion of important risks and uncertainties affecting world fish and seafood markets during the coming ten years.

8.1. Market situation

Overall, 2018 has been a year of further expansion for the fisheries and aquaculture sectors, with production, trade and consumption all reaching historical peaks. The growth in production was due to an increase in capture fisheries (mainly of anchoveta in South America) and the continued expansion of aquaculture production, at some 3-4% a year.

Fish¹ prices grew during the first part of 2018, driven by demand growing faster than supply for a number of key species, and weakened over the rest of the year due to increased supply and softening consumer demand in the United States and some European markets. The aggregate FAO Fish Price Index² reached a record high in March 2018 (165 from a base of 100 in 2002-04), and then started to slightly decline. However, fish prices remained above 2017 levels for most species and products. These high prices, combined with sustained trade volumes, resulted in the value of total trade in fish and fish products peaking at USD 166 billion in 2018, more than a 7% increase compared with the previous year.

8.2. Projection highlights

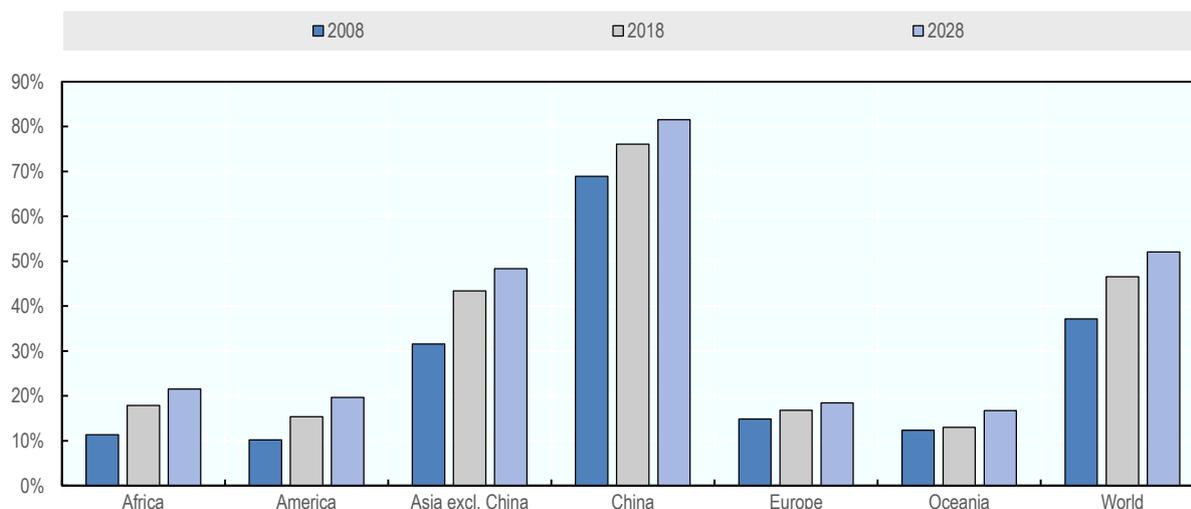
Fish prices will all remain relatively flat in real terms over the duration of the outlook period, as production constraints prevent prices falling to the same extent as expected in potential meat substitutes, such as poultry. Growth rates are projected to be within +/-1% p.a. in all cases; slightly negative for capture species, the world price for traded fish, and fishmeal; and slightly positive for aquaculture species and fish oil. When compared to the previous decade (2009-18), annual rates of price growth are all projected to be either lower or remain negative. In the wake of the higher price plateau observed for many agricultural products over the previous decade, prices of fishmeal and fish oil in particular have been historically high, a situation that is expected to continue into the foreseeable future. Growth in the weighted average real price of aquaculture species outpaces that of the price of low protein feeds such as maize. This is potentially a positive sign for profitability as low protein feeds represent a major input in the production of many aquaculture species. In nominal terms, fish prices are expected to gradually increase in all cases.

The quantity of fish produced at the global level is projected to continue growing (1.1% p.a.), but at a slower rate than observed over the previous decade (2.4% p.a.). Among the major contributors to the slowdown, there are the impacts of the China's 13th five-year plan (2016-2020)³, affecting both capture and aquaculture production, and the downwardly revised Chinese production data since 2009.⁴ The relative and growing importance of aquaculture should continue (Figure 8.1) and the average growth in this sector (2.0% p.a.) is expected to be the principle driver of growth in total fish production at the global level in this *Outlook*. By 2028, aquaculture is projected to produce substantially more fish than the capture sector (8.0 Mt). While inadequate governance and stock depletion of some fisheries will continue to be a concern at the global level, the quantity of fish produced by capture fisheries is projected to increase slightly over the outlook period (0.2% p.a.), partly supported by expectations that improved management conditions in several regions will continue to pay dividends.

It is projected that fish production will predominantly continue to be consumed as food (178 Mt in 2028), with only 9.4% utilised for non-food uses (mainly as fishmeal and fish oil). The share of fish for human consumption originating from aquaculture is projected to increase from 52% (average 2016-18) to 58% in 2028. The slowdown in world fish production growth means global food fish consumption is projected to increase by only 1.3% p.a., a substantial decline when compared to the 2.7% p.a. growth rate witnessed over

the previous decade. World per capita apparent⁵ fish food consumption is projected to reach 21.3 kg per capita in 2028, up from 20.3 kg per capita in 2016-18. While Sub-Saharan Africa is expected to decline slightly in per capita terms, or remain static in the case of Africa overall, Latin America and Europe should show the highest growth rates.

Figure 8.1. Contribution of aquaculture to regional fish and seafood production



Source: OECD/FAO (2018), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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Fish and fish products (fish for human consumption and fishmeal) are amongst the most traded food items in the world. By 2028, export volumes of fish and fish products are projected to account for about 36% of total production (31% excluding intra-EU trade). World trade of fish for human consumption is projected to continue growing over the coming decade (+1.1 p.a.) but at a slower rate than in the past decade (+1.9% p.a.), reflecting the slowdown in production growth. The long-term trend, which has seen Asian countries steadily increasing their proportion of world trade in fish for human consumption, is projected to continue with 52% of world exports by 2028, compared with 49% in 2016-18. After experiencing a downward trend over the previous decade, world fishmeal trade is expected to grow over the outlook period, boosted by higher fishmeal production as greater quantities are recovered from fish waste and capture production increases slightly.

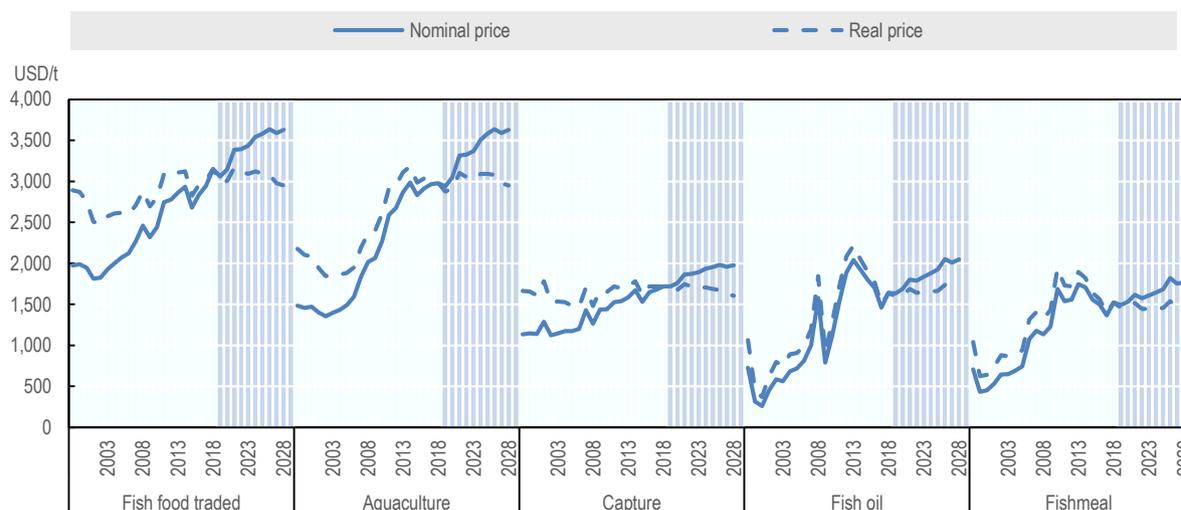
These outlook projections are a conditional scenario of what are considered the most likely developments, based on specific economic and policy assumptions. Future prospects for the fisheries and aquaculture sectors are subject to multiple uncertainties arising from changes in environmental conditions, governance in the fisheries sector, and trade policies and market access. Consequently, the implications of these uncertainties depend upon both the extent to which they differ from the assumption and the sector’s capacity to deal with them.

8.3. Prices

Fish prices are expected to remain relatively stable over the outlook period in real terms, with small reductions expected in most cases by 2028 when compared to the base period. The greatest decrease is projected for capture production (-6.5%) followed by fishmeal

(-4.0%), traded fish products (-3.0%), and then aquaculture (-2.2%), while the price of fish oil is projected to increase slightly (+1.8%) (Figure 8.2).

Figure 8.2. 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 price: US GDP deflator and base year = 2018. *Source:* OECD/FAO (2019), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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The most likely outcomes of China’s 13th five-year plan (2016-2020) are once again the key underlying assumptions for fish and seafood in this *Outlook*, as it was in the 2018 report. In combination with a census driven downward revision of production data for China from 2009, this has resulted in a substantial reduction in fisheries and aquaculture production. This reduction caused an increase in Chinese prices, which was further exacerbated by the ongoing swine flu outbreak reducing pork production and increasing demand for fish. China produces 59% of global aquaculture (average 2016-18), so its relative importance in combination with strong global demand for fish driven by a growing population and incomes, has helped to reduce the extent to which fish prices will fall at the world level.

While the fishmeal price is expected to fall slightly in real terms, it is coming from what are historically high levels and by 2028 prices will still be 53% higher than those seen in 2005, the year prior to the period when major increases started. This situation is even more pronounced for fish oil, where the real price in 2028 is projected to be 83% higher than that observed in 2005. Considered together, and all else remaining equal, this suggests that converting capture fish and fish waste to fishmeal and fish oil will remain a lucrative activity over the period projected.

Over the long term, world prices of fishmeal and fish oil are expected to continue to broadly follow the price of oilseed products due to their strong substitution possibilities. However, fishmeal prices are expected to slowly increase relative to oilseed meals due to limited growth of supply, with reductions in El Niño⁶ years; and continuous demand due to its

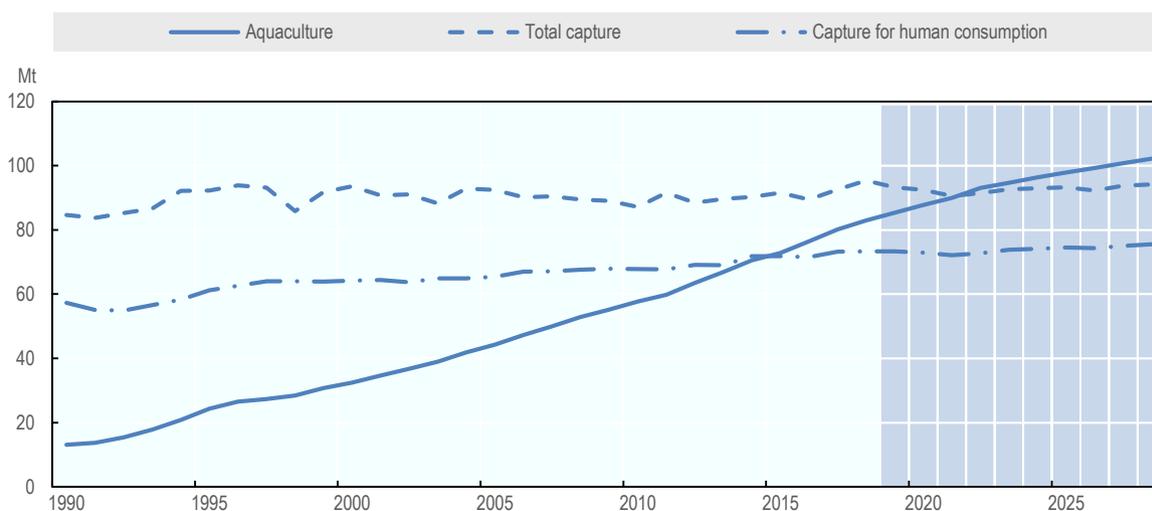
nutritional characteristics, from both expanding aquaculture production and other sources such as livestock breeding (mainly pigs and poultry). For fish oil, the ratio with oilseed oil will remain high since the structural change in the relationship that occurred in 2012 is assumed to be maintained. The change came about largely as a consequence of increased demand for omega 3 fatty acids, of which fish oil is particularly rich, in the human diet.

Feed is the major expense for most intensive aquaculture producers and the increasing importance of plant-based ingredients in feed rations make the ratio between aquaculture and maize prices a good indicator of potential profitability in aquaculture. This ratio is expected to remain high over the current outlook period, suggesting a profitable aquaculture sector in most years.

8.4. Production

The total quantity of fish produced at the world level is projected to be 196.3 Mt by 2028, an increase of 14% relative to the base period (average of 2016-18) and an additional 24.1 Mt of fish and seafood in absolute terms (Figure 8.3). While the total quantity being produced continues to increase, both the rate and absolute level of growth continue to fall. In absolute terms, growth in total fish and seafood production over this outlook period is projected to be 51% of that observed over the previous decade, when annual world production was 32.2 Mt higher by the final year.

Figure 8.3. World aquaculture and capture fisheries



Source: OECD/FAO (2019), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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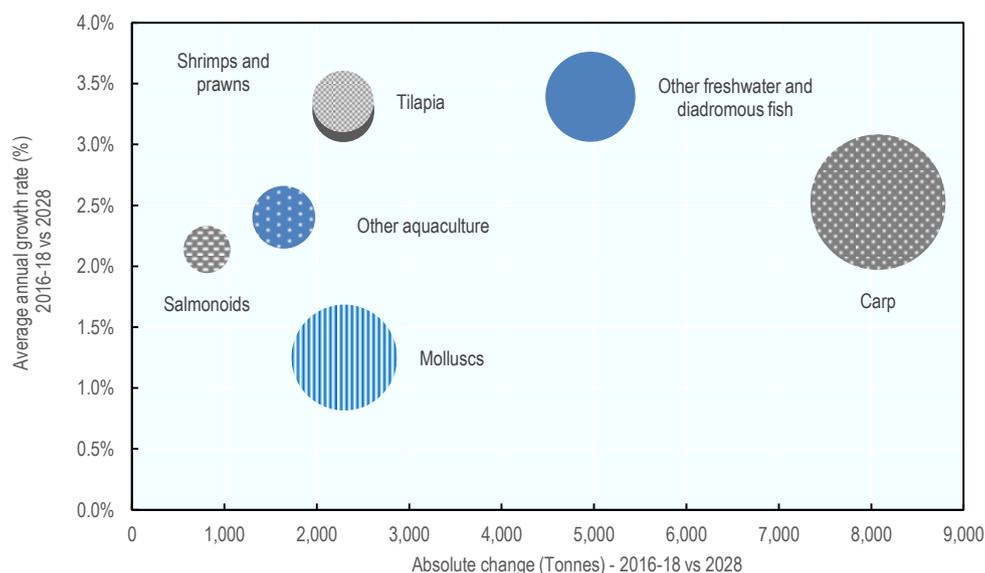
The majority of growth in world fish and seafood production will continue to come from the aquaculture sector, where output is projected to increase by an average of 2 Mt per year to 102.2 Mt in 2028, an increase of 28% over the outlook period. While breaking the 100 Mt threshold for the first time in 2027 will be a milestone event for the aquaculture sector, the annual rate of aquaculture growth is expected to continue to slow over the next decade, projected at less than half that observed in the previous one (2.0% vs 4.6%). This is largely a consequence of how China’s current five-year plan is expected to constrain

output growth of its aquaculture industry. China's aquaculture production is expected to grow by 24% in the next decade, halving from the 54% increase in the previous decade. China accounted for 59% of global aquaculture production in the base period (average of 2016-18) and this is projected to fall to 57% by 2028, despite aquaculture's contribution to total Chinese fish and seafood production increasing from 75% to 82% (Figure 8.3) in the same period, as levels of capture fisheries production fall (-14%). At the world level, the anticipated lower productivity gains in aquaculture, as a consequence of environmental regulations and a reduction in the availability of optimal production locations, will also contribute to lower production growth.

In contrast to the relative plateau of recent years, some growth in capture fisheries production is projected, resulting in world capture production at the end of the outlook period being 94.2 Mt, about 1.7 Mt larger than the average of 2016-18 and an increase of 1.9% compared to the base period. This increase is despite the anticipated reduction in capture fisheries production from China and is driven by expectations associated with better management in some regions (e.g. North and Latin America, Europe) and the relatively high price of fish driving demand. At a country level, the greatest absolute increases in capture production are expected to occur in the Russian Federation and Indonesia. As a consequence of the overall increase in capture production, aquaculture is now not expected to surpass total capture production (including that utilised for non-food uses) until 2022, an event previously anticipated to occur in 2021. Assumed *El Niño* events in 2021 and 2026 result in world capture production falling in both years, as these periodic environmental events have a substantial impact on the pelagic fisheries of South American countries.

At the species group level, all forms of aquaculture production will continue to increase, but rates of growth will be uneven across groups and the importance of different species, in terms of quantities produced at the world level, will change as a consequence. By 2028, carp and molluscs, are projected to remain the most significant aquaculture groups and will together account for 55% of total production by 2028, 35.8% and 19.2% respectively. The dominance of these groups continues to diminish though, especially for molluscs, having slowly fallen from a combined peak of 77% in the mid-1990s, as production growth in other species has outpaced them. This pattern will continue over the next decade, with tilapia followed by catfish and pangas (part of other freshwater and diadromous fish) projected to experience the highest rate of growth, at 3.4% p.a. (Figure 8.4).

After a decade of little growth in fish oil production and falling levels of fishmeal production, both are expected to increase over the outlook period by 3.9% in 2028 compared to the base period in the case of fish oil and 10.6% in the case of fishmeal. This is despite the share of capture production that is reduced into fishmeal and fish oil not being expected to move much from its current level of around 16%. Growth is instead expected to be a consequence of: the ongoing increase in the proportion of fishmeal and fish oil being sourced from fish waste, their relative higher prices; and the expected small increase in capture fisheries production. The proportion of fishmeal being produced from waste is projected to increase from 25% in 2018 to 31% by 2028, while for fish oil it is projected to increase from 35% to 40%.

Figure 8.4. Growth in world aquaculture production by species

Note: The size of the bubble represents the average world total production (tonnes) in 2016-2018.

Source: OECD/FAO (2019), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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8.5. Consumption

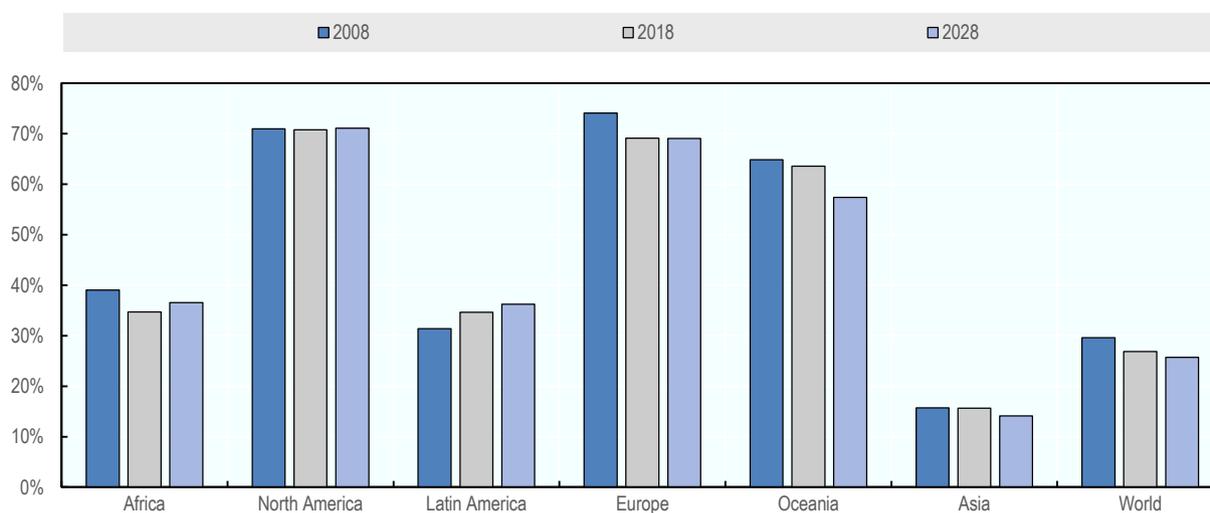
Fish is a versatile and heterogeneous commodity covering a wide variety of species. It can be prepared and consumed in many different ways and forms for either food or non-food uses. Marked differences also exist in how fish is utilised, processed and consumed within and between continents, regions and countries. The bulk of the utilisation of fish production is in the form of products for human consumption and this share is projected to grow from 89% in the base period (2016-18) to 91% by 2028. Overall, the amount of fish for human consumption is projected to increase by 25 Mt by 2028, reaching 178 Mt. This represents an overall increase of 16% compared to the average for 2016-18, a slower pace when compared to the 32% growth experienced in the previous decade. This slowdown mainly reflects the reduced amount of additional production available, a deceleration in population growth and saturated demand in some countries, particularly developed ones, where food fish consumption is projected to show little growth (+0.6% p.a. by 2028).

Growth in demand will stem mostly from developing countries (in particular in Asia), which are expected to account for 93% of the increase in consumption and to consume 81% of the fish available for human consumption in 2028 (vs 79% in 2016-18). Overall, Asia is projected to consume 71% (or 126 Mt), of the total food fish, while the lowest quantities will be consumed in Oceania and Latin America. Asia will also continue to dominate growth in consumption, accounting for 71% of the additional fish consumed by 2028. This growth, in particular in eastern (minus Japan) and south-eastern Asia, will be driven by a combination of further increases in domestic production, in particular from aquaculture, rising income and increased commercialisation and a large, growing and increasingly urban population, which will push the intake of animal proteins, including fish, at the expense of foods of vegetal origin. Being the largest fish producer, China will remain by far the world's largest fish consuming country, projected to consume about 36% of the global total in 2028,

with per capita consumption reaching about 44.3 kg compared with 39.3 kg in the base period.

Overall, growth in demand is also expected to be fuelled by ongoing changes in dietary trends, which should continue towards a greater variety in food choice along with increased health, nutrition and diet concerns. Fish, being a concentrated source of protein and of many other essential fatty acids and micronutrients, plays a particular role in this regard by providing a valuable and nutritious contribution to a diversified and healthy diet. Trade is expected to continue playing a major role as expanding the commercialisation of fish which will further help to reduce the impact of geographical location and limited domestic production, broadening the markets for many species and offering wider choices to consumer. Imports are projected to represent up to 69% of the food fish consumption in Europe and up to 71% in North America (Figure 8.5).

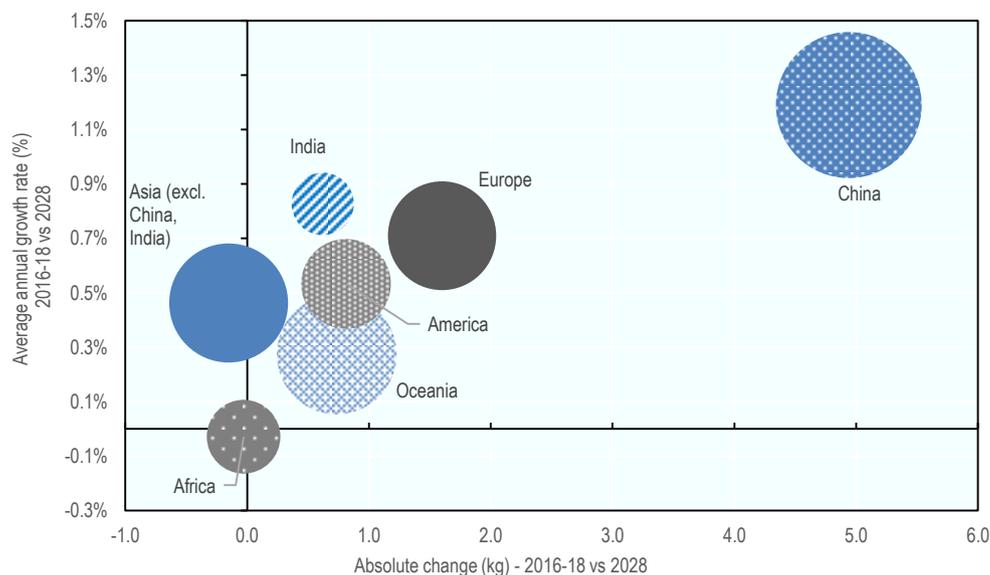
Figure 8.5. Share of imports in food fish consumption by region



Source: OECD/FAO (2018), "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 (Figure 8.6) should increase in all continents, except Africa where consumption is expected to remain static. A small decline is expected to occur in Sub-Saharan Africa. Despite an expected overall increase in total food fish supply (+30% for Africa and +31% for Sub-Saharan Africa compared to the base period), obtained through increased production and imports, it will not be sufficient to outstrip similar growth rates of the African population, with a consequent static or declining per capita fish consumption. This stagnation of per capita fish consumption for Africa as a whole and the decline for the Sub-Saharan region, raises an alarm in terms of food security, considering that the highest prevalence of undernourishment in the world is in Africa and that the food security situation has recently worsened, especially in parts of sub-Saharan Africa.⁷ Even if current per capita fish consumption in Africa is lower than the world average, fish plays a major role in the region, providing valuable micronutrients and proteins, at higher levels than the world average in the case of proteins.

Figure 8.6. Growth in per capita fish consumption by region

Note: The size of the bubble represents the average world total production (tonnes) in 2016-2018.

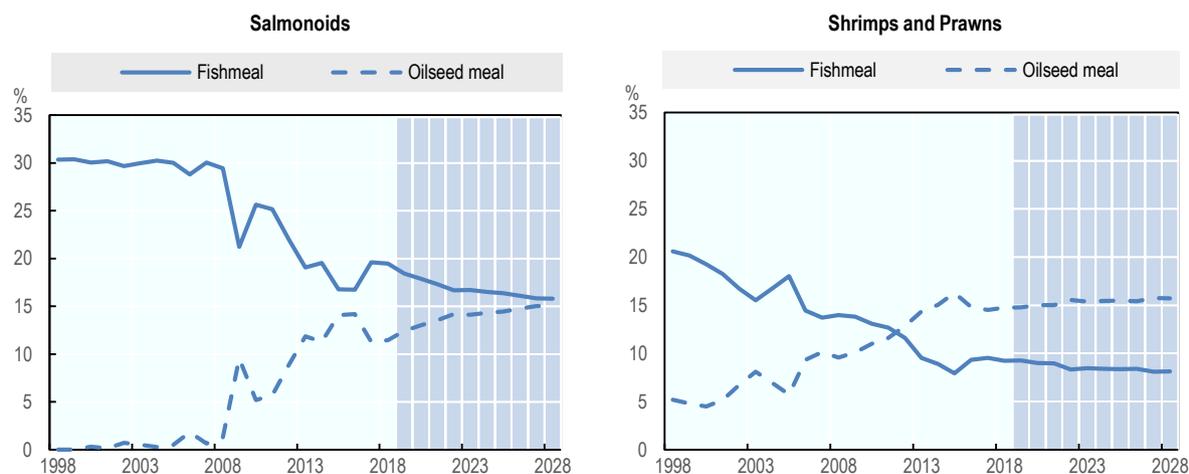
Source: OECD/FAO (2019), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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Just under 10% of fish production is projected to be utilised for non-food uses. The greatest amount will be used to produce fishmeal and fish oil, and about 2% for ornamental fish, culturing, fingerlings and fry, bait, pharmaceutical inputs, or as direct feed for aquaculture, livestock and other animals. Fishmeal and fish oil can be processed from whole fish, fish trimmings or other fish by-products resulting from processing. Both fishmeal and fish oil are mainly used as animal feed in aquaculture and livestock breeding (in particular pigs), and as dietary supplements for human consumption and ingredients in the food industry. Currently about 70% of fishmeal is used as feed in aquaculture and this share increases to 75% in the case of fish oil. Furthermore, about 7% of fish oil is utilised as dietary supplement.⁸ No major significant changes are expected in the next decade, except for a potential increase in the share of fish oil being utilised as dietary supplement, that usually obtain higher prices.

Due to limited increase in production volumes, together with high prices and innovation efforts, fishmeal and fish oil will be more frequently used as strategic ingredients to enhance growth at specific stages of fish or livestock production, as they are considered the most nutritious and most digestible ingredients for fish and livestock breeding. Their inclusion rates in compound feeds for aquaculture have shown a clear downward trend, as they are used more selectively and are substituted by lower priced oilseed meal (Figure 8.7). By 2028, the oilseed meal used in aquaculture is projected to reach almost 9 Mt in 2028, compared to 4.4 Mt for fishmeal. Being by far the main aquaculture producer, China will continue to be the main consumer of fishmeal, accounting for about 38% of total consumption, while Norway will remain the main consumer of fish oil due to its salmon industry.

Figure 8.7. Share of fishmeal and oilseed meal in feed ratio



Note: World weighted average.

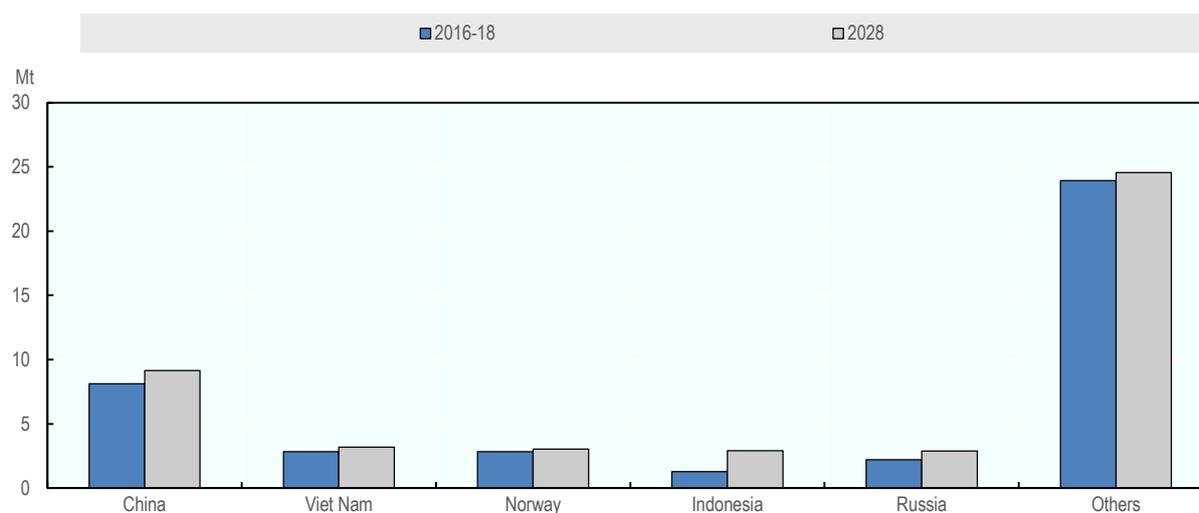
Source: OECD/FAO (2019), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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8.6. Trade

The expansion of trade in fish and fish products (fish for human consumption and fishmeal) will continue over the outlook period, but at a slower pace than in the previous decade, reflecting the slowdown in production growth and the trade tension between the United States and China. Trade will continue to play an important role in the fisheries and aquaculture sectors, notably in terms of food supply and food security. Globally, the contribution of fish to the total animal protein intake is trending upwards, partly due to the development of trade in fish and fish products.

World trade of fish for human consumption is projected to total 45.8 Mt live weight by 2028 (excluding intra-EU trade), up 11% on the 2016-18 base period. Exports of fish for human consumption are expected to concentrate in fewer exporting countries over the outlook period (Figure 8.8). The share of the top five largest exporters (China, Viet Nam, Norway, European Union (overtaken by Indonesia by 2028), and the Russian Federation) in total export volumes is expected to rise from 45% on average in 2016-18 to 46% by 2028. Among these countries, Norway is expected to experience the slowest growth rate, where the export trend mirrors the production trend. Alternatively, the fastest growth rate is forecasted for Indonesia. The country, in view of the expansion of its production, is expected to become the fourth largest exporter of fish for human consumption by 2028, ahead of the European Union and the Russian Federation, up from the tenth rank in the base period. Among the other large exporters, strong growth rates are projected in Chile and Thailand. However, the United States are projected to see a decline in their export volumes due to the on-going effects of the trade tension between the United States and China, which is assumed to last until 2028.

Figure 8.8. Exports of fish for human consumption by major exporters in 2016-18 and 2028

Source: OECD/FAO (2018), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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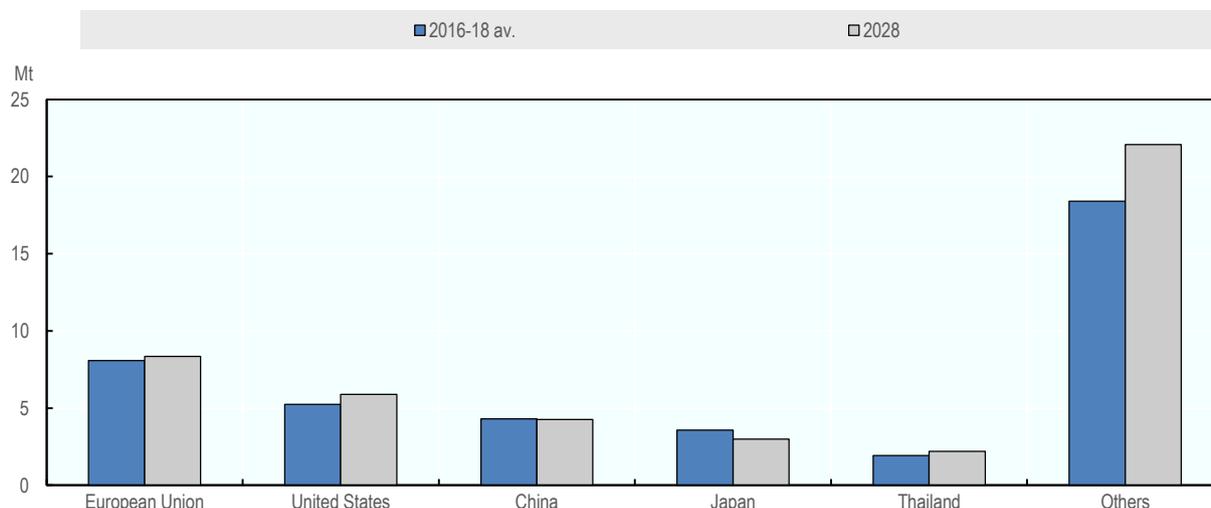
Imports, on the contrary, will become less concentrated over the outlook period. The European Union, United States, China, Japan, and Thailand will remain the top five importers of fish for human consumption (Figure 8.9). However, their share is projected to decline from 56% of global import volumes in 2016-18 to 52% in 2028, reflecting a decline in Japanese and Chinese imports. Fish consumption in Japan, which is partly sourced from imports, will continue its downward trend, as younger generations favour meat over fish. Chinese imports are expected to slightly decrease as the aquaculture sector better adapts to domestic consumers preferences in terms of species. In particular, imports of marine species are expected to decline over the outlook period. Overall, the share of Asia in world imports of fish for human consumption is projected to slightly decline from 40% in the base period to 39% by 2028.

Trade of fishmeal is projected to rise by 9.8% over the next decade, totalling 3.1 Mt product weight in 2028, reflecting higher production volumes except in 2026 an assumed severe *El Niño* year. This represents an upward change compared to the period 2013 to 2016 characterised by severe fishing quota in Peru and the occurrence of *El Niño*. Peru is expected to remain, by far, the main export of fishmeal, followed by the European Union and Chile. China will remain the main fishmeal importer, accounting for nearly half of total imports by 2028. It reflects the importance of its aquaculture production as fishmeal is used in feed manufacturing. Trade of fish oil is projected to reach 0.9 Mt product weight by 2028, up compared to the same dismal years for the same reasons. Fish oil is mainly imported by the European Union and Norway, where it is used as a food supplement and in the salmon industry.

The failure of the Doha round market access negotiation led to a proliferation of bilateral and regional trade agreements (RTAs). In this *Outlook*, the following seven trade agreements were explicitly taken into account: United States-Korea (KORUS), European Union-Korea, Canada-Korea (CKFTA), China-Korea, Canada-European Union (CETA), European Union-Japan economic partnership agreement (EPA), and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP).⁹ These agreements led

to a first tariff reduction on fish and fish products, respectively in 2012, 2013, 2015, 2017, 2018, 2019 and 2019.

Figure 8.9. Imports of fish for human consumption by major importers in 2016-18 and 2028



Source: OECD/FAO (2018), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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8.7. Main issues and uncertainties

The projections presented in this *Outlook* rely on a number of economic, policy, and environmental assumptions. A shock to any of these variables would result in different fish projections. Many uncertainties and potential issues may arise over the projection period. Several of these were analysed in previous editions of the *Outlook* (e.g. stock status, pollution, sector specific issues) and remain relevant. This section discusses some specific uncertainties.

For the period 2009-2016, capture and aquaculture production data for China have been revised following the new census results. The downward revision was taken into account in the *Outlook* as well as the most likely changes in the implementation of the Chinese 13th five-year plan (2016-2020), leading to significantly lower Chinese fish production than anticipated previously. However, uncertainties remain regarding the exact effects of the five-year plan. With China being the main fisheries and aquaculture producer and exporter, any changes from the baseline scenario could have significant consequences on the overall production, trade and consumption volumes of fish and fish products. For example, if the plan is fully implemented, overall production for China will be between 4 to 5 Mt less than the amount reported in this *Outlook*.

Climate change,¹⁰ weather variability and changes in the frequency and extent of extreme weather events are anticipated to have a major impact on the availability and trade of fish and fish products mainly through habitat destruction, changes in fish migration patterns and natural productivity of fish stocks. However, for complexity reasons, climate change was not explicitly included in the modelling exercise of this *Outlook*, except the influence of El Niño events, which are explicitly accounted for in the modelling process (in 2021 and

2026) based on previous behaviour. International fishing rights are likely to be further complicated as stocks move into new economic zones. There will be a higher potential for conflicts to arise when species enter new territorial waters and for temporary gaps in fishery managements policies as countries adapt to new migration routes. Already, with mackerel stocks shifting towards Iceland and the Faeroe Islands, a disagreement exists about mackerel management. Iceland and Greenland did not approve the proposal on quota shares agreed by the European Union, the Faeroe Islands, and Norway.

No impact from Brexit is taken into account in this *Outlook*. The current lack of agreement, ongoing uncertainty, and many possible outcomes mean it is not possible to account for this situation in the baseline. Potential outcomes of Brexit include reduced access to United Kingdom waters for European Union Member State vessels and higher tariffs for United Kingdom producers that export fish to the European Union. The European Union is the United Kingdom's most important export market for seafood so the impact of tariff, or customs-related delays when dealing with live or highly perishable fresh products have the potential to be costly to producers and may result in trade patterns changing.

The global level of fish production, accounting for both aquaculture and capture fisheries, is strongly influenced by management policy and enforcement. Governments are increasingly aware of the need for improved fisheries management frameworks. As a consequence of better and more effective resource management practices in certain regions of the world, some stocks and fisheries are showing signs of recovery and this is expected to continue in the next decade. This will help maintain and potentially increase overall capture fisheries by increasing catch in some fisheries and areas. The extent to which this is likely to occur is still subject to some uncertainty, but it is also a potentially positive development. Unfortunately, the objective of sustainable fisheries can be undermined by policies that ultimately encourage unsustainable harvest levels and methods, such as those that aim to support incomes or increase production. In this respect it is important that countries have set objectives as part of the UN SDGs to restore fisheries' sustainability and eliminate harmful support policies.

Future progress on eliminating harmful fisheries support policies is a further source of uncertainty for capture fisheries. Support policies can have unintended negative side-effects, such as increasing fishing effort beyond desired levels or causing excess capacity of fishing fleets, as well as making illegal unreported and unregulated (IUU) fishing more attractive for fishers. All of this taken together reduces the profits and income of fishers, leads to less fish for consumers, and risks the health of the ocean environment. New work by the OECD¹¹ has shown it is possible to support the fishing sector and deliver benefits to fishers without unduly provoking overfishing or overcapacity; for example, moving existing support away from gear, fuel, vessels or other inputs towards helping fishers to better operate their business could improve fishers' income by as much as USD 2 billion per year, reduce pressure on stocks, and increase harvest by almost half a Mt per year. Such changes, however, are dependent on progress at the WTO level and revisions to national fisheries policies.

The trade tension between China and the United States, resulting in a 25% rise in Chinese tariffs on all fishery products coming from the United States from mid-2018, was factored into the baseline. In the absence of signs of de-escalation of the trade tension, the higher tariffs were kept over the entire outlook period. The overall impact of the trade tension is estimated to be limited, as China should be able to source imports from alternative trading partners. Similarly, the United States should be able to partly divert exports to other destinations. However, it remains unclear whether these higher tariffs will be kept over the

entire outlook period. Depending on how long these tariffs remain active, they could lead to a potential reduction of traded volumes and to changes in trade patterns.

Notes

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

² Calculated in nominal terms and covering fish and seafood products.

³ As in the 2018 projections, this *Outlook* assumes only the most likely outcomes of China’s plan.

⁴ This revision occurred in light of new information from the census and affected both capture and aquaculture data in China.

⁵ 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.

⁶ The assumed magnitude of *El Niño* events in the *Outlook* is determined on the basis of previously observed events using historic Oceanic *Niño* Index values, a measure of the South Pacific water temperature Oscillation. The impact is set in 2021 and 2026.

⁷ FAO, IFAD, UNICEF, WFP and WHO. 2018. The State of Food Security and Nutrition in the World 2018. Building climate resilience for food security and nutrition. Rome, FAO. Licence: CC BY-NC-SA 3.0 IGO.

⁸ Source: The Marine Ingredients Organisation (IFFO).

⁹ Bilateral trade of the six countries (Canada, China, European Union with the United Kingdom, Japan, Korea, and the United States) could be included in the model thanks to the information kindly provided by the Department of Fishery and Ocean in Canada (DFO) coming from their seafood Market Simulation Model (SEASIM).

¹⁰ Barange, M., et al. (Eds.) (2018), “Impacts of Climate Change on fisheries and Aquaculture: Synthesis of Current Knowledge, Adaptation and Mitigation Options”, *FAO Fisheries Technical Paper* 627 <http://www.fao.org/3/I9705EN/i9705en.pdf>.

¹¹ Martini, R. and J. Innes (2018), “Relative Effects of Fisheries Support Policies”, *OECD Food, Agriculture and Fisheries Papers*, No. 115, OECD Publishing, Paris <http://dx.doi.org/10.1787/bd9b0dc3-en>.