

## Chapter 8. Fish and seafood

*This chapter describes the market situation and highlights the latest set of quantitative medium-term projections for world and national fish markets for the ten-year period 2018-27. Global fish production will continue to grow, albeit at a much reduced pace compared with last decade. Additional output derives completely from continued but slowing growth in aquaculture, while capture fisheries production is expected to fall slightly. Policy changes in China imply a potentially large reduction in the growth of its aquaculture and capture fisheries output. Asian countries will account for 71% of the increase in fish consumption as food, and per capita fish consumption will increase in all continents except Africa. Fish and fishery products will continue to be highly traded; Asian countries will continue to be the main exporters of fish for human consumption while OECD countries will remain the main importers. Fish prices will all increase in nominal terms but remain broadly flat in real terms*

## Market situation

The global fishery and aquaculture sector expanded further in 2017, with a faster growth rate than 2016. This increase was primarily accounted for by a recovery in catches of anchoveta (mainly used to produce fishmeal and fish oil) in South America and by a further expansion of aquaculture production, which continues to rise at some 4% a year. As in more recent years, aquaculture was responsible for the major growth of overall production and consumption.

Despite the higher level of production in 2017, additional demand generated by improving economic conditions globally lifted fish prices. The FAO Fish Price Index highlights higher prices in 2017 compared with 2016, in particular in the first nine months of 2017, followed by a slight decline towards the end of the year. This increase in prices, together with higher traded volumes, has made 2017 the year in which the value of total trade of fish and fishery products reached its peak. Despite higher prices, consumption was strong due to sustained consumer demand for fish, supported by the improving economic environment in both developed and developing regions, including recoveries of some major emerging markets such as Brazil and the Russian Federation.

## Projection highlights

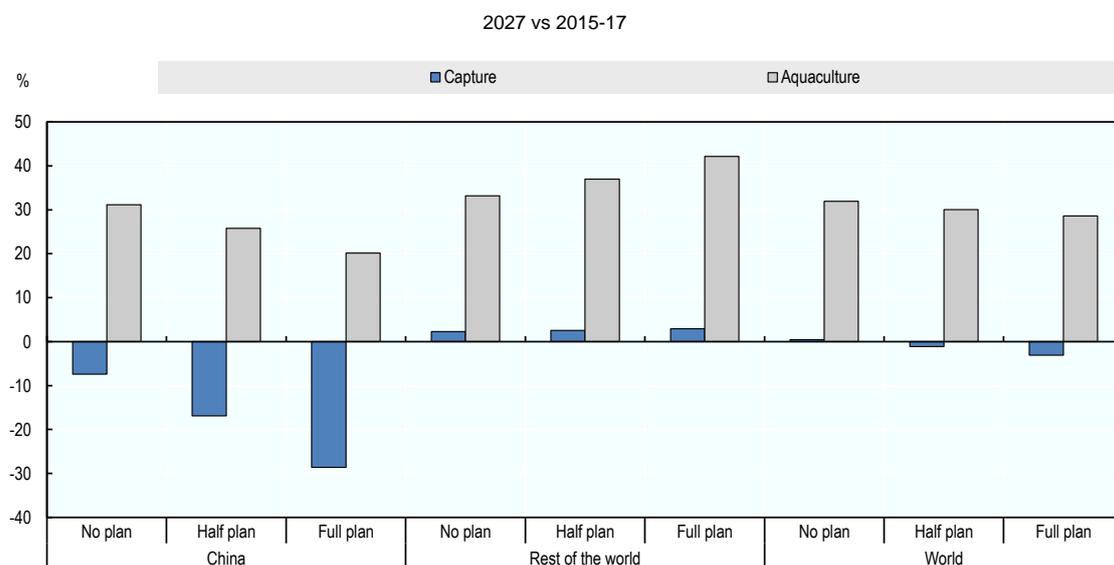
This *Outlook* contains major changes relative to the preceding years concerning fish production in the People's Republic of China (hereafter "China") for both capture and aquaculture. The first change is that China's 13<sup>th</sup> five-year plan (2016-2020) aims to, among other things, improve efficiency and sustainability in its fisheries sector, but this also implies potentially substantial reductions in growth for its aquaculture industry and reduced capture fisheries landings. Given China's significance in fisheries at the world level, even accounting for only the most likely outcomes of these objectives in this year's baseline<sup>1</sup> has resulted in total production in China being much lower in this outlook, which has had a visible impact on the projections for world fish production and consequently prices, trade and consumption (Figure 8.1). The second change is that estimates of the value of aquaculture production in China have been substantially upwardly revised since the last outlook, in light of new information, a change that has also affected aquaculture prices at the world average level.

Fish prices will all increase in nominal terms over the duration of the outlook period. The average nominal world price for traded fish<sup>2</sup> will increase by a total of 23.7%, demonstrating a relatively sustained growth trajectory that takes it from USD 2 828/t in the base period to USD 3 499/t in 2027. The weighted average price of aquaculture species is expected to have a lower rate of growth when compared to what was observed in the preceding decade (+1.5% p.a. vs +4.4% p.a.) as it is now starting from a high level, but its rate of growth will still be higher than that for capture species. The aquaculture price is now expected to increase by a total of 19.5% over the period, from USD 2 878/t to USD 3 439/t. Growth in the average nominal price of wild caught fish should remain steady as capture fisheries have limited ability to influence the quantities or compositions of the species they land at the global level. Average nominal capture fishery prices are consequently expected to go from USD 1 557/t to USD 1 819/t over the projection, an increase of 16.8%.

The quantity of fish produced at the world level is also expected to continue growing, increasing every year other than when the second of two assumed *El Niño* events<sup>3</sup> is imposed in 2026. Overall growth is expected to be relatively low, with total production

increasing by 13.4% between the base period and 2027, around half the increase seen in the previous decade (27.1%). The annual average rate of growth reflects this slowdown, being only slightly above 1% p.a. World growth will be completely founded upon the continued but slowing growth in aquaculture output. Capture fisheries production is expected to fall slightly over the outlook, period and result in 1.05 Mt less fish being caught in 2027 than in the base period (growth rate of -0.01% p.a.), mainly due to a reduction in catches by China. This decline should be partly compensated by expected growth in other areas also thanks to stricter management measures, which should allow the recovery of certain stocks.

**Figure 8.1. The potential impact of the Chinese plan on growth in world aquaculture and capture 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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A greater share of fish production will go to human food consumption by 2027 (91%) than in the base period (89%). However, mirroring the slowdown in fish production growth, global food fish consumption is anticipated to increase by just 1.2% p.a., a substantial decline when compared to the 3.0 p.a. growth rate witnessed over the previous decade. Overall food fish will increase from 153 Mt in the 2015-17 base level to 177 Mt in 2027. About 72% of this total will be consumed by Asian countries, which will account for 73% of the total increase in food fish consumption. In per capita terms, apparent fish food consumption is projected to rise slightly, from 20.3 kg in the base period to 21.3 kg in 2027, with the annual growth rate declining from 1.8 to 0.3%. Per capita fish consumption will increase in all continents, except Africa (-4% as population growth outpaces growth in supply), with Latin America and Asia showing the highest growth rate.

Fish and fish products for human consumption and non-food products will continue to be highly traded with about 38% of total fishery production (31% excluding intra-EU trade) expected to be exported in 2027. World trade of fish for human consumption is projected to expand by 18% or 7 Mt live-weight equivalent (lw) by 2027. However, its annual

growth rate for exports will decline from the 1.9% p.a. observed in the previous decade to 1.6% p.a. over the coming decade partly owing to increasing prices, and the slowdown in production. Asian countries will continue to be the main exporters of fish for human consumption, slightly increasing their share in world exports from 49% in the base period to 50% in 2027.

In addition to the possible consequences of the potential changes to be implemented in the fisheries and aquaculture sector in China, a number of uncertainties and challenges exist that influence the evolution and dynamics of the world fisheries and aquaculture sector. For production, these include issues related to the natural productivity of fish stocks and ecosystems, environmental degradation and habitat destruction, overfishing, illegal, unreported and unregulated fishing (IUU), climate change, weather patterns, transboundary issues with respect to natural resource utilisation, poor governance, invasion of non-native species, diseases and escapes, accessibility and availability of sites and water resources, as well as to technology and finance. Furthermore, trade policies, trade agreements and market access remain important factors influencing the overall dynamics of the fish markets. From the perspective of market access, issues include those related to food safety and traceability, the need to demonstrate that products are not derived from illegal and proscribed fishing operations.

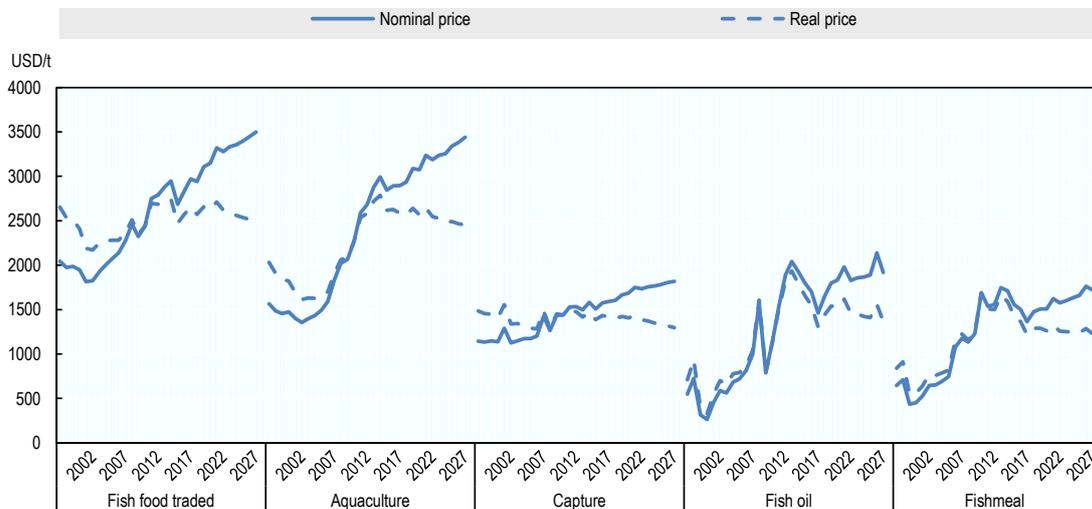
## Prices

Fish prices continue to remain at relatively high levels. In nominal terms they are expected to follow an increasing trend over the duration of the projection, with prices for aquaculture, capture and traded fish all growing at averages of less than 2% p.a. over the period 2018-2027. In real terms, average prices for both aquaculture and capture species are expected to fall; aquaculture by 0.7% p.a. and capture by slightly over 1% p.a.). Real prices for traded fish tend to increase over the short term before starting to fall after 2022, resulting in the annual average growth rate falling by 0.6% p.a. over the duration of the projection (Figure 8.2).

World fish prices are determined by both demand and supply side factors; on the demand side these elements include world population, income, and the price of substitutes such as meat. On the supply side prices are influenced by levels of production which, in turn, are affected by input prices, such as energy or feed in the case of aquaculture, and the physical limits of the natural resource base. The last of these is especially relevant for capture fisheries, which are constrained by the levels of production that wild fish stock populations can sustain. The growth of certain aquaculture species also depend upon their ability to reduce their dependence on the use of wild caught fish, transformed into fishmeal.

A major factor influencing prices in the current projection is the expectation that production growth in China will slow substantially and result in upward pressure on global prices. To put this in context, in the absence of China's reforms the real world price of traded fish would have followed the same downward trend as anticipated for the world poultry price. In this *Outlook*, however, the downward trend only starts in 2022. Within China, nominal fish retail prices are expected to increase by just less than 2% p.a. over the outlook period, a rate that slightly exceeds the world average (1.65% p.a.).

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: any origin, N.W. Europe.

*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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The anticipated increase in world traded prices continues to be driven by aquaculture prices, which are expected to grow by an average of just over 1.5% p.a. in nominal terms over the outlook period. This growth equates to an increase of 19.5% in absolute terms by 2027 when compared to the base period. In this *Outlook*, aquaculture prices and the resultant growth figures are strongly influenced by both the expected slowdown in aquaculture production growth at the world level, mostly caused by the assumed changes in Chinese production, and the upward revision of data on the value of Chinese aquaculture production. The first of these revisions results in upward price pressure at the world level whilst the second has substantially increased the base from where aquaculture prices start in the projection. As before, the ability for aquaculture to influence the species mix it sells is also a factor in it achieving higher average prices than the capture sector (USD 3 439/t vs USD 1 819/t). Capture fisheries prices are also anticipated to increase in nominal terms but at a flatter trajectory, averaging 1.2% p.a. over the same period. In real terms, and other than in the assumed *El Niño*<sup>4</sup> years, all prices are expected to fall over the period of the outlook.

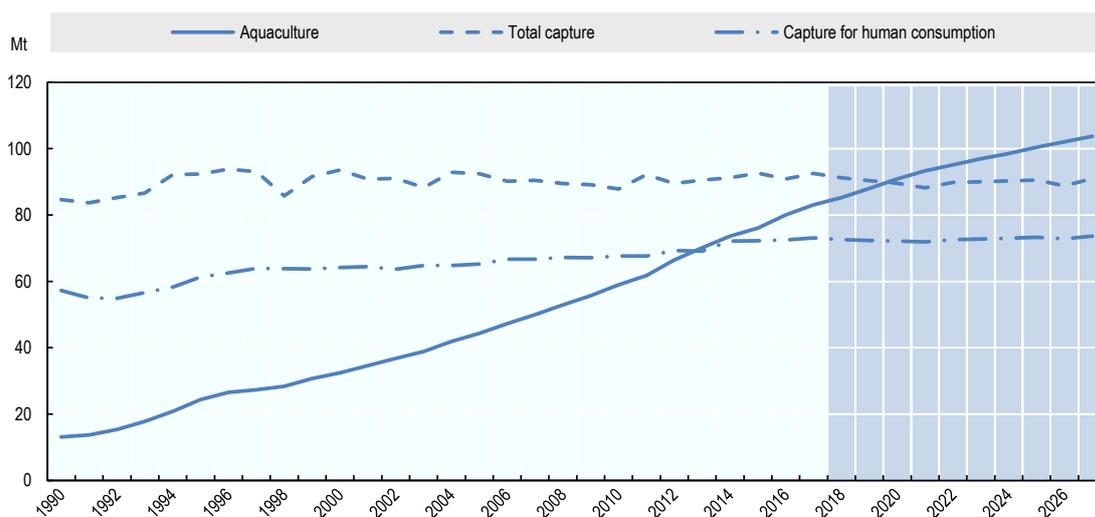
The popularity of omega 3 fatty acids in the human food diet and the specific characteristics required for feed by the aquaculture sector are assumed to have permanently increased the fish to oilseed oil price ratio and it is not expected that new feeding techniques will change this in the short to medium term. With slower but continuing growth in demand from aquaculture and rather stable supply, the price of fishmeal is expected to grow by a small amount relative to oilseed meals. No further increase is currently foreseen for fish oil, whose price ratio with oilseed is already high following the structural change observed beginning in 2012. World prices of fishmeal and fish oil are expected to generally follow the price of oilseed products over time as a consequence of strong substitution possibilities on the demand side. World prices for

fishmeal and fish oil, which have been in decline since peaking in 2013, are expected to start increasing again in nominal terms over the duration of the outlook, Fishmeal by 1.8% p.a. and fish oil by 1.6% p.a. Real prices will continue to fall but by only just under 0.5% p.a. for fishmeal and 0.7% p.a. for fish oil.

## Production

Total fish production at the world level will continue to grow, increasing by slightly more than 1% p.a. over the duration of the outlook to 195 Mt by 2027 and result in an additional 22.9 Mt of fish being produced when compared to the base period (Figure 8.3). This rate of growth and the quantity of additional fish produced are substantially lower than those observed over the previous decade though (2008-2017), when growth was 2.4% p.a. and the increase in quantity of fish produced was 37.4 Mt greater (difference in production between the base period 2005-2007 and 2017). The growth in total fish production is also entirely driven by aquaculture production, which is expected to increase by 30.1% over the outlook period (24 Mt) and overtake total capture fisheries in 2020.

**Figure 8.3. Aquaculture and capture fisheries**



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

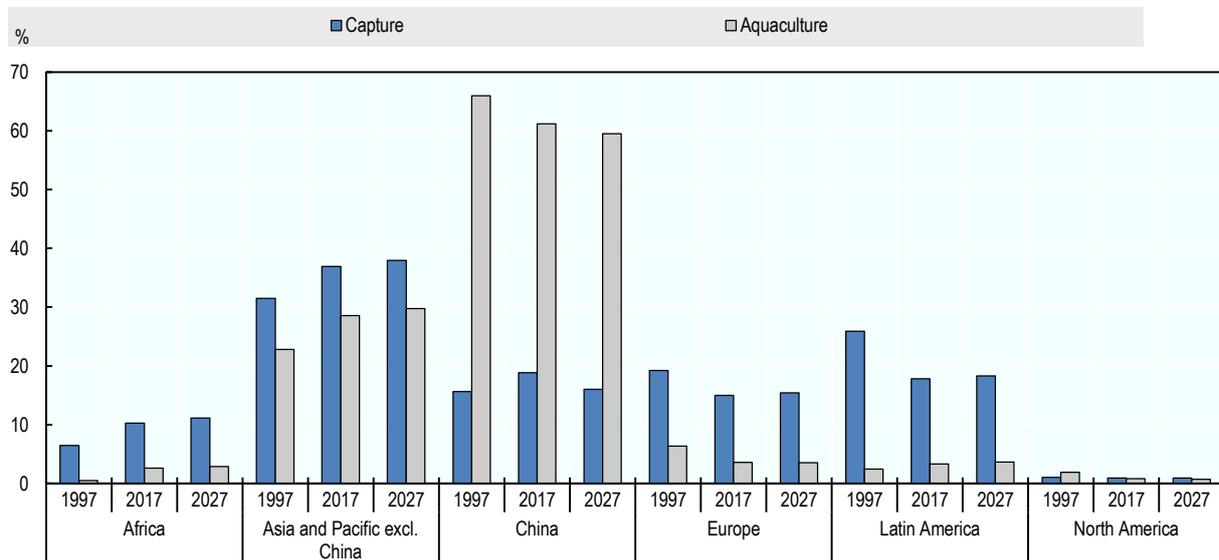
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China accounted for 38.8% of world fish production in the current base period (61.5% of world aquaculture production and 19.0% of capture in 2015-2017). Given its significance at the world level, it should be noted that a key factor influencing the fish sector in this *Outlook* is the set of assumptions made relating to the implementation of China’s 13<sup>th</sup> Five Year Plan, which is expected to reduce both the country’s level of capture production and the growth rate of its aquaculture production. For example, total Chinese fish production by 2027 as projected in this *Outlook* is expected to be 4.3 Mt lower than potential production without implementation of the plan (*status quo* scenario) of fish (Box 8.1). At the world level, the assumed reduction in Chinese production results in 2.9 Mt less fish being produced by 2027, as some of the reduction is mitigated by increases in production elsewhere. Despite the anticipated changes within China, the

majority of world fish production will still originate from Asia, increasing from 70.8% of total production in the base period to 71.8% by 2027.

Aquaculture growth at the world level is expected to continue facing challenges associated with factors that include environmental regulations, diseases related to stocking density, and a reduction in the availability of optimal production locations. World aquaculture production is projected to increase by just over 2.1% p.a. over the duration of the current outlook, this rate of growth is substantially lower than the 5.1% p.a. observed for the previous decade but in line with the observed trend of falling aquaculture growth rates over the last five decades. While the absolute increase in the quantity of fish produced by aquaculture is smaller over this projection (24.0 Mt) than in the previous decade (35.9 Mt) the percentage growth rate calculations are also moderated by continued growth in the absolute size of the underlying base number.

**Figure 8.4. Regional contribution to world total production**



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

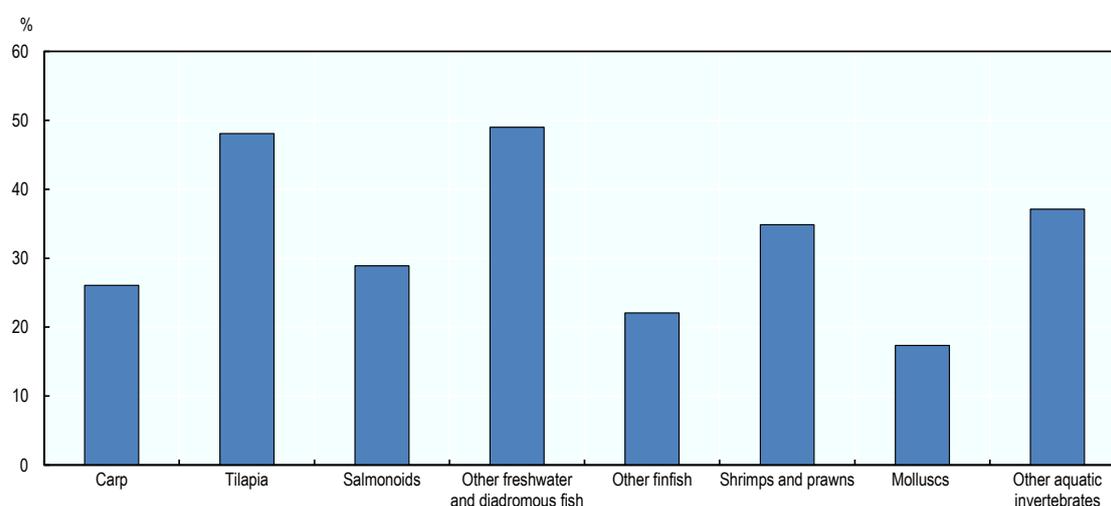
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World capture production will be relatively flat over the outlook period, falling by a total of just over 1% between the base period and 2027, from 92.0 Mt to 91.0 Mt. Due to the rapid reduction in capture production by China at the beginning of the outlook period, world aquaculture production is now anticipated to surpass total wild capture fisheries production (food and non-food uses) in 2020, a year earlier than anticipated in the previous *Outlook*.

Pressure for greater fish production at the world level is expected to come about as a consequence of the price effect of lower growth in world fish supply and continuing growth in demand. Increases in production will predominantly be met by aquaculture, where output is expected to increase in areas other than China, particularly within Asia. As it is assumed that quota under-fill is minimal in capture fisheries and current potential for further growth is limited by the resource base. China was responsible for 59% of growth in world aquaculture production over the previous decade but this share is

expected to fall to 53% over the current outlook period. Simulations undertaken with the model that consider the *status quo* versus a full implementation of the objectives of the 1<sup>3th</sup> Plan have indicated that other countries potentially have the ability to replace just over 50% of the lost aquaculture production but only 14% of the lower capture production (Box 8.1). This outcome in China will also contribute to a change in the species composition of world aquaculture production. The share of salmon and trout, shrimp, catfish (including pangas) and tilapia will increase while that of carps, marine fish and molluscs will fall. However, all the species groups showed an increase in production even if at different growth rates (Figure 8.5). Given these different growth rates by species, the share of aquaculture production harvested in inland waters is expected to increase over the outlook period, but at a slower pace than in the previous decade. That share went from 60% in 2007 to 64% in 2017 and it is expected to reach about 66% by 2027.

**Figure 8.5. Growth in world aquaculture production by species, 2027 vs 2015-17**



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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The share of wild fish reduced to produce fishmeal and fish oil is expected continue declining over the next decade, following the fall in world capture production. However, because the use of fish residue to produce fishmeal and fish oil will also continue to increase, as growing market demand for fillets is resulting in more residues being produced, the absolute level of world fishmeal and fish oil produced will gradually increase (except in *El Niño* years) to 5.2 Mt and just under 1.0 Mt respectively in 2027. These increases equate to growth rates of just under 0.9% p.a. for fishmeal and slightly less than 0.6% p.a. for fish oil. The share of fishmeal production that comes from residue will increase from 29% in the base period to 33% in 2027. The consequences of this change on the composition and quality of fishmeal (it will generally result in more minerals and less protein) is not captured by the model.

A notable consequence of the relatively limited ability for fishmeal production to increase and the continued growth of aquaculture is that a new, albeit relatively small, market for oilseed meals emerges to make up the shortfall. The observed price differential between

fish and vegetable oil, and the increasing difference between fishmeal and oilseed meals suggest that crushing fish is likely to remain a profitable activity for those who have access to the base resource.

**Box 8.1. China's 13<sup>th</sup> Five-Year Plan (2016-2020) foresees slower growth and greater efficiency for fisheries and aquaculture**

The People's Republic of China (hereafter "China") guides its social and economic development through the use of five-year plans, which set out strategic intentions and define major objectives, tasks, and measures for economic and social development. The 13<sup>th</sup> five-year plan (2016-2020) sets out policies for the "transformation and upgrading" of the fisheries and aquaculture sector. Objectives include a continued shift away from the past emphasis on increasing production and a move towards a more sustainable and market-oriented sector, where the focus is on improving product quality and optimising industry structure. This includes the processing sector, with plans to reduce waste levels and establish industrial clusters.

China is the world's leading fisheries and aquaculture producer and exporter. The capture and aquaculture sector experienced rapid growth in output in the period 1980-2016, with aquaculture production increasing by about 10% per year on average and capture fisheries by almost 5%. A major contributor to this expansion was production oriented government policy, which aimed to expand the output of both aquaculture and capture fisheries, as well as the liberalisation of fish production and trade.

The new five-year plan seeks to address current challenges to the sector, which include limited farming space, scattered small-scale farms, degraded fisheries resources and excess capacity in the capture sector. The objectives for aquaculture development include:

- Demand-oriented production that produces species for which there is a market.
- "Healthy aquaculture" production that is standardised, sustainable and better integrated with the environment.
- Ecologically sound technological innovation to facilitate the sustainable intensification of production.
- For fisheries, the main objectives relate to:
  - The protection of marine ecosystems and the restoration of resources within China's exclusive economic zone (EEZ).
  - Constraining capacity and landings through licensing and output controls - in the form of Total Allowable Catch (TAC).
  - Reducing illegal, Unreported and Unregulated (IUU) fishing, control over fishing gears and vessels.
  - Modernising vessels to improve efficiency and reducing fuel subsidies to 40% of 2014 levels by 2019.
  - Developing the distant-water fleet.
  - Restoration of domestic fish stocks through the use of restocking, artificial reefs, and seasonal closures.

These objectives aim to improve the efficiency and sustainability of the domestic sector by better coordinating activities and implementing policies that ensure the restoration of ecosystems that domestic fisheries and aquaculture depend upon. However, if fully realised, the plan also points to a potentially substantial decrease in Chinese domestic capture fisheries landings and a slowdown in aquaculture production growth.

As the practical measures to implement these objectives are not yet clear, the baseline projections take a conservative approach and factor in only the most likely changes. Under these assumptions, Chinese capture fisheries production is expected to decline during the

outlook period, whilst aquaculture output should increase, both in terms of the quantity produced and as a share of total fishery outputs (from 75% in the base period to 81% in 2027), but with a slowdown of its growth rate.

**Table 8.1. Scenarios for China and the world**

	BASE	NONE	PARTIAL	FULL	NONE	PARTIAL	FULL
		Status quo	Baseline	Comprehensive	Status quo	Baseline	Comprehensive
	2015-2017	2027	2027	2027	(2018-27)	(2018-27)	(2018-27)
					% p.a.	% p.a.	% p.a.
<b>China</b>							
Aquaculture <sup>1</sup>	49.0	64.3	61.7	58.9	2.3	1.9	1.4
Capture <sup>1</sup>	17.5	16.2	14.6	12.5	-0.1	-0.8	-2.1
Total production <sup>1</sup>	66.6	80.6	76.3	71.4	1.7	1.3	0.7
Food consumption <sup>1</sup>	59.5	70.7	69.1	67.5	1.4	1.2	1.0
Exports <sup>1</sup>	7.6	10.4	8.7	6.9	3.5	1.9	-0.4
Imports <sup>1</sup>	4.0	3.3	4.1	5.1	-2.5	-0.9	1.4
Per capita (kg) <sup>2</sup>	42.4	49.0	48.0	46.8	1.2	1.0	0.8
<b>World</b>							
Aquaculture <sup>1</sup>	79.7	105.2	103.7	102.6	2.2	2.1	2.0
Capture <sup>1</sup>	92.0	92.4	91.0	89.2	0.1	0.0	-0.2
Total production <sup>1</sup>	171.7	197.6	194.7	191.7	1.2	1.1	1.0
Food consumption <sup>1</sup>	153.2	185.9	183.6	180.7	1.3	1.2	1.1
Exports/imports	38.9	46.1	45.9	45.9	1.7	1.6	1.7
Per capita <sup>2</sup>	20.5	21.6	21.3	21.0	0.3	0.2	0.1
Price:							2.2
Aquaculture <sup>3</sup>	2878	3165	3439	3716	0.9	1.5	1.6
Product traded <sup>3</sup>	2828	3203	3499	3815	1.1	1.7	1.8
Fishmeal <sup>3</sup>	1475	1726	1720	1724	1.9	1.8	2.1
Fish oil <sup>3</sup>	1655	1879	1919	2018	1.4	1.6	

Notes: <sup>1</sup> in Mt; <sup>2</sup> in Kg; <sup>3</sup> USD/t

Source: Own calculations based on OECD/FAO (2018).

In order to gauge the potentially far-reaching consequences for the Chinese and the global fisheries and aquaculture sector, two ad hoc implementation scenarios have been developed: status quo before the plan (none) and another which simulates a comprehensive implementation of the five-year plan objectives (full). The results of the two scenarios and those of the baseline, reported in the fish and seafood section in Chapter 3, are presented for comparison in Table 8.1. The comprehensive scenario points to an overall reduction of fisheries and aquaculture production in China when compared to the baseline results and to the *status quo* (-5 Mt and -9 Mt, respectively in 2027), with an increase of only 4.5 Mt compared to the 2015-17 average level. However, the new policies also point to a reduction of waste which, when combined with China's trade balance falling as a consequence of reduced exports and increased imports, will partially limit the reduction of per capita fish consumption in China. Under the comprehensive scenario per capita consumption is expected to be 46.8 kg in 2027, instead of the potential 49 kg of the status quo or the 48.0 kg indicated in the baseline. The overall reduction in supply will increase fish prices in China by 32% in the comprehensive scenario as compared to 16% in the baseline.

At the world level, China's reduced production and lower net exports will impact prices. Aquaculture prices are expected to increase by 9% when moving from the status quo to the baseline and then by just over a further 8% under the comprehensive scenario, while

capture prices are expected to increase by 6% and then just under a further 6%, respectively. The impact on world production will be partially mitigated by higher prices stimulating an increase in aquaculture production in other Asian countries but, given the practical constraints associated with natural capital and management in some of these areas, this response will not be sufficient to prevent world per capita fish consumption from declining from 21.6 kg in the status quo scenario to 21.3 kg in the baseline and to 21.0 kg in the comprehensive scenario.

## Consumption

World fish food<sup>5</sup> consumption is anticipated to reach 177 Mt in 2027 with an overall increase of 24 Mt compared to the base period. A growing share of fish consumption is expected to originate from aquaculture production, which is projected to represent 58% of the total food fish consumed in 2027. The driving force behind the growth in food fish consumption will be a combination of rising incomes, population growth and urbanisation, together with a growing recognition of fish as healthy and nutritious food. Demand will also be facilitated by developments in food processing, packaging and distribution. However, the pace of this increase will slow with respect to previous decades. This slowdown is mainly due to lower production growth, leading to higher fish prices, and a deceleration in population growth. Per capita apparent fish consumption is anticipated to reach 21.3 kg in 2027, up from an average of 20.5 kg in 2015-17.

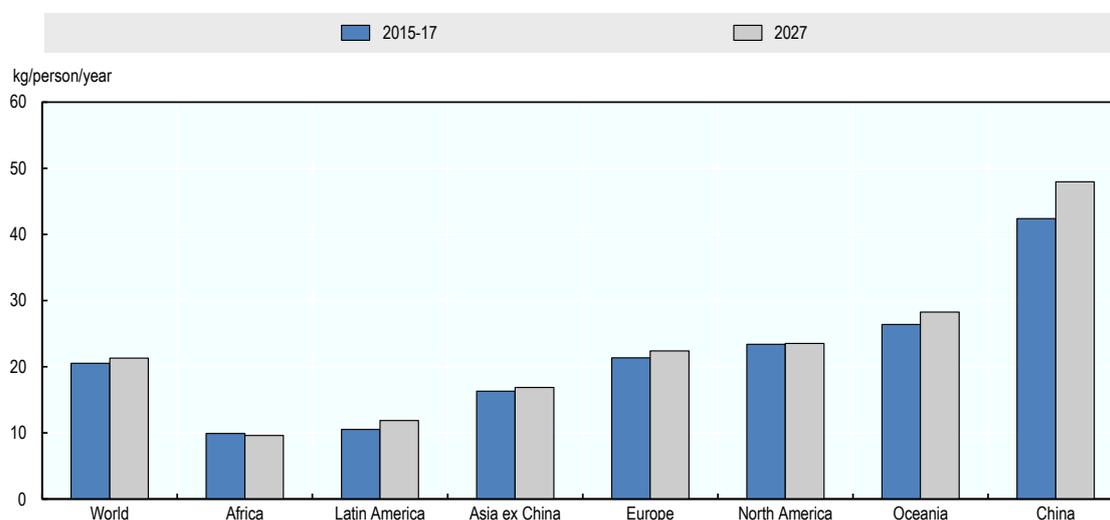
In the next decade, a major expansion in demand is expected to occur in developing countries, which will be responsible for 94% of the increase in consumption and will consume 81% of the fish available for human consumption in 2027. Despite this additional growth, annual per capita apparent fish consumption in developing countries will remain lower than that of more developed countries (21.0 kg vs 22.9 kg in 2027). Consumers in developed countries, with ageing populations and already high rates of per capita consumption, are projected to only slightly increase their per capita fish intake (from 22.7 kg to 22.9 kg).

Total fish food consumption should rise in all continents, by 2027 compared to the base period, with major growth expected in Africa (+26%), Oceania (+23%), America (+16%, with +24% in Latin America) and Asia (+16%). 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 at per capita level 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 typology of fish consumed. As the fishery and aquaculture sector is highly globalised, consumers will also be exposed to and subject to the impacts of global trends, with a higher range of products and species available.

In per capita terms, fish consumption will increase in all continents except Africa (Figure 8.6), where it is projected to decline from 9.9 kg in 2015-17 to 9.6 kg in 2027, with a more substantial decrease in Sub-Saharan Africa. This decrease continues a trend that started in 2014 and is mainly caused by population growing faster than supply. Between 2015-17 and 2027, the population in Africa is anticipated to grow at 2.4% p.a., while the supply of fish for food consumption will increase by only 2.1% p.a. In order to satisfy the growing demand, Africa is expected to become further dependent on fish imports for human consumption (overall increase to 26%, at 2.5% p.a.), representing 36%

of total fish consumed in Africa and 43% if considering Sub-Saharan only. The decline in per capita fish consumption in Africa, with the subsequent reduction in the intake of fish proteins and micronutrients, can impact food security and their ability to meet malnutrition targets (2.1 and 2.2) of the United Nations (UN) Sustainable Development Goal (SDG) 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture). This is particularly relevant, considering that, at world level, the prevalence of undernourishment is highest in Africa and that the food security situation has recently worsened in particular in parts of sub-Saharan Africa.<sup>6</sup> Despite Africa currently having a lower per capita fish consumption than the world average, it has a higher proportion of fish to total animal protein intake. Fish represents about 19% of total animal protein intake in Africa and this can be higher than 50% in selected African countries, in particular in West Africa.

**Figure 8.6. Per capita fish consumption**



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 that is not consumed as food is reduced into fishmeal and fish oil and serves other non-food uses, such as for ornamental fish, culturing, fingerlings and fry, bait, pharmaceutical inputs, and as direct feed for aquaculture, livestock and other animals. 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 to be constrained by the rather stable production. Due to their high prices and major innovation efforts, fishmeal and fish oil will continue to be used in more limited amounts in aquaculture feeds and to be more frequently used as strategic ingredients to enhance growth at specific stages of fish production. The reduction in fishmeal use will continue to expand the market for oilseed meals in the aquaculture industry, where oilseed meal use is anticipated to reach about 9.4 Mt in 2027. China will be the country to utilize the highest quantity of fishmeal as feed with a share of over 39% of the total in 2027. Fish oil is still expected to predominantly be used in the aquaculture industry, but also processed

for direct human consumption as reach in omega-3 fatty acids, which are considered beneficial for a wide range of biological functions.

## Trade

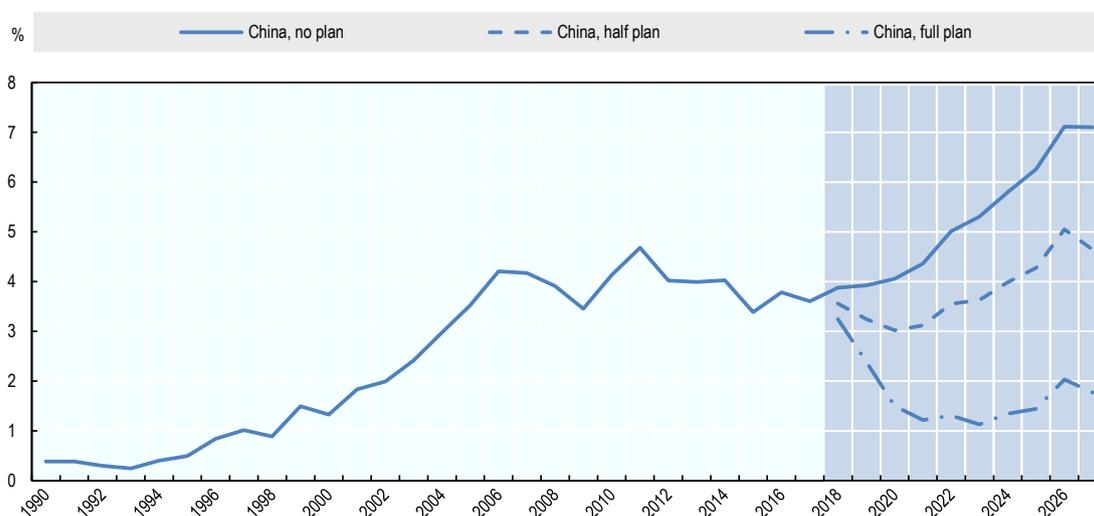
Fish and fish products are among the most traded food commodities worldwide. Trade plays a major role in the fishery and aquaculture sector as a creator of employment, food supplier, income generator, contributor to economic growth and development, and to food security. For many countries and for numerous coastal, riverine, insular and inland regions, fish exports are essential to the economy. The fisheries sector operates in an increasingly globalized environment, with fish that can be produced in one country, processed in a second and consumed in a third. About one third of production is expected to be exported in 2027 in different products forms and species. Sustained demand, trade liberalisation policies, globalisation of food systems, improved logistics and technological innovations will further expand international fish trade, even if at a slower rate than in the previous decade. World exports of fish for human consumption are projected to reach almost 46 Mt lw, 7 Mt more compared to the average 2015-17 level. However, the annual growth rate of exports is expected to slow due to increasing prices, high transportation costs, slower expansion of fish production and more sustained domestic demand in some key countries, including China.

Being the main producers, developing nations are expected to remain the key suppliers to world markets, notwithstanding a slight decline of their share in total trade of fish for human consumption (from 66% in the base period to 64% in 2027). China, Viet Nam and Norway will continue to be the world's largest fish exporters. It is interesting to note that the Chinese 13<sup>th</sup> Plan can cause quite relevant impacts not only to production, but also to trade. Figure 8.7 illustrates these potential impacts as taking into account different stages of implementation of the plan: no plan, half plan (as included in this fish outlook) and full implementation of the plan that can strongly modify the trade balance for China, with further consequences at world level as well.

International trade has also played an important role in broadening fish consumption by providing wider choices to consumers. A sizeable and growing share of fish consumed in North America, Europe and Africa consists mainly of imports, owing to steady demand, also for non-locally produced species, and static or declining domestic fishery production. The European Union, the United States and Japan will remain the leading importers. OECD countries will consolidate their position as the leading importers of fish for human consumption with a 54% share of world imports in 2027. Overall, developed countries will maintain their 53% share in total imports of fish for human consumption in 2027. Developing countries are expected to increase their imports of fish for human consumption. These will consist of supplies of raw material, which are then processed and subsequently re-exported and, growingly, of products destined to meet surging domestic consumption, in particular for species not produced locally.

Trade of fishmeal is expected to increase by 8%<sup>7</sup> by 2027 as compared to the base period. Peru and Chile are estimated to remain the leading exporters of fishmeal, while Asian countries, and in particular China, are projected to remain the main importers of fishmeal due to their sizeable aquaculture production. European countries will continue to be the main importers of fish oil (mainly for salmon production, but also for pharmaceutical purposes) with a share of 52% of world imports of fish oil.

**Figure 8.7. China: Net-trade of fish for human consumption according to the implementation of the plan**



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

StatLink  <http://dx.doi.org/10.1787/888933743670>

## Main issues and uncertainties

The projections reported and discussed in this chapter represent the anticipated scenario for fish and seafood over the forthcoming decade. Developing these projections depends upon assumptions being made with respect to a range of economic, policy and environmental conditions, and unforeseen changes to these conditions thus have the potential to result in different outcomes, making the projections subject to some level of uncertainty. This section sets out and discusses some uncertainties and potential issues that may arise over the projection period.

The influence of *El Niño* events are explicitly accounted for in the modelling process (in 2021 and 2026) but their frequency and ultimate effect on global fish production are assumed on the basis of previous behaviour<sup>8</sup>. The influence of climate change, weather variability and changes in the frequency and extent of extreme weather events are anticipated to disrupt existing capture fisheries and aquaculture production, contributing to existing sustainability concerns in some cases. For capture fisheries, changes in fish migration patterns have started to generate international jurisdiction issues and to create fisheries management challenges in instances where fish stocks are migrating to other managed areas. As indicated in previous issues of the *Outlook*, climate change is expected to affect not only fish production but the entire value chain, with effects of different kinds and magnitude. A recent FAO study<sup>9</sup> provides a comprehensive analysis of the key climate impacts in the fishery and aquaculture sector. It gives an overview of potential changes in terms of impacts, vulnerabilities and production levels by sectors and regions and also provides methods and tools for climate change adaptation in fisheries and aquaculture. Many other studies and analyses are being undertaken, but the precise mechanics of how, where and when these impacts will occur are too complex to directly account for in the present *Outlook* and, with the exception of *El Niño*, the projection consequently assumes normal weather conditions will continue from 2018.

In addition to climate change, a wide ranging set of other policy and environment-related factors are known to influence the evolution and dynamics of the fisheries and aquaculture sectors. Many of these issues have been discussed at some length in previous editions of the *Outlook* (e.g. stock status, pollution, sector specific issues) and remain relevant.

The global level of fish production, accounting for both aquaculture and capture fisheries, is strongly influenced by management policy and enforcement. On the basis of existing policies, expectations are that capture production at the global level will remain relatively stable over the coming decade, whilst aquaculture production will continue to grow but at a slower rate than seen over the last decade. Governments are increasingly aware of the need for improved fisheries management frameworks, and the better solutions that are available. 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. Reform can also be difficult to achieve in practice due to poor information, insufficient resources, policy incoherence, vested interests and lack of trust<sup>10</sup>. In this respect it is important that countries have set objectives as part of UN SDGs to restore fisheries' sustainability and eliminate harmful support policies. A further noteworthy source of uncertainty with respect to fish production is the eventual impact of China's current five-year plan (Box 8.1). While this change is partially factored into the baseline, it is difficult at this stage to be certain of the eventual magnitude of impact to capture and aquaculture production.

Fisheries subsidies and IUU fishing, especially in the context of the UN SDGs, are ongoing issues of discussion at the international level. Despite an inability to agree to text on subsidy prohibitions relating to IUU fishing and overfished stocks at the World Trade Organization's Eleventh Ministerial Conference (MC11) in December 2017, it is still possible that some progress could be made in the relatively near future. Delegations at MC11 agreed to continue to engage constructively in the fisheries subsidies negotiations, with the objective of adopting an agreement in 2019. If meaningful progress can be made in this area it has the potential to affect capture production from some areas, reducing it in the short to mid-term. There is a high degree of uncertainty though as to whether or when agreement will be reached and the extent of the production related effect it will have if it is.

From a trade perspective uncertainties persist with respect to both global and regional trade agreements. A specific case of trade related uncertainty over the projection period is the yellow card status awarded to Viet Nam by the European Union under its IUU Regulation in October 2017, due the country being assessed as taking insufficient action to fight IUU fishing. The yellow card in itself does not entail any form of trade limiting measures but if sufficient action is not taken to lift it there is the risk of this being followed by a red card, which can be accompanied by a complete ban on products caught by Vietnamese vessels being imported into the European Union. Such an outcome would imply at least short term changes in some trade relationships and flows.

## Notes

- <sup>1</sup> Which results in a scenario that is in-between last year's *Outlook* and the scenario showing the largest decline in the aquaculture growth rate and capture production.
- <sup>2</sup> The terms "fish" and "fish and seafood" indicate fish, crustaceans, molluscs and other aquatic invertebrates, but excludes aquatic mammals and aquatic plants. All quantities are expressed in live weight equivalent, except those of fishmeal and fish oil.
- <sup>3</sup> A small *El Niño* is also assumed in 2021 but its effect is not sufficient to reduce world fish production relative to 2020.
- <sup>4</sup> Set in the model at 2021 and 2026.
- <sup>5</sup> Fish for food/human consumption indicates fish production, excluding non-food uses, such as fish destined to reduction into fishmeal and fish oil, minus exports, plus imports, plus/minus stock data. Fish consumption data reported in this section refer to apparent consumption, which refers to the average food available for consumption, which, for a number of reasons (for example, waste at the household level), is not equal to edible food intake/edible food consumption.
- <sup>6</sup> FAO, IFAD, UNICEF, WFP and WHO. 2017. *The State of Food Security and Nutrition in the World 2017. Building resilience for peace and food security*. Rome, FAO.
- <sup>7</sup> That percentage is affected by the small trade in 2016 due to a strong *El Niño* event.
- <sup>8</sup> 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.
- <sup>9</sup> 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* (in press).
- <sup>10</sup> On 2 May 2018 the OECD organised the conference "Making reform happen for sustainable fisheries", which brought together policy-makers and specialists from business, academia and civil society to explore practical ways to accelerate fisheries policy reforms.