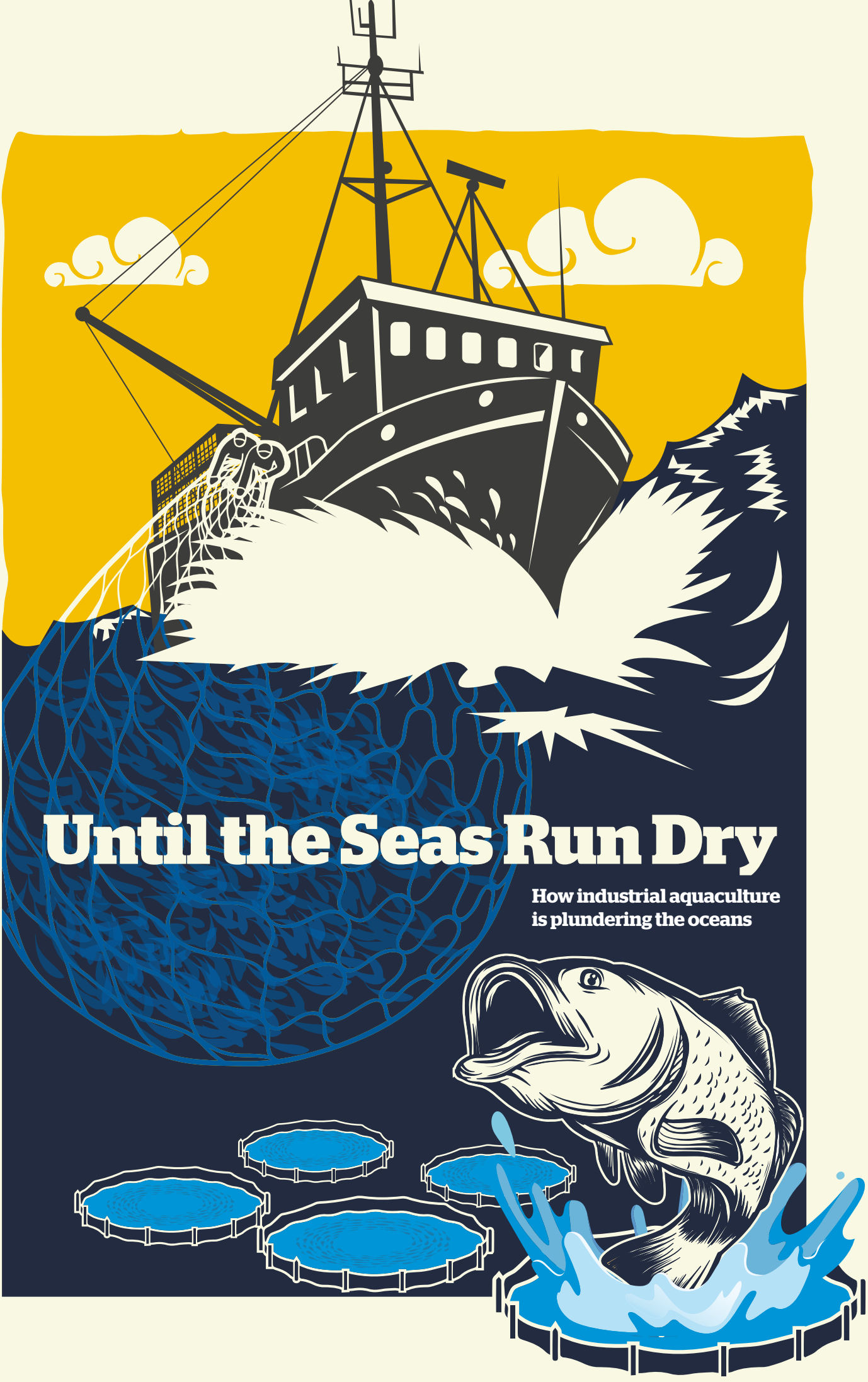

Until the Seas Run Dry

How industrial aquaculture is plundering the oceans

The purpose of this report is to shed light on industry-specific issues related to the environmental and food security impacts of the use of wild-caught fish as feed inputs in the aquaculture industry.

The information in this document has been obtained from sources believed reliable and in good faith but any potential interpretation of this report as making an allegation against a specific company or companies named would be misleading and incorrect.

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This report was published in April 2019 by the Changing Markets Foundation and Compassion in World Farming.

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Printed on recycled paper

Overview

As we gradually take stock of the full extent of the devastation humankind is wreaking on our planet's oceans and life therein, this report takes a critical look at one of the most wasteful industries currently plundering the seas: industrial aquaculture and its use of wild-caught fish for feed.

Through a comprehensive review of the latest scientific research on the impacts of reduction fisheries[a] on marine ecosystems, an examination of the geographies of destruction in which fishmeal and fish-oil (FMFO) production take place, and a brief analysis of some of the major corporate players behind the expansion of the aquafeed industry into a multi-billion-euro business, this report will show how current market dynamics are fundamentally broken. Grinding wild fish into FMFO to feed a growing aquaculture industry raises concerns of overfishing, poor animal welfare and disruption of aquatic food webs; it also undermines food security, as less fish is available for direct human consumption.[1] Given the rapid growth of the sector, it is clear that the aquaculture industry's business-as-usual approach is pushing marine resources beyond planetary boundaries and disregarding the welfare of hundreds of billions of sentient animals.

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a Reduction fisheries 'reduce', or turn fish catch into, fishmeal and fish oil.

Aquaculture: Is the cure worse than the disease?

Aquaculture is the fastest-growing segment of the food-production sector, accounting for roughly half of world fish consumption.[2] Proponents of the industry claim aquaculture has the potential to deliver affordable, healthy protein with a low carbon footprint, and could provide a way of diverting pressure from wild-capture stocks, which have been systematically overfished for decades.[3] However, the industry is failing to deliver on this promise due to its continued reliance on wild-caught fish;[4] almost a fifth of the world's total catch of wild fish is processed into FMFO,[5] of which 69% of fishmeal and 75% of fish-oil production are used to feed farmed fish.[6]

The Food and Agriculture Organization of the United Nations (FAO) projects that aquaculture will produce 109 million tonnes of fish, providing 60% of the world's fish consumption, by 2030.[2] The growing demand for carnivorous farmed fish, and the trend of feeding FMFO to non-carnivorous fish to speed up growth cycles, is reflected in FAO projections that fishmeal production will be 19% higher in 2030 than in 2016.[2] The business-as-usual scenario therefore places sustained pressure on wild fish populations to feed farmed fish.

At this critical juncture, this report takes stock of the impacts that intensive aquaculture is already having on the marine environment and food chains, as well as on the food security and wellbeing of vulnerable coastal communities, and proposes a more sustainable way forward by eliminating the industry's reliance on wild-caught fish.

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Key findings

- **The aquaculture industry is targeting keystone species and causing environmental problems by fishing further down marine food webs**

Small forage fish (including sardines, anchovies, mackerel and herring) and crustaceans (mainly krill) constitute a critical link in marine food webs, transferring energy to predators (such as tuna, salmon, cod, sharks and whales) at higher trophic levels.[7] Highly nutritious, they are bursting with vitamins, minerals and omega-3 fatty acids. Paradoxically, it is these unique life-giving attributes that now threaten their existence, as they are highly sought-after as 'raw materials' for intensive aquaculture – one of the most voracious industries on the planet.

Despite increased focus on this issue in recent years, industrial aquaculture and the multinational aquafeed companies that supply it are putting increased pressure on forage fish, which, because they move around in dense schools, are highly susceptible to overfishing. Almost 70% of landed forage fish are processed into FMFO,[8] which based on industry data, represents nearly 20% of wild-caught fish landings.[9] The mass exploitation of these species poses the risk of localised population collapses with knock-on effects on other marine life, including marine mammals and seabirds, and could have other unknown consequences given the extreme complexity of marine ecosystems and the impacts of climate change.[10]

Because forage fisheries are subject to overfishing and frequent population declines, sometimes resulting in full-scale population collapse,[4] the industry is using a more diverse range of species for fishmeal production than in the past. Reduction fisheries (especially in Asia) are plundering the ocean for juvenile fish and exploring new species that were previously commercially uninteresting. Bycatch is now considered to be the origin of virtually all fish fed to fish and crustaceans in East Asia, and contains a very large share of juveniles, which undermines the recovery of fish stocks and ocean ecosystems. In addition, estimates suggest 3–6 million tonnes of low-value fish are captured and used as direct feed, which could amount to 20% of catches in South East Asian countries and up to 50% in Thailand and China.[11]

The use of wild-capture fish for fishmeal is therefore placing significant pressure on wild fish stocks rather than alleviating it. What is more, given widespread illegal, unreported and unregulated (IUU) fishing and a significant information gap on what is happening in Asia - the biggest aquaculture region globally - the problem is likely to be more significant than current knowledge suggests.[5]

- **Forage fisheries are impacting the food security and livelihoods of vulnerable coastal communities**

Apart from concerns over the impact of reduction fisheries on wild fish populations and ecosystems, there is growing evidence of the threat they can pose to food security in vulnerable countries, where fish protein is of great nutritional importance.[12] Of fish used in FMFO, 90%could be used directly for human consumption instead, as it comes from food-grade or prime-food-grade fish.[5] In West Africa and Southeast Asia, in particular, the ever-increasing use of wild fish for feeding farmed fish instead of human beings presents a significant challenge to food security, while also leading to pollution and corruption scandals.[13]

FISHMEAL AND FISH OIL PRODUCTION: GEOGRAPHY OF DESTRUCTION

Reduction fisheries are implanted around the world, mostly in the Global South, with Peru, China, Thailand, Chile and Vietnam currently dominating fishmeal production. In the Global North, the United States, Denmark, Japan, Norway and Iceland all have a sizeable share of the market. In recent years, as a result of increasing demand in major markets, some West African countries have begun producing fishmeal and fish oil as well.

While Peru and Chile operate the world's largest single-species reduction fishery catching Peruvian anchoveta, almost half of the fishmeal produced worldwide is derived from fish caught by Southeast Asian fisheries. The fishmeal produced in Southeast Asia is used in the region's aquaculture industries, particularly for farmed shrimp. However, data is scarce and outdated for most countries.

China is home to the world's largest aquaculture industry and is the biggest consumer and importer of fishmeal.

ARCTIC OCEAN
BEAUFORT SEA
BAFFIN BAY
HUDSON BAY
NORTH PACIFIC OCEAN
NORTH ATLANTIC OCEAN
SOUTH PACIFIC OCEAN
SOUTH ATLANTIC OCEAN
INDIAN OCEAN
GULF OF MEXICO
CARIBBEAN SEA
MEDITERRANEAN SEA
BLACK SEA
RED SEA
ARABIAN SEA
BAY OF BENGAL
SOUTH CHINA SEA
PHILIPPINE SEA
SEA OF JAPAN
SEA OF OKHOTSK
CORAL SEA
TASMAN SEA

NORTH AMERICA
CANADA

150,000 t
46,000 t
Denmark mostly trades fishmeal and fish oil and absorbs half of all fish oil imported to the EU

Denmark imported 28,000 t from Peru in the first half of 2018

51,000 t
Norway is the main supplier of fish oil to the EU and, as the world's largest farmed salmon producer, a major consumer itself.

SCANDINAVIA
NORWAY
DENMARK
GERMANY
EUROPE
RUSSIA

Germany acts as trading hub for fishmeal and accounted from almost half (47%) of imports coming from outside the EU in in 2016 and a third (30%) in 2017;

Germany is traditionally supplied by Peru but in 2017 it imported most of its fishmeal from Morocco.

ASIA
CHINA
519,000 t
70,000 t
INDIA
TAIWAN
THAILAND
VIETNAM
279,000 t
462,000 t
INDONESIA

92,000 t
26,000 t
India is the world's biggest exporter of shrimp; its growing shrimp farming sector is a key consumer of fishmeal

70,000 t in 2017
MAURITANIA
SENEGAL
THE GAMBIA
AFRICA

835,000 t
140,000 t
PERU
SOUTH AMERICA
CHILE

Peru exported around 480,000 t of its FM to China in the first half of 2018

4/5 of Peru's fishmeal goes to China
4/5 → 1

FISHMEAL EXPORT
FISH OIL EXPORT

Reduction fisheries
Aquaculture industry
Pollution
Food insecurity
Ecosystem loss and damage

Unless specified otherwise, the values represent average production of fish meal/fish oil between 2012-2015.

(sources: Seafish, 2018; Sefish, 2016; FAO, 2018; FAO, 2019; Green, M., 2018; Veiga, P. et.al., 2018; European Commission, 2018; European Commission, 2017)

Shoal of anchovies (© iStock)

Despite limited publicly available information, this report shows that several major aquafeed producers that supply global markets, including Skretting, BioMar, MOWI and Cargill, source or have recently sourced raw materials and marine ingredients from West African and/or Latin American countries, where pollution scandals have prompted local protests and media reports, and NGO exposés have highlighted food security and corruption issues. For example, not only are reduction fisheries in Peru linked to the destruction of coastal ecosystems and local fish and bird die-offs but the region's fishmeal industry also causes serious air and water pollution, with knock-on health impacts such as skin diseases and respiratory illnesses.

In West Africa, fishmeal producers, often equipped with better fishing technologies or offering higher prices for forage-fish catches, enter into competition with local fishermen and markets; this directly impacts local communities, which rely on small pelagic fish for food security and their livelihoods. In Senegal and The Gambia, several instances of pollution from (often foreign-owned) fishmeal-production plants have threatened marine environments, contaminated waterways and damaged local fishing and tourism industries. As this report shows, in some cases this has led to highly publicised scandals, public protests and the closure of plants. Local people have accused fishmeal producers of failing to conduct environmental and social impact assessments, causing local fish die-off and building closer to residential areas than regulations allow.

As it is currently practiced, industrial aquaculture is therefore not the answer to, but rather part of the problem of, the global food security challenge.

- **Producing FMFO for farmed seafood is unsustainable, and claims of improving environmental credentials are not warranted**

Our research shows that, despite commitments to sustainability and transparency, fishmeal producers and major aquafeed companies disclose little information about the origin, quantity or sustainability of the wild-caught fish used in their feed. Before preparing this report, we contacted 15 aquafeed companies in a bid to understand more about their sourcing policies and practices, but received only three responses; this casts serious doubt over their commitment to transparency.

The limited information available shows that many companies source from fisheries that are not sustainably managed, or for which incomplete information exists to assess their stock status. Most FMFO comes from fisheries that '*take place in regions with low levels of governance, where fishing pressure can be very high and ecological impacts may be extreme*'.[11] Fishing fleets in Asia are notoriously unregulated, with vessels frequently changing names and identities. The current lack of registration systems makes evading scrutiny extremely easy. An intricate web of actors maintains this highly problematic lack of transparency and sustainability through complex supply chains and a lack of consumer awareness, which translates into aquafeed producers and retailers taking limited action to mitigate potential negative impacts from sourcing ingredients for feed.

The situation is further exacerbated by aquaculture certification schemes, which allow wild-caught fish to continue being used, as long as they are 'sustainably sourced'. The definition of 'sustainably sourced' is problematic; it mainly relies on existing initiatives and schemes, such as the Marine Stewardship Council (MSC) and the Marine Ingredients Organisation (IFFO). The latter is the trade body representing the FMFO industry; its 'responsible supply' standard (IFFO RS) currently certifies around half of global FMFO supply. The MSC has its own problems, and has been subject to criticism because it certifies fish that are not used for human consumption, which contradicts the FAO Code of Conduct for Responsible Fisheries.[8] But because the MSC is unable to certify sufficient quantities of fisheries to meet growing demand, companies mainly rely on IFFO, despite the apparent conflict of interest in its dual role as both a standard-setter and the body representing the interests of the global fishmeal industry. This becomes apparent in IFFO's controversial statements, such as its claim that 'almost all the remaining wild-caught fish used in fishmeal and oil would not typically be fished in significant quantities for human consumption', which contradicts independent research showing that 90% of fish used by the reduction industries is suitable for human consumption.

- **Catching vast quantities of wild fish for FMFO creates a hidden layer to the global animal welfare crisis**

Annually, 52 million tonnes of fish are produced worldwide in intensive aquaculture systems, which are essentially underwater factory farms.[14] As aquaculture intensifies and grows, the number of animals suffering in these systems multiplies. The widespread use of FMFO in aquaculture adds a hidden layer to this animal welfare crisis: the welfare of wild-caught fish destined for fish feed. The staggering 0.5–1 trillion forage fish (approximately) caught each year are reduced to ingredients to feed farmed animals – mainly fish. There is also the issue of bycatch of fish, mammals and birds who die slow deaths or are injured during capture and return to sea.

Although they may be small, forage and juvenile fish caught for use in FMFO are sentient beings, able to feel pain and fear, so there are ethical implications to harvesting them from the ocean in such huge numbers and using fishing methods that damage their welfare. These negative animal welfare implications are another strong incentive for reducing the aquaculture industry's reliance on wild-caught fish for feed.

The way forward and recommendations for action

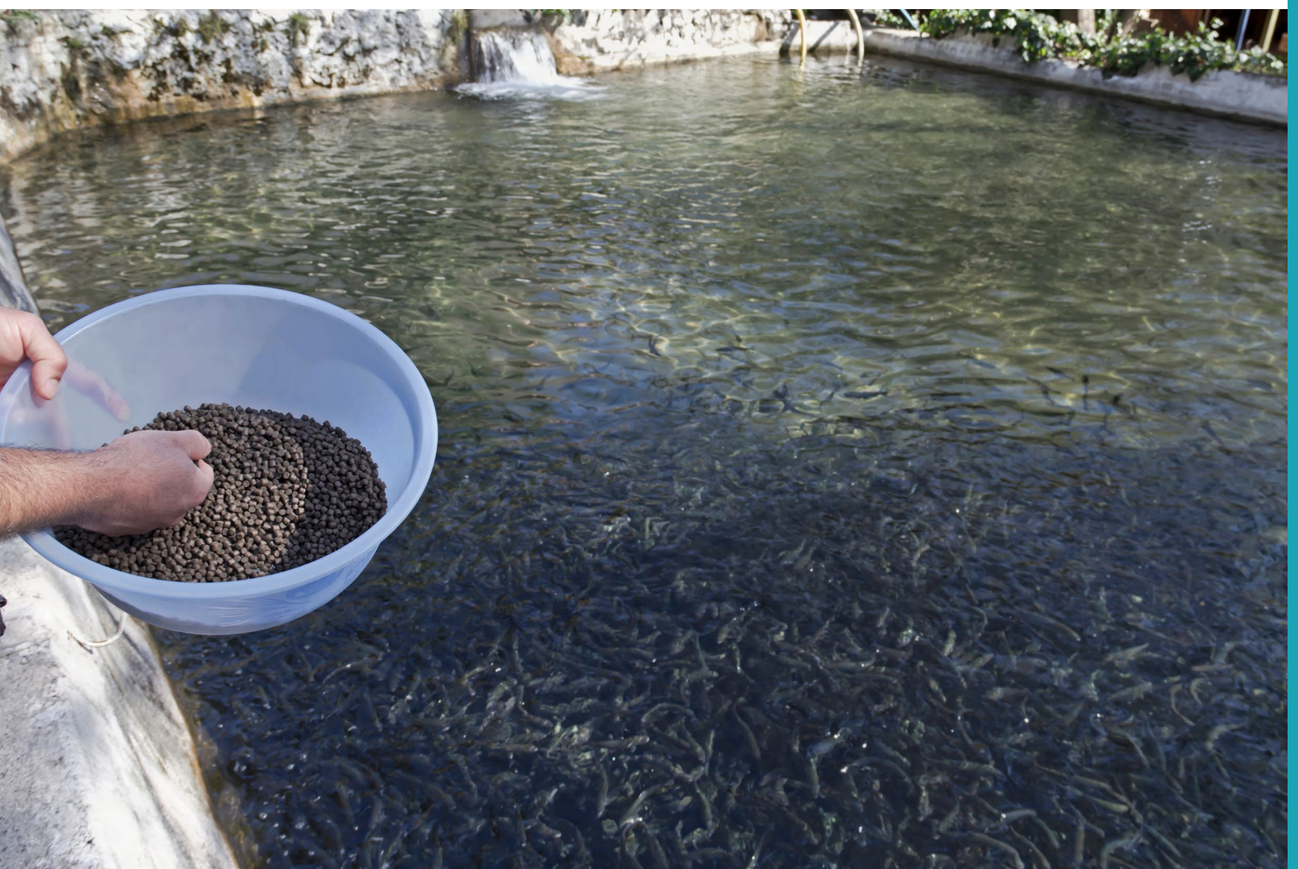
The aquaculture industry has an opportunity to decouple its growth from that of the FMFO industry by phasing out the use of wild-caught marine ingredients altogether. It can do this by switching to farming herbivorous

species, which do not require the use of wild-caught fish, and to aquaculture models that require fewer inputs, such as more extensive systems and integrated multi-trophic aquaculture. It should also seek more sustainable alternative sources of essential protein, such as insects and algae.

Our report shows that some aquafeed companies are already reducing their reliance on wild-caught fish for fish farming; some have even begun the commercial roll-out of fish-free aquafeed products. While we welcome these steps, this approach needs to be reinforced and rapidly scaled up across the entire sector if we are to sustain ocean resources, healthy ecosystems, food security and livelihoods in the Global South. The sustainability of alternative sources, such as soy, must also be carefully considered to avoid substituting unsustainable FMFO with equally unsustainable alternatives.

This report outlines specific steps the aquafeed industry, certification bodies, governments, retailers and consumers can take to rapidly scale up and accelerate the shift away from the wasteful, unsustainable practice of using wild-caught fish to feed farmed fish. This transformation will require the involvement of a range of actors including aquafeed producers, aquaculture companies, retailers, policymakers and consumers.

Feeding fish on a farm (© istock)



Recommendations

Aquafeed industry

- Stop using wild-caught fish and switch to more sustainable alternatives.
- Ensure alternative feed sources do not give rise to other ecological problems.

Aquaculture industry (fish farms)

- Focus on cultivating more species that do not require feed, require fewer inputs or can be fed an entirely vegetarian diet.

Certification schemes

- MSC and other wild catch schemes should stop certifying fish that is not used for direct human consumption.
- Aquaculture certification schemes should only certify farmed fish that is not reliant on the use of wild-caught fish.

Policymakers

- Strengthen governance frameworks to eliminate IUU and slave labour, prevent overfishing, and enhance transparency and reporting in global fisheries' supply chains.
- Stop supporting aquaculture that relies on wild-caught fish, and support the phase-out of wild-caught fish for aquafeed and fish farming.

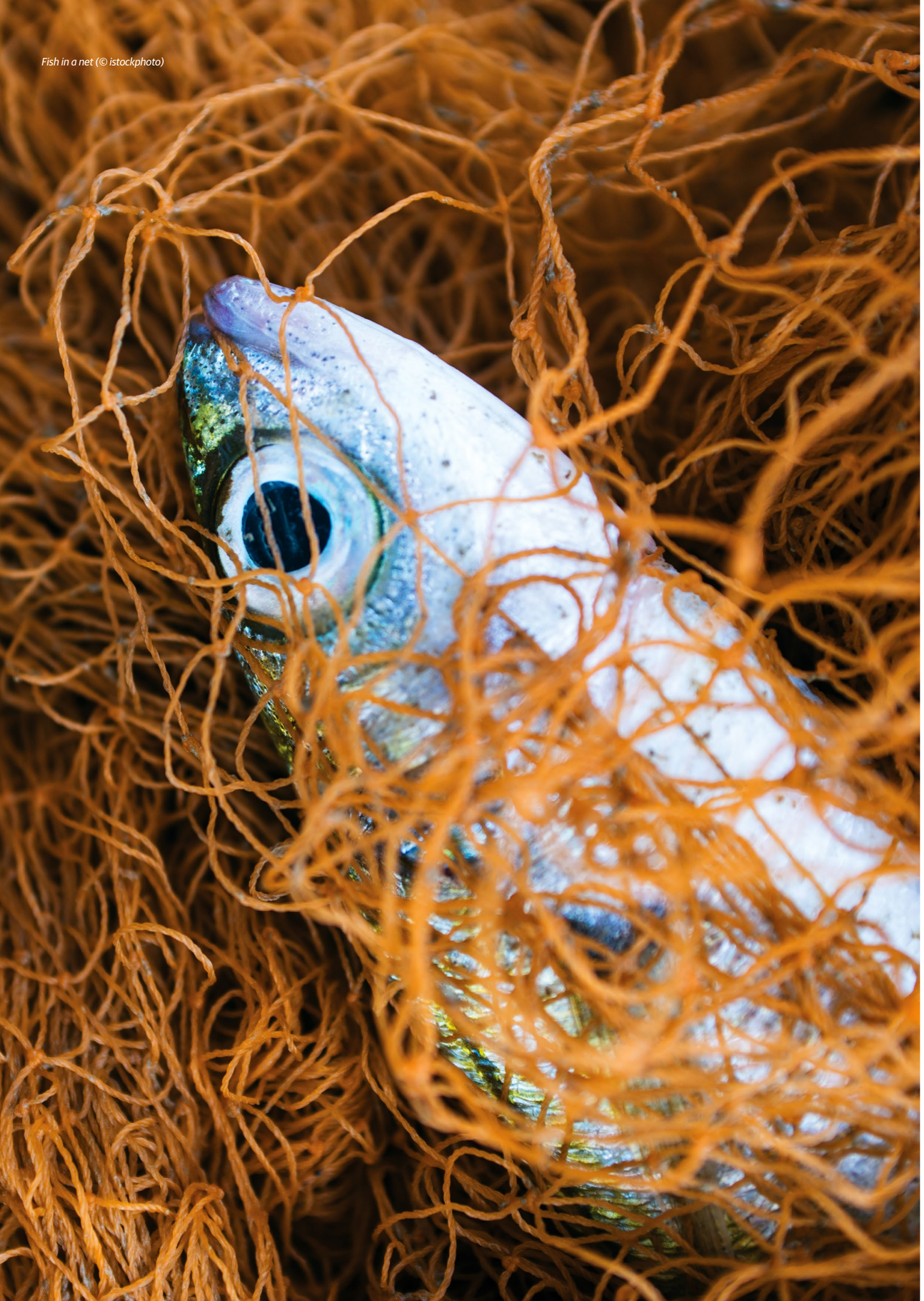
Retailers

- Commit to full supply-chain transparency.
- Commit to eliminating seafood cultivated using FMFO.

Consumers

- Reduce fish consumption, especially of carnivorous farmed species (such as salmon and shrimp).

The species that reduction fisheries target are already under immense pressure as a result of extreme weather events and climate change, which affect migration and reproduction patterns. The Lenfest Forage Fish Task Force, a panel of 13 fishery and marine scientists, has recommended that forage-fish management should be more precautionary, and catch target levels significantly reduced, to leave more of these fish populations (75% of the stock) in the ocean in order to safeguard the health of the ecosystem. It is high time that governments and regulators enforced this approach, and that the aquaculture industry aligned its objectives with the science and embraced more innovative production models – ones that genuinely make food security and healthy oceans a top priority.[15]



Fish in a net (© istockphoto)

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