

REPORT

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THE PUSHBACK AGAINST AQUACULTURE INC



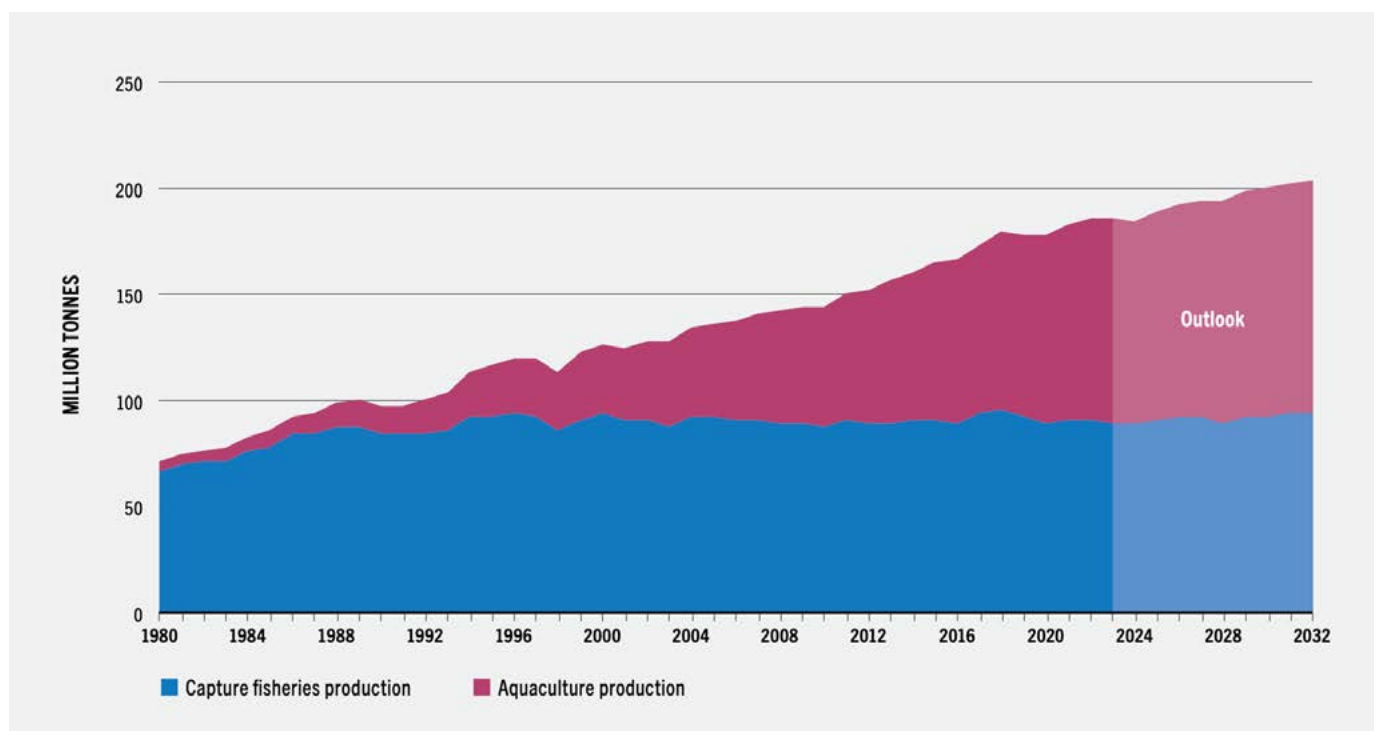
Fishing communities are leading a global fight to stop the industrial farming of shrimp and fish. They say these farms are toxic for their territories and that the world's food needs can be better met by revitalising wild fisheries and small scale, sustainable aquaculture systems. But they are up against powerful opponents. Industrial aquaculture is a US\$300 billion business controlled by large multinational corporations and powerful local businessmen. With the support of governments, they are moving aggressively to not only keep their farms afloat, but to expand production to new territories.

A tale of two growths

Open any recent report on aquaculture and chances are it begins with a few sentences about the industry's spectacular growth over the past few decades. The

numbers are indeed impressive. Global production has tripled since the start of this century and, for the first time in history, people are now consuming more seafood from farms than from fisheries.¹

Graphic 1: World fisheries and aquaculture production of aquatic animals, 1980-2032²



Aquaculture companies and agencies like the UN Food and Agriculture Organisation (FAO) like to point to this steep growth curve (and the stagnation of wild fisheries) as proof of aquaculture's importance to global food security. Only through more investment in

aquaculture, they say, can we possibly meet the world's growing need for seafood.³

But this blanket approach to aquaculture is misleading. Within the impressive numbers lie two distinct growth stories, with vastly different outcomes for food security.

One of these growth stories centres on China, which accounts for well over half of the world's aquaculture production. No other country comes close to the growth China has achieved since the 1980s, when the Chinese government implemented programmes and policies to encourage aquaculture as a food security and livelihood strategy.⁴

What's crucial to understand about China's growth story is that it is almost entirely about small-scale inland farming of freshwater carps and semi-wild systems for farming molluscs (clams, oysters, scallops, etc) along the coasts. These are hardy species that have long been farmed in China. They require little, if any, external feed or other inputs. And in the case of carps, they are typically integrated with other fish, crops and livestock.⁵

The 40-fold increase in the production of seafoods has benefited millions of farmers and fishers in China, and supplied consumers in urban and rural areas with an abundant and affordable source of protein. China's per capita seafood consumption soared from around 3kg in the mid 1980s to between 20-40 kg or so today, with nearly three-quarters of this coming from aquaculture.⁶ There's no doubt that the growth of this low-input form of aquaculture, in China and elsewhere, has made a huge contribution to global food security over the past few decades, with relatively few negative impacts and minimal greenhouse gas emissions.⁷

The other growth story also begins in the 1980s, after corporations and governments succeeded in developing breeds of shrimp, salmon and a few other "high-value" species that could be raised in industrial, monoculture farms and cages. Unlike China's carp and mollusc farms, these industrial operations require large volumes of commercial feeds and vast amounts of antibiotics, pesticides, disinfectants and other chemicals to keep diseases from breaking out. They produce for export and supermarket chains, not local markets, and rely on highly exploited labour. And they are under the thumb of corporations, not small fishers, either through ownership of the farms themselves or by controlling the genetics and the input supply.

This second growth story has done more harm than good for food security. Consider, for example, the boom in the industrial farming of sea bream and sea bass off the coast of Türkiye over the past two decades. Production of industrially farmed fish may have quadrupled, but three-quarters of it gets sent to restaurants and supermarkets in Europe. Meanwhile, Turks, who are consuming the same amount of seafood they did 20 years ago, are having a hard time accessing the anchovies and other small wild fish that are traditionally important to their diets. The fish farms take small fish from Turkish

waters and ground them into feed. Now there are so few small fish left in Turkish waters that the farming companies are fishing for them off the coast of West Africa, where stocks of small fish are also in rapid decline and local consumers and fisherfolk are struggling to access the small fish they depend on.⁸

Globally, over 12 million tonnes of wild fish (15% of the entire wild catch) are ground into meal or oil every year and fed to fish and shrimp in industrial farms.⁹ A recent study estimates that industrial aquaculture farms use up to 6 kilograms of wild fish to produce a kilogram of salmon and 1.5 kilograms of wild fish to produce a kilogram of shrimp. The demand is unsustainable, and is already leading to a critical drop in wild fish stocks that will only get worse with climate change.¹⁰

Most of these wild fish are taken from traditional fishing areas off the coasts of countries in the global South, where they would otherwise provide local people with a cheap and nutritious source of food and provide small vendors (mostly women) with a source of income.¹¹ The use of West African fish for industrial aquaculture feed diverts what would normally sustain 33 million people each year in the region.¹² And much nutrition gets lost in the process; farmed fish retain less than half of the essential dietary minerals and fatty acids found in the wild fish they consume.¹³ Meanwhile the climate emissions are boosted; emissions from a kilo of salmon are at least 15 times higher than the emissions of a kilo of small fish used to feed the salmon.¹⁴

The food security equation gets even bleaker when we factor in the increasing number of mass die-offs from disease outbreaks that occur on industrial aquaculture farms. Norway, for example, the world's top producer of farmed salmon, lost 17% of all its output in 2023 because of a sudden disease outbreak. Researchers estimate that, globally, nearly one billion farmed salmon have died from disease outbreaks on large-scale fish farms over the past decade, and the situation is getting worse because of climate change and the increasing scale of the farms.¹⁵

Then there's the destruction of local food sources by the farms themselves. Corporations build their fish farms in precisely those areas that have long been used by traditional fishers: areas where there is good water flow, abundant marine life and proximity to harbours. They also build shrimp farms in coastal areas that have mangroves and access to irrigated water – the very same areas used for small-scale fishing, aquaculture and agriculture.¹⁶ The result is that industrial farms not only take away access to water and land used for fishing and food production, but also undermine them with pollution, disease and escapes.



Workers at a seafood processing factory in Can Tho province, Viet Nam, June 2007. Creative Commons © ILO

For example:

- In Norway and the west coast of Canada, escaped farm salmon and chronic infestations of sea lice and disease on overcrowded industrial salmon farms have devastated the wild salmon populations that are critical to the food systems of local indigenous communities.¹⁷
- Industrial salmon farms in the Chiloé archipelago of Chile have drastically reduced the once abundant sea life in the area and cut local communities off from their traditional fishing grounds.¹⁸
- Along the shores of Andhra Pradesh and Tamil Nadu, in India, industrial shrimp farming has destroyed the fishing grounds of local communities by polluting the waters with antibiotics and chemicals. The farms have also taken over and poisoned the lands communities used for growing rice, coconut, fruits and vegetables or for grazing their animals, and undermined their access to potable water.¹⁹
- In Ecuador, the shrimp industry has destroyed approximately 70% of the country's mangroves, severely impacting the food supply for around

100,000 families who depend on traditional fishing, as well as shellfish and crab harvesting.²⁰

The big fish

If food security was really the driving concern here, governments and companies would be getting behind small-scale, low-input aquaculture. But that's not what's happening. Over the last decade, industrial aquaculture has been growing much faster.²¹ This is where the bulk of the money and policy support measures go towards.²² It shows how corporations and local elites control food and fisheries policy-making, since they are the only ones deriving any tangible benefits.

Industrial aquaculture, like industrial meat, is about producing global commodities that flow from the cheapest areas of production to wherever they can be sold at the highest price. Profits are extracted where there is the highest level of corporate concentration, in this case upstream with the inputs (feed, seed, chemicals, pharmaceuticals) and downstream with the retailing. At all other points along the chain, profit margins are razor thin, if they exist at all.

So, for example, while shrimp feed companies and retailers in the import markets, like Walmart, can make



Sea Granary No. 1' in China. Has an annual output of 1,000 metric tons of Atlantic salmon. The cage is 35.9 meters high, 89 meters long. @Wanzefeng Group

profit margins of up to 40%, most shrimp farmers and processors in places like Vietnam and Indonesia are barely breaking even.²³ Many processors deal with this situation by further exploiting their workers. Shrimp processing plants in Asia tend to use recruiters to hire migrant women who are subjected to rampant sexual harassment and abuse, dangerous and unsanitary working conditions, stolen wages, long working hours, union busting and debt bondage.²⁴ The situation is hardly different in the salmon industry, where investigations into processing plants in Canada and Chile show that companies also rely on migrant workers who work long hours for low wages and suffer harassment, overcrowded accommodations and unsafe working conditions. Gustavo Cortés Solís, a Chilean salmon worker leader, calls it a “new kind of slavery” in which companies are able to impose harsh working conditions by sub-contracting workers and using tactics like fake unions and threats of lay-offs to undermine labour organising.²⁵

At the farm level, the rising cost of inputs and low prices for shrimp and fish, combined with the vulnerability of farms to disease outbreaks, forces many producers to close shop. This paves the way for larger players to buy out those who struggle or fail to make a profit. The farms get bigger and bigger, with more and more of the farming in the hands of an alliance of wealthy local families and foreign corporations that have farms across different geographies, as well as

their own feed, breeding, hatchery, and processing operations. Some of these companies have expanded into owning their own fishing fleets and factories that supply their feed mills with fish meal and fish oil.²⁶ (See Table: 15 top aquaculture corporations)

Salmon farming, once a fragmented and relatively national industry, is now dominated by just 10 corporations that control over half of global production.²⁷ Several of these companies are now owned in whole or in part by giant food and agribusiness corporations like Cargill, JBS, Mitsubishi, Mitsui and Agrosuper (Chile's largest food company). One of them, the privately owned Canadian company Cooke Seafood, just bought the largest fishing company in Peru, Copeinca. This gives Cooke, the world's fourth largest salmon farmer, ownership over the world's top fish meal producer.²⁸

The situation is similar with shrimp. In India, the entire shrimp industry, from farming to processing, has always been controlled by wealthy families, mainly from outside of the communities.²⁹ But, over the years, power has consolidated in the hands of fewer Indian players that are increasingly allied with foreign corporations.³⁰ For instance, Avanti Feeds, a company founded and controlled by billionaire Alluri Indra Kumar, has grown into the country's largest shrimp feed company (with a 50% market share) and one of its largest shrimp exporters by placing shares on the stock market and selling a quarter of the company and half of its export processing unit to the Thai seafood giant Thai Union.

Table: 15 top aquaculture corporations

Company	Home country	Aquaculture sales 2023 (US\$mn)	Aquaculture activities	Locations	Subsidiaries
Mowi	Norway	6.070	Salmon farming and feed, processing	Canada, Chile, Faroe Islands, Norway	Marine Harvest
Haid Group	China	*3,745	Shrimp and fish feed, shrimp farming/breeding	China, Ecuador, Egypt, Indonesia, Malaysia, Vietnam	Sheng Long Bio-Tech, Hisenor, Histar (Vietnam), PT Haida (Indonesia)
Kverva	Norway	3.421	Salmon farming and feed, processing	Iceland, Norway, UK	SalMar, Icelandic Salmon/ Arnarlax, Scottish Seafarms Ltd, MariCulture AS, Norway Royal Salmon, Nutrimar, Pelagia AS
SHV	Netherlands	2.800	Shrimp and fish feed, land-based salmon farming, catfish/tilapia farming	Australia, Canada, Chile, China, Ecuador, Egypt, France, Honduras, Italy, India, Japan, Norway, Nigeria, Turkey, Spain, US, Vietnam, Zambia	Skretting, Nordic Aqua Partners
Mitsui	Japan	*2,722	Shrimp processing and farming, salmon farming, processing	Ecuador, Japan, Vietnam	Minh Phu (Vietnam), Salmenes Multiexport (Chile), Industrial Pesquera Santa Priscila (Ecuador)
Cargill	US	*2,678	Fish and shrimp feed, salmon farming	Canada, Chile, China, Ecuador, India, Indonesia, Norway, UK, Thailand, Vietnam	Salmenes Multiexport (Chile), EWOS, Aquacargill/ Newco (Ecuador)
Schouw	Denmark	2.650	Fish and shrimp feed, salmon and shrimp farming	Australia, Chile, China, Costa Rica, Denmark, Ecuador, France, Greece, Norway, Spain, Türkiye, UK, Vietnam	Biomar, Salmenes Austral (Chile), Alimentosa (Ecuador), BioMar-Sagun (Türkiye), Viet Uc (Vietnam)
Tongwei	China	*2,500	Shrimp and fish feed, shrimp and tilapia farming and processing	Bangladesh, Indonesia, Vietnam	Anhui Tech-bank, BioMar-Tongwei Biotech, Bohai Aquaculture
Thai Union	Thailand	2.129	Shrimp feed, farming and processing; salmon processing	India, Indonesia, Pakistan, Thailand	Avanti Feeds (India)
Cooke Seafoods	Canada	*2,112	Salmon farming, fish feed, fish meal and fish oil processing	Australia, Canada, Chile, Peru, UK, US	Tassal (Australia), Copeinca (Peru)
Charoen Pokphand	Thailand	2.106	Shrimp and fish feed, shrimp farming, processing	Cambodia, China, India, Indonesia, Philippines, Thailand, Vietnam	CP Prima (Indonesia)

Company	Home country	Aquaculture sales 2023 (US\$mn)	Aquaculture activities	Locations	Subsidiaries
Mitsubishi	Japan	*1,635	Salmon farming, fish and shrimp feed	Canada, Chile, China, Japan, Norway, UK	Cermaq (Norway), Finnforel (Finland), Atland, Nosan, Fujian Coland-Nosan Feed (China)
Agrosuper	Chile	1.510	Salmon farming and feed	Chile	AquaChile, Friosur, Salmenes Magallanes, Pesquera Eden
Guangdong Evergreen	China	1.500	Shrimp and fish farming and feed	Egypt, Indonesia, Malaysia, Vietnam	Viet Hoa Aquatic Feed (Vietnam), Evergreen International, Evergreen Egypt United
Kılıç Deniz	Turkey	500	Fish farming, fish feed, fish meal and fish oil processing	Turkey, Dominican Republic, Mauritania	

Source: Compiled by GRAIN from company reports, CapitalIQ, MarketScreener and other sources

*Sales were estimated based on available information

Note: Sales include subsidiaries with at least a 20% ownership

Another Thai conglomerate, the meat and retail giant Charoen Pokphand (CP), is not only the largest player in Thailand's aquaculture industry but has a dominant position throughout Southeast Asia. In Indonesia, CP has 70,000 hectares of aquaculture farms, produces a quarter of all the country's shrimp and is the largest supplier of shrimp feed to other farms.³¹ In China, CP and three national feed corporations – Tongwei, Haid, and Evergreen – dominate the country's shrimp industry, which is second in size only to Ecuador. After a massive disease outbreak in 2009 wiped out many of the small pond farms that accounted for most of the country's production, the feed companies helped to facilitate a new wave of wealthier shrimp farmers who bought up vast swathes of land and installed hundreds of thousands of greenhouse farms that are hugely reliant on feeds and other inputs sold by the big feed companies. But the greenhouse farms may not last long either, in the face of increasing regulations and low-priced imports.³² So China's big feed companies are hedging their bets and expanding to areas of lower cost production in Ecuador Vietnam, Indonesia, India and Malaysia – building farms, feed mills and hatcheries. They are also investing billions of dollars in massive, indoor farms near cities to cater to the market for live shrimp (which sells at a higher price to the imported, frozen shrimp).³³

In Ecuador, three companies founded by powerful local families control almost half of the national production.³⁴ One of them, Santa Priscila, the world's largest

shrimp farming company, just sold 20% of its shares to Japan's agribusiness and energy giant Mitsui.³⁵ A second, Naturisa, has a close partnership with Cargill, through which the US operator has taken control over much of Ecuador's shrimp feed production and supply.³⁶ The third, OMARSA, is getting funds from the World Bank's International Finance Corporation (IFC) for a 3,000 ha expansion that will double its production.³⁷

Development banks are also channeling funds into aquaculture companies through private equity funds, which have become a major source of money driving the consolidation and expansion of the industry. Between 2019-2022, GRAIN identified 41 investment deals by private equity groups in the seafood and fisheries sector. Over half of them were in companies involved in industrial aquaculture.³⁸

But profits are not the only consideration driving corporate investment in the industry. For Saudi Arabia, industrial aquaculture is a major part of its food security agenda. The kingdom is bankrolling a rapid expansion of its capacities through its sovereign wealth fund, the Public Investment Fund (PIF). In 2022, PIF's food security arm, the Saudi Agricultural and Livestock Investment Company (SALIC), acquired a controlling stake in Olam Agri, one of the largest agribusiness companies in the world, giving it access to Olam's aquaculture feed operations in Vietnam and Nigeria. The following year, SALIC spent US\$1.1 billion for a controlling stake in Saudi Arabia's top shrimp and fish farming company,



Farmers and fishers from Songkhla Lake talking at a public forum in Bangkok, Thailand about the devastation caused to them by an invasive species of Tilapia that likely escaped from the aquaculture farms of the Thai food company Charoen Pokphand. @ Biothai

the National Aquaculture Group (Naqua). With this money from SALIC, Naqua is now planning to quadruple its shrimp farm production along the Red Sea Coast to 250,000 tonnes per year by 2030, which would make Naqua the world's second largest aquaculture producer, in terms of volume of seafood, behind Mowi of Norway.³⁹

PIF has an even bigger aquaculture investment in the works for its futuristic city project, NEOM. By way of a newly formed company called Topian Aquaculture it plans to produce an astounding 600,000 tonnes of fish per year in pens off the city's coast by 2030.⁴⁰ If the Naqua and NEOM projects move forward, Saudi Arabia will not only become one of the largest aquaculture producers in the world, but also one of the top importers of fish meal and other aqua feed ingredients – all in the name of supposedly ensuring food security.

The UAE is also investing heavily in aquaculture as part of its food security agenda, but with more of an eye overseas. In 2016, the Abu Dhabi sovereign wealth fund Mubadala Investment joined a Wall Street private equity fund to acquire Avramar, the largest fish farmer in the Mediterranean. To rescue it from bankruptcy, it now seems likely that Avramar will be taken over by Aqua Bridge, a leading UAE aquaculture company owned by

Dubai's ruling Al Maktoum family.⁴¹ This would mark the second major acquisition of a Mediterranean fish farming company by Emirati interests in the past year. In late 2023, the Abu Dhabi agribusiness investment firm E20 acquired Lucky Fish, one of Turkey's largest fish farmers and exporters.⁴²

Chinese companies are entangled in large-scale, state-led projects too– both at home and abroad. Some are involved in bilateral projects under the Belt and Road Initiative, like the rice-fish investment corridor that China is pursuing in Cambodia or China National Fisheries and Aquaculture's industrial aquaculture park in the Saint-Louis region of Senegal.⁴³ One of China's largest aqua feed companies, the privately-owned Evergreen Group, is building a 2,085 hectares industrial shrimp farm in Waingapu, East Nusa Tenggara, Indonesia, as part of the Indonesian government's controversial shrimp estate project.⁴⁴ In Egypt, the same company has a joint venture with the Egyptian army to build Africa's largest aquaculture farm on over 2,000 hectares in Barkat Ghalyoun, along the coast of the Mediterranean Sea.⁴⁵ Local fisherfolk in Barkat Ghalyoun say the project, imposed on them by the central government, is already depriving them of access to their fishing grounds.⁴⁶



Shrimp farms in Andhra Pradesh. Shrimp Aqua Farms Elite@LinkedIn

Time to jump ship

With this flood of money going into aquaculture corporations, industrial fish farms are multiplying and getting bigger at a time when they should be urgently rolled back. Corporations want us to believe that they can address the problems plaguing the seafood industry with new technologies and certification schemes. But this is just smoke and mirrors. (See Box 1: Of techno-fixes and greenwashing)

In a context of climate change and biodiversity collapse, we should be prioritising systems of food production that secure food and livelihoods for those most in need and in ways that are sustainable – not factory farms that maximise profits for corporations and supply seafoods high up in the food chain to relatively wealthy consumers.

This means putting the focus on small-scale, low input, and diverse aquaculture systems. There are many examples from around the world of farming systems that integrate fish and other marine animals with crops and livestock that can be drawn upon.⁴⁷ Some fisherfolk organisations call this “community-led aquaculture” or “community-based, values-driven aquaculture”.⁴⁸

It also means rebuilding fish stocks, both in the seas and inland. The FAO estimates that rebuilding overfished stocks in the oceans alone could increase the annual fish catch by an amount equal to all of the current production of industrially farmed fish and shrimp combined.⁴⁹

Fancy technologies and private equity funds are not what’s required. What is needed, first and foremost, are actions to stop companies from overfishing and polluting the seas and to stop destroying and grabbing traditional inland and coastal fishing grounds and water sources for real estate projects, mines, dams, industrial farms, chemical factories and other destructive industries.⁵⁰

Fishers and fishworkers around the world are leading the charge in this direction.⁵¹ In Senegal, for instance, the fisher people in the region of Saint-Louis are mobilising to prevent the UK energy giant BP from decimating their fishing grounds with the construction of an offshore natural gas platform. And they’ve also formed a coalition with national and international allies to fight against the increasing number of fish meal and fish oil factories that are draining their waters to supply far away industrial aquaculture farms with feed.⁵²

Many fishing communities are struggling directly against powerful industrial aquaculture farms, too. For example:

— Small scale fishers in Thailand, with the support of the NGO Biothai, are braving lawsuits and intimidation to hold the country’s most powerful corporation, CP, to account for the release of an invasive tilapia species that has destroyed their livelihoods.⁵³

— In India, communities in the main shrimp farming areas of Andhra Pradesh, Tamil Nadu and West Bengal are struggling to rid their coastlines of industrial shrimp farms despite the use of physical violence and arrests against them.⁵⁴

— In Indonesia, villagers on the island of Karimunjawa are fighting to stop a massive shrimp farming project, even as their leaders are thrown in jail.⁵⁵ At the same time, communities in other parts of the country and allied organisations like the People's Coalition for Fisheries Justice (KIARA) are organising against the government's national plan that will hand millions of hectares of coastal areas over to companies for industrial shrimp farms.⁵⁶

— In Argentina, local communities in the province of Tierra del Fuego mobilised to stop a deal for a large-scale salmon farming project between their government and Norway in 2019. Not only did they stop the project, but they got the government to impose a ban on salmon farming in the province.⁵⁷

— In Chile, indigenous communities are organising to get their coastal areas recognised under a 2008 law that should give them more say over how salmon farms operate in their territories, in the face of a huge disinformation campaign by powerful salmon corporations.⁵⁸

— In Canada, an alliance of Indigenous Nations and local communities on the west coast have also faced massive campaigns of disinformation, lobbying, intimidation and lawsuits as they try to stop industrial salmon farms from destroying the area's wild salmon.⁵⁹ They managed to get the Canadian government to commit to a ban on open-net salmon farms by 2025, but are now fighting to stop the government from back peddling.⁶⁰

— In the US, the North American Marine Alliance is working with a diverse coalition of organisations to stop corporate efforts to open US waters on the west coast to "sea-based factory farms" while on the east coast, where Cooke and other salmon companies are aggressively expanding, coastal towns are campaigning to get moratoriums on intensive aquaculture.⁶¹

The industry's constant drive for expansion means that more struggles are on the horizon, including in Africa, which has long been viewed as a potential area for growth. In Namibia, for instance, the Norwegian-based African Aquaculture Company has received a 15-year permit for the installation of large salmon pens across 1,600 hectares in the cold Benguela Current off the coast of Namibia.⁶² The company is aiming to

export 50,000 tonnes of salmon a year from its farms and plans to expand to South Africa.⁶³ It will be critical for communities in Namibia and elsewhere facing new industrial aquaculture projects to learn from the experiences of communities already suffering from the impacts of this industry and to construct international alliances. As Catalina Cendoya of the Global Salmon Farming Resistance says: "It's easier to stop the industry from coming in than it is to get rid of it once it's there."⁶⁴

In April 2024, a number of communities fighting against industrial aquaculture farms came together in Poros, Greece, where the local community has been fighting to stop the construction of a massive fish farming project. They launched an international campaign #FishFarmsOut to stop the industrial farming of carnivorous fish (such as salmon, sea bream and sea bass) and sent a letter to the FAO, signed by over 160 organisations, calling on the agency to exclude carnivorous fish farming from sustainable aquaculture policies.⁶⁵

Fisher organisations converging for the 8th general assembly of the World Forum of Fisher Peoples (WFFP) in Brazil in November 2024 also took a clear stand against industrial aquaculture, and they too have launched a global campaign against it.⁶⁶ In their final declaration, they stated:

Industrial aquaculture is NOT fishing; it is privatizing, fencing and destroying our territories; dispossessing fisher peoples from the lands and waters; polluting water and coastal ecosystems with dangerous chemicals; driving ocean grabbing and climate change; and contributing to the criminalisation of and violence against fisher peoples ... The expansion of industrial aquaculture is leading to increased violence against our communities, especially our fisherwomen, women shellfish collectors and gatherers, who are excluded from our traditional territories and collection grounds; subjected to gendered violence, harassment, criminalization, and abuse; and deprived of our traditional livelihoods and food sovereignty. In areas where the industry has proliferated for decades, our fisher peoples are subjected to divide and conquer tactics, which foster mistrust, weakening our social mobilization and resistance ... Many of our fisher peoples are forced to work in the aquaculture industry, including on the industrial fishing vessels sourcing the ingredients for feed, to make a living. Disenfranchised, marginalised and exploited workers are not our enemy. Rather, we focus our attention on those who promote, and profit from, industrial aquaculture: governments, corporations, international organisations and investors.⁶⁷

These gatherings signal that a global movement against industrial aquaculture is growing. But the brave actions of frontline communities in defending their territories need to be matched by actions that shift consumption away from industrially produced seafoods.

We have to recognise that the struggle to end industrial aquaculture and build back local fisheries and small-scale aquaculture is critical to the larger movement for food sovereignty, dignified working conditions and climate justice.

Of techno-fixes and greenwashing schemes

In the face of mounting global criticism of the heavy use of antibiotics in salmon farms, Norway has nearly eliminated their use on farms in its waters. But salmon are dying in ever increasing numbers from diseases on Norwegian farms as they are elsewhere- and that means that even more fish meal and fish oil will have to be used to maintain production levels.⁶⁸

Pollution from intensive aquaculture has become so bad that the Chinese government has recently started to take some action. But part of its answer is to subsidise its corporations to build massive cages that can be placed further out to sea. The farms can be as high as a 20-story building and cost up to US\$1 billion to build and operate. They will only increase the use of fossil fuels, increase China's already unsustainable imports of fish meal and fish oil, and do little to address marine pollution other than making it less visible.⁶⁹

Opposition to salmon farms is heating up on the Australian island of Tasmania because of its impacts on marine biodiversity. The Brazilian meat giant JBS, one of the biggest salmon farmers in the country, is investing US\$75 million in the expansion of its land-based salmon farm that it says will reduce the environmental impacts. People in Tasmania aren't impressed. The facility is just a hatchery and, as pointed out by the local alliance against industrial salmon farming, all fish will spend the last part of their lives in open net pens in shallow waterways.⁷⁰ Many salmon farming companies are making big promises about the potential of such land-based farms, but, to date, the farms have been plagued by financial and technical problems, and they do nothing to reduce salmon farming's unsustainable use of fish meal and fish oil.⁷¹

Feed corporations like CP and Cargill have been able to reduce the amount of fish meal and fish oil used in their feeds over the years, these companies keep their exact formulations a secret. But the problem is that they are using a lot of agricultural crops instead, especially soybeans, as a replacement- globally, a whopping six times more per year.⁷² This contributes to deforestation, chemical pollution, greenhouse gas emissions, land grabbing and even the destruction of wild fisheries from pollution. Corporations are also developing GM crops designed for fish feeds (and some are even genetically modifying fish).⁷³ Meanwhile, the growth in industrial aquaculture means that the overall demand for fish meal and fish oil keeps growing.

The biggest aquaculture corporations have produced sustainability standards that they claim will deal with labour abuses, overfishing, pollution, mass die-offs and other problems in their industry. But can standard bodies run by corporations be trusted to certify these same corporations? Apparently not.⁷⁴ Investigations into the schemes show they are "plagued by corruption and scandals" and a lack of reporting and enforcement.⁷⁵ When even the low bar certification standards of the salmon farming industry's Aquaculture Stewardship Certification became too much for the biggest salmon farming companies, they simply switched to an even slacker standard called Best Aquaculture Practices that happily certifies farms infested with sea lice or where mortality rates are over 50%!⁷⁶ Most problematically, the corporate schemes are greenwashing the use of wild-caught fish for aquaculture feed, giving it a label of "sustainably sourced" when there is no "sustainable" way to divert wild fish that people eat into the production of fish feed for industrial farms.

Notes

1. Naylor et al., "A 20-year retrospective review of global aquaculture," *Nature* volume 591, 2021: <https://www.nature.com/articles/s41586-021-03308-6>
2. FAO, WORLD FISHERIES AND AQUACULTURE PRODUCTION OF AQUATIC ANIMALS, 1980-2032, page 209: <https://openknowledge.fao.org/items/06690fd0-d133-424c-9673-1849e414543d>
3. Zoe W. Brent, Mads Barbesgaard and Carsten Pedersen, "The Blue Fix: Unmasking the politics behind the promise of blue growth," *TNI*, 2018: https://www.tni.org/files/publication-downloads/the_blue_fix_english.pdf
4. Newton et al., "Intensification, regulation and diversification: The changing face of inland aquaculture in China," *mbio*. September 2021, doi: 10.1007/s13280-021-01503-3
5. Chiu et al., "Feed and fishmeal use in the production of carp and tilapia in China," *Aquaculture*, 414-415, 127-134, 2013: doi:10.1016/j.aquaculture.2013.07.049
6. Crona et al., "China at a Crossroads: An Analysis of China's Changing Seafood Production and Consumption," *One Earth*, 3(1), 32-44, 2020: doi:10.1016/j.oneear.2020.06.013
7. The intensification and growth of carp farming did cause water pollution and increased China's demand for fish meal, putting pressure on ocean fish stocks elsewhere.
8. Irmak Ertör and Miquel Ortega-Cerdà, "The expansion of intensive marine aquaculture in Turkey: The next-to-last commodity frontier?," *Journal of Agrarian Change*, 31 July 2018: <https://onlinelibrary.wiley.com/doi/10.1111/joac.12283>; Alexandra Heal et al., "The hidden cost of your supermarket salmon," *Financial Times*, January 2024: <https://ig.ft.com/supermarket-salmon/>
9. Changing Markets and Compassion in World Farming, "Until the seas run dry", 2019: <https://www.ciwf.org.uk/media/7436097/until-the-seas-dry.pdf>; Greenpeace Africa and Changing Markets, "Feeding a monster," October 2023: <https://changingmarkets.org/wp-content/uploads/2023/10/Feeding-a-Monster-EN-low-res.pdf>
10. Roberts et al., "Feeding global aquaculture", *Science Advances*, October 2024: <https://www.science.org/doi/10.1126/sciadv.adn9698>
11. Roberts et al., 2024.
12. Feedback Global, "Blue Empire: How the Norwegian salmon industry extracts nutrition and undermines livelihoods in West Africa" January 2024: <https://feedbackglobal.org/wp-content/uploads/2024/01/Feedback-BlueEmpire-Jan24.pdf>; Heal et al. 2024.
13. Roberts et al., 2024.
14. WWF, "Measuring and Mitigating GHGs: Salmon," October 2022: <https://www.worldwildlife.org/topics/measuring-and-mitigating-greenhouse-gas-emissions-for-specific-commodities>
15. Matt McGrath, "Mass die-offs among farmed salmon on the rise around the world," *BBC*, March 2024: <https://www.bbc.co.uk/news/science-environment-68502267>
16. WFFP, "The Shift From Capture To Culture Fisheries & Challenges in Advancing Food Sovereignty", September 2024: <https://wffp-web.org/webinar-recap-the-shift-from-capture-to-culture-fisheries-challenges-in-advancing-food-sovereignty/>; International Collective in Support of Fishworkers, "Aquaculture at crosswaters", <https://www.icsf.net/resources/aquaculture-at-crosswaters/>
17. Simen Sætre and Kjetil Østli, *The New Fish: The Truth about Farmed Salmon and the Consequences We Can No Longer Ignore*, Patagonia, 2023; Alexandra Morten, *Not on my watch: How a renegade whale biologist took on governments and industry to save wild salmon*, Random House, 2022. See also the materials developed by A Growing Culture and Block Corporate Salmon: https://www.instagram.com/p/DAmh-uNtkOC/?utm_source=ig_web_copy_link&igsh=MzRIODBiNWFIZA==
18. Andres Gálvez, "La comunidad indígena chilena que se enfrentó a la salmonera que arrasa sus océanos, y ganó", *Carbono News*, May 2021: <https://www.carbono.news/politica/la-comunidad-indigena-chilena-que-se-enfrento-a-la-salmonera-que-arrasa-sus-oceanos-y-gano/>; Meritxell Freixas, "El impacto de cultivar salmones en el Pacífico Sur," *El País*, October 2019: https://elpais.com/elpais/2019/08/14/planeta_futuro/1565798074_381312.html
19. Pradeep Elangovan, Jones T Spartegus, Yifang Tang, "Impact of Shrimp Aquaculture on Fisherpeoples' Right to Food and Nutrition in India, FIAN, 2023: [https://www.fian.org/files/is/htdocs/wp11102127_GNIAANVR7U/www/files/FIAN-English\(2\).pdf](https://www.fian.org/files/is/htdocs/wp11102127_GNIAANVR7U/www/files/FIAN-English(2).pdf); "Aquaculture at Crosswaters", International Collective in Support of Fishworkers, 2023: <https://icsf.net/resources/aquaculture-at-crosswaters/>
20. Acción Ecológica, "No más zonas de sacrificio por el negocio camaronero ¡No a los Tratados de Libre Comercio!", 2022: <https://www.accionecologica.org/no-mas-zonas-de-sacrificio-por-el-negocio-camaronero-no-a-los-tratados-de-li>

- [bre-comercio/; C-CONDEM, "Certificando la destrucción", 2007: <https://ccondem.org.ec/wp-content/uploads/2021/05/certificando-la-destruccion-92-1.pdf>](#)
21. Sumaila et al., "Aquaculture over-optimism?," Front. Mar. Sci. 9:984354, 2022: <https://www.frontiersin.org/journals/marine-science/articles/10.3389/fmars.2022.984354/full>
22. WFFP, "The Shift From Capture To Culture Fisheries & Challenges in Advancing Food Sovereignty", September 2024: <https://wffp-web.org/webinar-recap-the-shift-from-capture-to-culture-fisheries-challenges-in-advancing-food-sovereignty/>
23. <https://elsam.or.id/storage/files/2/Fact-Sheet.pdf>
24. The Outlaw Ocean Report, "India Shrimp Rife with Bondage, Hazards, and Stolen Wages," March 2024: <https://www.theoutlawocean.com/investigations/india-shrimp-a-growing-goliath/indian-shrimp-rife-with-bondage-hazards-and-stolen-wages/>; International Labor Rights Forum & Warehouse Workers United, "The Walmart Effect: Child and Worker Rights Violations at Narong Seafood," September 2013: <https://laborrights.org/publications/walmart-effect-child-and-worker-rights-violations-narong-seafood/>; Chris Chase, "Report on Indonesia shrimp industry adds to evidence claiming labor abuses in supply chain," SeafoodSource, September 2024: <https://www.seafoodsource.com/news/supply-trade/report-on-indonesia-shrimp-industry-adds-to-evidence-claiming-labor-abuses-in-supply-chain>
25. "Trabajo forzoso en industria salmonera chilena: Sindicatos y comunidades confirman abusos laborales y violación de derechos humanos," Radiodelmar.cl, November 2024: <https://www.ecoceanos.cl/2024/11/trabajo-forzoso-en-industria-salmonera-chilena-sindicatos-y-comunidades-confirman-el-abuso-en-este-enclave-exportador/>
26. DeSmog has created a database on the major players in industrial aquaculture and gradually filling it out: <https://www.desmog.com/industrial-aquaculture-database/>
27. Calculation is based on 2020 data from: Pandey et al., Production growth, company size, and concentration: The case of salmon, Aquaculture, Volume 577, 2023: <https://www.sciencedirect.com/science/article/pii/S0044848623007469>
28. Rachel Mutter, "Cooke to acquire one of world's largest fishmeal producers", ItraFish, November 2024: <https://www.intrafish.com/finance/cooke-to-acquire-one-of-worlds-largest-fishmeal-producers/2-1-1736754>
29. Snigdendu Bhattacharya, "Artisanal fishers wary of coastal aquaculture regulation amendments that legalise past violations", Mongabay, September 2023: <https://india.mongabay.com/2023/09/artisanal-fishers-wary-of-coastal-aquaculture-regulation-amendments-that-legalise-past-violations/>
30. See presentation by Siddharth Chakravarthy in the webinar organised by WFFP, "The Shift From Capture To Culture Fisheries & Challenges in Advancing Food Sovereignty", September 2024: https://www.youtube.com/watch?v=uXNBq2yqh2U&ab_channel=WorldForumofFisherPeoples
31. Boston Consulting Group, "A Strategic Approach to Sustainable Shrimp Production in Indonesia, November 2019: <https://media-publications.bcg.com/BCG-A-Strategic-Approach-to-Sustainable-Shrimp-Production-in-Indonesia-Nov-2019.pdf>
32. Undercurrent News, "China's shrimp farming renaissance driven by humble greenhouse tech", March 2024: <https://www.undercurrentnews.com/2024/03/18/chinas-shrimp-farming-renaissance-driven-by-humble-greenhouse-tech/>; N'Souvi et al. "Shrimp industry in China: overview of the trends in the production, imports and exports during the last two decades, challenges, and outlook", Frontiers in Sustainable Food Systems, vol.7, 2024: <https://www.frontiersin.org/journals/sustainable-food-systems/articles/10.3389/fsufs.2023.1287034>
33. Rachel Muller, "China's 'stunning' shrimp growth: New farming techniques drive massive production surge," IntraFish, March 2024: <https://www.intrafish.com/shrimp/china-s-stunning-shrimp-growth-new-farming-techniques-drive-massive-production-surge/2-1-1591804/>; Rachel Muller, "Consolidation has changed the landscape in China's aquaculture feed sector," IntraFish, March 2024: <https://www.intrafish.com/shrimp/consolidation-has-changed-the-landscape-in-chinas-aquaculture-feed-sector/2-1-1603999>
34. Undercurrent News, "Omarsa targets 50% farm ownership with huge low-salinity RAS buyouts", September 2024: <https://www.undercurrentnews.com/2024/09/06/omarsa-targets-50-farm-ownership-with-huge-low-salinity-ras-buyouts/>
35. "Mitsui raises shrimp stakes with \$360m investment in Santa Priscilla", The Fish Site, August 2023: <https://thefishsite.com/articles/mitsui-raises-shrimp-stakes-with-360m-investment-in-santa-priscilla/>; See Mitsui press release, 2023: https://www.mitsui.com/jp/en/release/2023/1247737_13943.html
36. World Grain, "Cargill to expand shrimp-feed production in Ecuador", October 2022: <https://www.world-grain.com/articles/17666-cargill-to-expand-shrimp-feed-production-in-ecuador>
37. IFC press release, December 2023: <https://www.ifc.org/en/pressroom/2023/ifc-grants-loan-to-omarsa-to-boost-shrimp-production-in-ecuador>
38. GRAIN, "Private equity sharks take a bite out of the 'blue economy'", December 2022: <https://grain.org/e/6932>
39. NAQUA press release, June 2023: <https://www.naqua.com.sa/en/news/Strategic-Partnership-Between-NAQUA-and-SALIC-Towards-Achieving-the-Goals-of-Vision-2030-Through-the-Development->

and-Sustainability-of-the-Aquaculture-Sector; Robert Fletcher, "The Saudi shrimp farm whose sights are set on 250,000 tonnes a year", The Fish Site, November 2023: <https://thefishsite.com/articles/the-saudi-shrimp-farm-whose-sights-are-set-on-250-000-tonnes-a-year-naqua-diego-illingworth>

40. Topian Aquaculture is a joint venture with one of Saudi Arabia's oldest aquaculture companies, Tabuk Fisheries Company, which only produces 5,000 tons annually of farmed fish. See: <https://www.skretting.com/en-gm/feed-mag--ras/SustainabilityandinnovationsinRedSeaaquaculture/>

41. "Avramar: White smoke coming out", Naftemporiki, October 2024: <https://www.naftemporiki.gr/english/1809716/avramar-white-smoke-coming-out/>

42. Undercurrent News, "UAE investor strikes deal for majority stake in Turkish bass, bream supplier," October 2023: <https://www.undercurrentnews.com/2023/10/31/uae-investor-strikes-deal-for-majority-stake-in-turkish-bass-bream-supplier/>; GRAIN, "From land to logistics: UAE's growing power in the global food system," July 2024: <https://grain.org/en/article/7170-from-land-to-logistics-uae-s-growing-power-in-the-global-food-system>

43. Phnom Penh Post, "Cambodia, China mull 'Fish and Rice Corridor' in Kingdom's northwest," February 2023: <https://www.phnompenhpost.com/business/cambodia-china-mull-fish-and-rice-corridor-kingdoms-northwest>; Maritim Africa, "Strategic partnership between Senegal and China for the development of aquaculture in Senegal," September 2024: <https://maritimafrika.com/en/strategic-partnership-between-senegal-and-china-for-the-development-of-aquaculture-in-senegal/>

44. VOI, "The Shrimp Estate Program In NTT Is Confirmed To Continue Even Though It Replaces The Minister Of KP," February 2024: <https://voi.id/en/economy/354746>; KatongNTT, "Tender Ditetapkan, Target Produksi Udang Sumba Timur Rp 4,16 Triliun/Tahun," January 2024: <https://katongntt.com/tender-ditetapkan-target-produksi-udang-sumba-timur-rp-416-triliun-tahun/>; Aqua Research, "Indonesia adds 12 shrimp farming areas for 2 million tonnes of vannamei shrimp in 2024," December 2023: <https://aquaasiapac.com/2023/12/14/indonesia-adds-12-shrimp-farming-areas-for-2-million-tonnes-of-vannamei-shrimp-in-2024/>

45. Mostafa Hosny, "Big fish in a shrinking pond: How an Armed Forces company is building a fish farming monopoly," April 2021: <https://www.madamasr.com/en/2021/04/15/feature/economy/big-fish-in-a-shrinking-pond-how-an-armed-forces-company-built-a-fish-farming-monopoly/>; See Evergreen's Egypt website: <https://www.evergreenegy.com/about/company-overview>

46. Mona Ali Allam, "Egypt: The Women and the Sea," Assafir Al-Arabi, April 2020: <https://assafirarabi.com/en/30254/2020/04/05/egypt-the-women-and-the-sea/>

47. See for example, AFSA, "Overfishing threatens food security, but aquaculture provides an answer for women in Senegal", 2020: <https://afsafrica.org/wp-content/uploads/2020/11/wadaf.pdf> or Daniel Njagi, "Sustainable fish farming & agroecology buoy Kenyan communities," Mongabay, February 2023: <https://news.mongabay.com/2023/02/sustainable-fish-farming-agroecology-buoy-kenyan-communities/>

48. <https://thefishsite.com/articles/fishermens-leaders-speak-out-against-aquaculture>; <https://dontcageouroceans.org/wp-content/uploads/Aquaculture-With-Values-One-Page2.pdf>

49. FAOs estimates a 16.5 MT increase in fisheries production: <https://openknowledge.fao.org/server/api/core/bitstreams/9df19f53-b931-4d04-acd3-58a71c6b1a5b/content/sofia/2022/status-of-fishery-resources.html>. Figure for total farmed fish and shrimp is derived from Majluf et al., "A review of the global use of fishmeal and fish oil and the Fish In:Fish Out metric", Scientific Advances, 10/42, October 2024: <https://www.science.org/doi/10.1126/sciadv.adn5650>

50. For more information see the website: <https://dontcageouroceans.org/>

51. See, for instance, the work on aquaculture featured by the International Collective in Support of Fishworkers: <https://icsf.net/aquaculture/>

52. The national coalition is La Coalition contre les usines de farine de poisson (see: <https://maritimafrika.com/coalition-contre-les-usines-de-farine-de-poisson-memorandum-contre-les-usines-de-farine-et-dhuile-de-poissons/>). At the international level there is the Our Fish, Notre Poisson campaign that brings together local community organisations with the Regional Network of West African Marine Protected Areas (RAMPAO), Greenpeace Africa, the West African Association for the Development of Artisanal Fisheries (WADAF), the Sub-Regional Fisheries Commission (SRFC), the Regional Partnership for Marine and Coastal Conservation in West Africa (PRCM), and Lancaster University (see: <https://feedbackglobal.org/campaigns/our-fish-notre-poisson/>)

53. See Biothai website: <https://biothai.net/> and Bangkok Tribune, "Series of legal action taken in Blackchin tilapia fish invasion case", 10 September 2024: <https://bkktribune.com/series-of-legal-action-taken-in-blackchin-tilapia-fish-invasion-case/>

54. See for example, "Aquaculture at Crosswaters", International Collective in Support of Fishworkers, 2023: <https://icsf.net/resources/aquaculture-at-crosswaters/>; Priyanka Shankar, "Artisanal fishers of Rameswaram resist the polluting shrimp farms on the island", Mongabay, March 2023: <https://india.mongabay.com/2023/03/artisanal-fishers-of-rameswaram-resist-polluting-shrimp-farms-on-the-island/>

55. Basten Gokkon, "Indonesian activists face jail over FB posts flagging damage to marine park," Mongabay, March 2024: <https://news.mongabay.com/2024/03/indonesia-karimunjawa-marine-park-illegal-facebook-uu-ite-pollution-shrimp-farms/>
56. See presentation by Susan Gui of KIARA in the webinar organised by WFFP, "The Shift From Capture To Culture Fisheries & Challenges in Advancing Food Sovereignty", September 2024: https://www.youtube.com/watch?v=uXNBq2yqh2U&ab_channel=WorldForumofFisherPeoples
57. Patagonia Works, "Historic Announcement: Argentina becomes first country to reject salmon farming," June 2021: <https://www.patagoniaworks.com/press/2021/6/30/historic-announcement-argentina-becomes-first-country-to-reject-salmon-farming>
58. Barinia Montoya, "Industria del salmón acusada de desinformar sobre solicitudes de espacios marinos costeros de pueblos originarios en Chile", Mongabay March 2024: <https://es.mongabay.com/2024/03/industria-del-salmon-acusada-de-desinformar-solicitudes-espacios-marinos-costeros-pueblos-originarios-chile/>; Ecoceanos, "Organizaciones y comunidades defienden Ley Lafkenche y recursos de pesca artesanal ante avance de la industria salmonera en la Patagonia," February 2022: <https://www.ecoceanos.cl/2024/02/organizaciones-y-comunidades-defienden-ley-lafkenche-y-recursos-de-pesca-artesanal-ante-avance-de-la-industria-salmonera-en-la-patagonia/>; María del Mar Parra, "Tras 'campaña de desinformación' salmonera, frenan administración indígena de mares en Aysén", El Desconcierto, March 2023: <https://eldesconcierto.cl/2024/03/01/tras-campana-de-desinformacion-salmonera-frenan-administracion-indigena-de-mares-en-aysen/>; El Mostrador, "Pueblos originarios denuncian 'racismo' tras rechazo de área marítima," March 2024: <https://www.elmostrador.cl/noticias/pais/2024/03/03/pueblos-originarios-denuncian-racismo-tras-rechazo-de-area-maritima/>
59. See the websites of the First Nation Wild Salmon Alliance (<https://www.firstnationwildsalmonalliance.ca/>) and Living Oceans (<https://livingoceans.org/>). "Marine Harvest Canada sues Alexandra Morton for trespassing on fish farms," CBC, September 2016: <https://www.cbc.ca/news/canada/british-columbia/marine-harvest-canada-alexandra-morton-1.3780977>
60. For more information see: <https://pacificwild.org/campaign/fish-farms-out/>
61. For more information see the website of Don't Cage our Oceans (<https://dontcageouroceans.org/>) and this article by Casey Wilson, "Corporate Takeover of Our Food System: Say No to Offshore Fish Farming!", NFFC, August 2023: <https://nffc.net/corporate-takeover-of-our-food-system-say-no-to-offshore-fish-farming/>. Also, Ethan Genter, "Major aquaculture projects are hitting roadblocks along Maine's coast," December 2022: <https://www.mainepublic.org/2022-12-06/major-aquaculture-projects-are-hitting-roadblocks-along-maines-coast>
62. "Norwegian company plans N\$20bn turnover Lüderitz Salmon Farm", The Brief, 10 August 2023: <https://thebrief.com.na/2023/08/norwegian-company-plans-n-20bn-turnover-luederitz-salmon-farm/>
63. See company website: <https://africanaqua.com/>
64. Interview with GRAIN, November 2024.
65. See the website: <https://fishfarmsout.org/>
66. See the IG of the WFFP: https://www.instagram.com/p/DC4in1GRDSr/?utm_source=ig_web_copy_link&igsh=MzRIOD-BiNWFIZA==
67. See WFFP's website: <https://wffp-web.org/>
68. "Revealed: The main causes of death in Norwegian farmed salmon for 2023," Salmon Business, March 2024: <https://www.salmonbusiness.com/revealed-the-main-causes-of-death-in-norwegian-farmed-salmon-for-2023>
69. Feng Yingxin, "China's offshore fish farming grows amid environmental concerns," Dialogue Earth, October 2023: <https://dialogue.earth/en/ocean/chinas-offshore-fish-farming-grows-amid-environmental-concerns/>; "China launches \$700 million AI-powered offshore salmon farm", Salmon Business, January 2024: <https://www.salmonbusiness.com/china-launches-ambitious-700-million-ai-assisted-offshore-salmon-farm/>
70. See Neighbours of Fish Farming: <https://www.noff.au/l/huon-aquacultures-announcement-of-ras-developments-at-port-huon-is-pure-greenwashing/>
71. For some discussion within the industry, see The Economist, "The future of fish farming is on land," May 2023: <https://www.economist.com/science-and-technology/2023/05/31/the-future-of-fish-farming-is-on-land> and Drew Cherry, "The critics are right: it's time to 'close down' salmon farms," IntraFish, October 2024: <https://www.intrafish.com/opinion/the-critics-are-right-it-s-time-to-close-down-salmon-farms/2-1-1718947>
72. Brigitte Wear, "Fish Farming Industry is Using 'Misleading' Figures to Downplay its Role in Overfishing, New Research Finds," DeSmog, November 2024: <https://www.desmog.com/2024/11/21/fish-farming-industry-is-using-misleading-figures-to-downplay-its-role-in-overfishing-new-research-finds/>; Roberts et al., "Feeding global aquaculture", Science Advances, October 2024: <https://www.science.org/doi/10.1126/sciadv.adn9698>

73. The Fish Site, "Nuseed steps up GM Omega-3 canola sales drive in Norway and Europe," November 2024: <https://thefishsite.com/articles/nuseed-steps-up-gm-omega-3-canola-sales-drive-in-norway-and-europe>; On GM fish see resources on GM salmon on the Canadian Biotechnology Action Network website: <https://cban.ca/gmos/products/ge-animals/ge-fish/>
74. DeSmog, "Revealed: Industry-led West Africa Fishery Protection Measures Marred By 'Massive Conflicts of Interest'", July 2024: <https://www.desmog.com/2024/07/04/revealed-industry-led-west-africa-fishery-protection-measures-marred-by-massive-conflicts-of-interest/>
75. Changing Markets, "What Lies Beneath: Uncovering the truth about Peru's colossal fishmeal and fish oil industry," November 2020: <https://changingmarkets.org/report/what-lies-beneath-uncovering-the-truth-about-perus-colossal-fishmeal-and-fish-oil-industry/>; Outlaw Ocean Project, "China: the superpower of seafood", October 2023: <https://www.theoutlawocean.com/investigations/china-the-superpower-of-seafood/findings/>
76. Kelly Roebuck, "B.C. salmon farms drop Aquaculture Stewardship Certification", SeaChoice, May 2023: <https://www.seachoice.org/b-c-salmon-farms-drop-aquaculture-stewardship-certification/>; Carbon Pulse, "Fish farming marine destruction claims highlight challenge in meeting GBF targets", May 2024: <https://carbon-pulse.com/286627/>



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