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Hidden cost of salmon farming almost US$50 billion since 2013

Huge environmental and social risks must be mitigated by rapid switch to sustainable farming practices and diversification

The short-term pursuit of profits by salmon producers is creating significant unaccounted environmental and social costs, which include growing mortality rates, damage to local ecosystems, pressure on wild fish stocks and poor fish welfare, reveals a new report by **Just Economics**.

New analysis into the negative impacts of salmon farming puts the cumulative costs to economies, society and the environment since 2013 at almost US$50 billion. More than half of these costs are falling to producers (US$28 billion), with the rest being passed on to society (US$19 billion) in the top four salmon-producing countries.

Norway, Scotland, Canada and Chile account for 96 percent of farmed salmon across the world. The '*Dead Loss'* report, commissioned by **The Changing Markets Foundation**, analyses the impacts of the industry in these four countries, to reveal the hidden costs.

Eilís Lawlor, Director, Just Economics, commented: *"There is a growing demand from consumers to source fish from producers that care for the environment, protect coastal communities and prioritise fish welfare. However, our analysis shows that salmon farming is incurring significant economic, social and environmental costs that are not currently accounted for in company reporting. Investors should factor in the long-term risks facing salmon aquaculture and governments should implement robust regulation to ensure that companies rapidly switch to more sustainable farming practies."*

Natasha Hurley, Campaigns Manager, Changing Markets Foundation, commented: *"Salmon farming is a prime example of a broken food system: every year, it hoovers up millions of tonnes of wild-caught fish for feed, mortality rates on farms are soaring, and pollution is harming pristine ecosystems and wild salmon. This analysis shows that disregard for good fish husbandry is not just bad for the environment and fish welfare, it's also a business risk: companies are squandering money and resources and if they carry on like this, the industry won't be able to sustain itself in the long-term. Sooner or later it will hit environmental limits and a refusal by tax-payers to keep footing the bill for pollution and other losses."*

Economic costs

The report identifies that poor fish husbandry, parasites and pollution are causing hundreds of millions of fish mortalities before the fish are ready for slaughter. This accounts for the highest proportion of the costs - US$15.5 billion - to the four countries' economies (US$8.9 billion in

Norway, US$922 million in Scotland, US$768 million in Canada and US$4.9 billion in Chile (2013-2019)).[i]

Of the four countries, only Scotland and Norway publicly release mortalities data. In Scotland, deaths have increased two-fold since 2013, from 10,329 tonnes in 2013 to 25,772 tonnes in 2019. More than 13 percent of the harvest was lost in 2019 – a significant figure that is three times higher than mortality rates on UK chicken farms.[ii]

Ten companies, with combined total revenues of more than US$12 billion in 2018, account for 50 percent of global salmon production. The short-term pursuit of profits by these producers has resulted in the deaths of 100 million salmon (half a million tonnes) since 2010.

The world's largest farmed salmon producer, Mowi, headquartered in Norway, accounted for half of overall mortalities from the top ten companies over the period. The report finds that unexplained and unexpected deaths at all of Mowi's farms worldwide, over the period 2010-2019, totalled approximately 50 million salmon (252,521 tonnes) with a cost of US$1.7 billion. This is despite Mowi claiming to be a leader in sustainability, with its new 2020 Sustainability Strategy and slogan: "Leading the Blue Revolution".[iii] Mowi supplies farmed salmon to some of Europe's biggest supermarket chains – it is also the main supplier to British retailer Sainsbury's.[iv]

The producer with the second highest salmon mortality count is Norway's Lerøy, which totalled 66,975 tonnes in losses with a cost of US$456 million to the company. Lerøy supplies farmed salmon to major international retailers, including Ikea,[v] Tesco,[vi] Carrefour[vii] and Spanish retailer Mercadona.[viii] Through its UK subsidiary, Scottish Sea Farms, Lerøy also supplies salmon to British retailer Marks & Spencer.[ix]

Environmental costs

The environmental cost of unsustainable farming approaches over the same period is estimated at US$14.5 billion, through the pollution of seas and freshwater lakes, damage to wild salmon stocks and biodiversity, and the generation of CO_2 emissions.

The analysis also calculates the total indirect cost of the use of forage fish in feed for salmon farming in Norway, Scotland, Canada and Chile. Wild forage fish such as sardines, herring and anchovies are 'keystone species' which play an important role in the marine ecosystem. Their use in feed for salmon farms incurs an indirect ecosystem loss equating to US$1.8 billion since 2013.

Social costs

The report estimates the social cost of poor fish welfare by using an estimate of the premium that consumers are willing to pay for higher welfare standards (14%). When this is applied to relevant consumers, the total opportunity cost from poor fish welfare is valued at US$4.67 billion.

It also highlights that almost one-fifth of the world's annual marine fish catch is used to rear farmed animals and fish instead of being consumed directly by people.[x] Unsustainable fishing practices and the diversion of fish from vulnerable communities in West Africa, which has become a key supplier of fishmeal and fish oil (FMFO) to the global market, is putting livelihoods at risk, driving poverty and forced migration.[xi] [xii]

A case study for Norway, which imported 8.4 thousand tonnes of fish oil from Mauritania in 2019, shows a loss to Mauritania in 2019 of US$37.5 million.

The total global production of farmed Atlantic salmon is estimated to have increased by seven percent in 2019, to around 2.6 million tonnes.[xiii] Expansion of production is planned across all four countries. By 2050, Norway is expected to see a five-fold increase and production in Scotland is predicted to double by 2030.[xiv]

Transparency and accounting

The report finds that transparency and accountability in salmon farming are extremely weak and that legislation is needed for the industry to meet higher standards.

Just Economics provides its recommendations for governments, investors and companies to bring accountability to the salmon farming industry:

- **Governments**: must require improvements in social, economic and environmental accounting and ensure more robust regulation of salmon farming by restricting licences and subsidies to companies that meet higher standards.
- **Companies:** should diversify species cultivated via aquaculture, prioritising non-carnivorous species, and improving fish husbandry. The industry must also invest in technologies to address the risks and drive a rapid transition towards alternative feeds and farming practices.
- **Investors:** need to take a long-term view, which may involve accepting lower returns in the short term but will create competitive advantage in the long run.

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Notes to Editors

About Just Economics (www.justeconomics.co.uk)

Just Economics is a research organisation that uses the tools of economics to further progressive social change. It was founded on the belief that research should be a socially valuable exercise that leads to improved conditions for people and the planet.

About Changing Markets Foundation (www.changingmarkets.org)
The Changing Markets Foundation partners with NGOs on market-focused campaigns. Its mission is to expose irresponsible corporate practices and drive change towards a more sustainable economy.

About the report available here from Thursday 11 February:
https://www.justeconomics.co.uk/health-and-well-being/dead-loss)

The study was commissioned by the Changing Markets Foundation as part of its Fishing the Feed campaign, to calculate the hidden cost of salmon farming. The research was carried out independently by Just Economics.

Based on detailed economic analysis of industry and government data, it estimates the costs across three different areas:

- **ECONOMIC:** The report considers three economic variables: the 'opportunity cost' of mortalities (pre-slaughter deaths) on salmon farms; the cost of marine ingredients (fishmeal and fish oil, or FMFO) in feed ; and the cost of combating sea lice, which is a common problem in salmon farming.
- **ENVIRONMENTAL**: The report considers four environmental impacts: Welfare loss of depleted salmon; Biodiversity loss of pelagic fish stocks; Impacts of local pollution; and Climate change impacts.
- **SOCIAL**: The report considers two social variables: Salmon welfare and the impacts of diverting wild fish away from direct human consumption for use in salmon feed, which is depriving economies in the Global South of millions of dollars in revenue every year and putting livelihoods at risk.

Definition of mortalities: 'Mortalities' in the context of salmon farming refer to unexpected deaths of salmon pre-slaughter. This could be due to a number of causes, including lice outbreaks, disease and algal blooms. It's important to note that salmon farmers assume a minimum amount of mortalities per number of smolts released into pens, and most likely incorporate this into their harvest calculations. In this scenario, the difference between expected and actual harvests is therefore a measure of excess deaths, rather than total deaths.

Summary of costs for each variable per country (MUSD)

	Canada	Norway	Chile	Scotland	Total
Mortalities	768	8908	4939	922	15,539
Lice	111	2142	1647	463	4,365
FMFO	454	4832	2045	859	8,192
Total economic cost	**1333**	**15969**	**8631**	**2233**	**28,096**

Salmon stocks	*187*	52	Insufficient data	68	308
Pelagic fish stocks	*135*	665	302	680	1,784
Local pollution	*189*	2328	1268	288	4,073
Climate change	*425*	*5224*	2282	425	8,356
Total environmental cost	936	8269	3852	1461	14,521
Fish welfare	*97*	*3675*	Insufficient data	*902*	*4,674*
Total social cost	97	3675	Insufficient data	902	*4,674*
Total	2366	27913	13304	4596	*47,291*

[i] To find the cost of mortalities across all four countries, Just Economics applied the average mortalities of Scotland and Norway, which have been reported on annually, to Canada and Chile, where mortalities data is not publicly available,

[ii] Based on 4% mortality on UK chicken farms. Ref: https://www.theguardian.com/environment/2020/aug/25/over-60-million-chickens-in-england-and-wales-rejected-over-disease-and-defects

[iii] https://mowi.com/sustainability/

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[vi] Ibid.

[vii] Carrefour (2020) *Carrefour applies blockchain technology to Carrefour quality line salmon*, 29 January. [Press Release] [ONLINE] Available at: https://www.carrefour.com/en/newsroom/carrefour-applies-blockchain-technology-carrefour-quality-line-salmon

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[xiii] FAO: http://www.fao.org/in-action/globefish/market-reports/resource-detail/en/c/1296665/#:~:text=Total%20global%20production%20of%20farmed,around%205%20percent%20in%202018.

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