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Hazardous substances going astray

PERSPECTIVES

BJØRN J. BOLANN

bjorn.bolann@uib.no
Bjørn J. Bolann, specialist in medical biochemistry and professor emeritus in medical biochemistry at the University of Bergen.
The author has completed the ICMJE form and declares no conflicts of interest.

ANNE-LISE BJØRKE-MONSEN

Anne-Lise Bjørke-Monsen, PhD, specialist in paediatric medicine and medical biochemistry, and senior consultant at Innlandet Hospital, Førde Hospital Trust, and Haukeland University Hospital.
The author has completed the ICMJE form and declares no conflicts of interest.

MARIA AVERINA

Maria Averina, PhD, specialist in medical biochemistry and departmental senior consultant in the Department of Laboratory Medicine, University Hospital of North Norway, Tromsø and associate professor at the Department of Clinical Medicine, UiT The Arctic University of Norway.
The author has completed the ICMJE form and declares no conflicts of interest.

JAN BROX

Jan Brox, specialist in medical biochemistry, professor emeritus and senior consultant at the Department of Laboratory Medicine, University Hospital of North Norway, Tromsø.
The author has completed the ICMJE form and declares no conflicts of interest.

MERETE EGGESBØ

Merete Eggesbø, PhD, doctor and professor at the Department of Clinical and Molecular Medicine, Norwegian University of Science and Technology (NTNU).
The author has completed the ICMJE form and declares the following conflicts of interest: she has received lecture fees and royalties from GOLD Academy, had travel and hotel expenses covered for participation at the World of Microbiome Conference, a seminar with Monica Lind, a workshop in Tromsø by Young CAS fellow Veronika K. Pettersen, and a symposium for Philip Grandjean. Until 2023, she was a board member of ISCHE (International Society of Children's Health and the Environment).

INGRID HOKSTAD

Ingrid Hokstad, specialty registrar in medical biochemistry at Innlandet Hospital.
The author has completed the ICMJE form and declares no conflicts of interest.

SANDRA HUBER

Sandra Huber, PhD, special adviser in the Department of Laboratory Medicine, University Hospital of North Norway, Tromsø.
The author has completed the ICMJE form and declares the following conflicts of interest: she has received funding from the EU's PARC project (Partnership for the Assessment of Risks from Chemicals), served as an external examiner for a bachelor's exam at UIT The Arctic University of Norway, received support from the Research Council of Norway for a meeting related to the NFR project in Nepal, had travel and accommodation covered by EU-Horizon Europe for a PARC meeting in Amsterdam, and received support from the Norwegian Fund for Clinical Chemistry for travel to the Dioxin Conference in Maastricht in 2023. She has also been a member of the external advisory committee for the AMAP Ring Test for Persistent Organic Pollutants in Human Serum.

Harmful substances that are prohibited or strictly regulated in Norway are now to be dispersed on Norwegian agricultural soil. We must work to prevent them spreading to groundwater and entering the food chain.

Photo: Gorm Kallestad/NTB

Drinking water in Norway contains low concentrations of hazardous environmental pollutants. Our drinking water is an invaluable resource that we must manage well. The Norwegian Pollution Control Act aims to protect groundwater from contamination, the main sources of which are agricultural activities, waste landfill sites, industry, urbanisation and traffic. Norway adheres to several international agreements, such as the 1992 UN Water Convention and the Water Framework Directive (1).

In other parts of the world, drinking water is often heavily contaminated, which is associated with serious health impacts, such as birth defects and cancer (2, 3). In Denmark, for example, recent studies found that the risk of congenital heart disease increased with the amount of arsenic in maternal drinking water (4). The odds ratio of congenital heart disease was 1.33 at arsenic concentrations of 1.0–4.9 µg/L and 1.42 for ≥ 5.0 µg/L. Some drinking water sources in Norway have also been found to have high concentrations of arsenic, with up to 14 µg/L (5).

Global problem

Environmental contamination with arsenic is a global problem (6). Many countries, particularly in Asia, have high concentrations in their groundwater. Arsenic is taken up in food crops such as rice (7). In Southeast Asia, large portions of the population suffer from chronic arsenic poisoning, which can lead to, for example, skin lesions, an increased incidence of diabetes and cardiovascular disease, as well as a higher risk of cancer (8, 9).

> ***«In many places, environmental pollutants and organic material are gradually destroying life in the Norwegian fjords»***

Norway currently has substantial emissions of arsenic and heavy metals. In 2022, more than 2 million tons of fish feed (dry weight) were used to feed over 500 million farmed fish in the pens along the Norwegian coast (10). Data from the Norwegian Food Safety Authority's monitoring programme show that the fish feed used in the period 2003–2020 contained a total of 79 tons of arsenic, 1.7 tons of lead, 5.8 tons of cadmium and 0.7 tons of mercury (11). Arsenic and heavy metals are elements and thus not subject to further decomposition. Many organic pollutants that are resistant to degradation also accumulate in the environment and pose serious adverse health risks (12). The fish feed used in 2022 was partly made up of 11 kg of DDT and 200 kg of glyphosate (13), which is the active ingredient in Roundup weedkiller. Both DDT and glyphosate have been shown to have epigenetic effects, which means they could also affect future generations (14, 15). While some of the feed is digested by the fish, nearly half remains uneaten and settles in the fjord along with the fish waste (16).

In many places, environmental pollutants and organic material are gradually destroying life in the Norwegian fjords (17). Residents near fish farms can witness firsthand the fouling of the shoreline, the decline of local fishing and the suffocation of life in the fjords.

Where do the fish go?

In 2023, 62.7 million farmed salmon in Norway died in the sea; a mortality rate of 16.7 % (18). In other words, one in six salmon die in the pens from disease and other stresses. Besides the fact that this is poor animal welfare, the question arises of where the aquaculture industry has disposed of more than 60 million dead, inedible farmed fish. The Norwegian Broadcasting Corporation (NRK) has revealed that some of the naturally deceased and severely injured fish have been sold for human consumption (19), but what happened to the rest? When dead fish are used in the production of fishmeal and fish oil, both inorganic and organic toxins are carried over, and when these are added to concentrate feed, the toxins ultimately end up in meat and eggs.

It has been claimed that it is now possible to collect around 334 000 tons of fish sludge and use it for biogas and fertiliser production (20, 21). This method of waste collection, it is argued, can increase fish production in existing fish farms *without increasing the environmental impact* (22). This could significantly boost fish farmers' revenues.

It would be better if this collection of fish sludge was used to *reduce the environmental impact* rather than increase revenues. This type of waste is problematic for several reasons (23). In 2009, Norway implemented a ban on the disposal of biodegradable waste (24), largely on the justification that degradable waste generates substantial emissions of the greenhouse gas methane and environmentally harmful leachate from landfills.

Fish sludge as fertiliser

By dispersing farmed fish sludge on agricultural soil, farmers in Norway can save vast amounts of artificial fertiliser. However, this practice also leads to the soil being contaminated with environmental pollutants.

In 2022, the Norwegian Scientific Committee for Food and Environment conducted a risk assessment of fertilisers and found that arsenic and heavy metals in fertilisers accumulate in soil over time, resulting in increased concentrations in crops. Thus, using fertilisers derived from aquaculture can lead to higher concentrations of arsenic and heavy metals in the environment. The committee states: 'The intake of arsenic, cadmium, mercury and lead from food is already high relative to their toxicity, and any increase in intake of these substances is undesirable' (author's translation) (25). Animals grazing in contaminated areas will absorb these toxins, which will then continue to circulate in the environment (26, 27).

Fish waste is therefore a significant and extensive problem. Elements do not break down – no matter what is done with the waste, the arsenic and heavy metals remain in the mix.

Fish sludge is not approved in the EU as fertiliser, nor is it approved as an ingredient in organic fertiliser (28, 29). However, a new market has been found for the sludge: it is dried, pelletised and shipped to Vietnam for sale as fertiliser (30). Thus, it is being sent to a country already facing major problems with contaminated drinking water (7). Some of the fish sludge also ends up in agricultural soil in Norway.

> ***«Dispersing the waste into the environment is contributing to the distribution of harmful substances throughout the food chain and contaminating the groundwater»***

Slow poisoning

There is a global shortage of fertiliser. Meanwhile, life in our fjords is being destroyed by over-fertilisation with waste from fish farms. It can therefore be tempting to seek better ways to deal with fish waste. However, dispersing the waste into the environment is contributing to the distribution of harmful substances throughout the food chain and contaminating the groundwater. Unfortunately, industry stakeholders seem to be ignoring the problem. Furthermore, it is worth noting that the environmental toxins in fish waste originate from the fish feed, most of which is imported. We are essentially importing both an environmental problem and a potential public health risk, and the volume of this import is increasing.

Contamination from arsenic and heavy metals in fertilisers, and consequently in groundwater, is a global problem (6, 9) that Norway also needs to take seriously. However, as long as the focus remains on increasing fish production rather than reducing the environmental impact, enormous volumes of waste will continue to pollute our fjords, our nature and our food sources, slowly poisoning us all.

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