

A deadly harvest?



While synthetic pesticides are designed to kill certain species, they can also have unintended consequences for the environment and human health. By Sonya Likhtman and Zoe de Spoelberch.

Setting the scene

Synthetic pesticides, including herbicides and insecticides, are designed to kill insects, weeds, fungi or other pests, to protect crops, increase food production and reduce the risk of famine. Over 1,000 different pesticides are used around the world.¹ However, the human health and environmental risks associated with particular chemical compounds have been well documented, perhaps most famously in Rachel Carson's 1962 book, *Silent Spring*. Carson's research highlighted the severe negative impact on insects, birds, fish and humans of the chemical DDT, which was widely applied as an insecticide. This ultimately led to the banning of DDT for agricultural use in the US.²

The degradation of British waterways has recently led news bulletins, with English water companies forced to issue an apology for repeated raw sewage discharges.³ Meanwhile, the "nitrogen crisis" that has resulted from intensive animal farming in the Netherlands has become a political focus.⁴ But it is not just sewage and manure that has eroded the health of rivers, streams and freshwater marshes –

agricultural runoff has played a significant role.⁵ But what is runoff and why are pesticides used in farming problematic for wildlife habitats?

While synthetic pesticides are designed to kill target species, they can also have unintended consequences for ecological and human health. The risk depends on the type of chemical compound, with some chemicals considered more toxic than others, the concentration and the level of exposure.

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¹ Chemical safety: Pesticides (who.int)

² DDT - A Brief History and Status | US EPA

³ <https://www.theguardian.com/environment/2023/may/18/uk-water-companies-offer-apology-and-10bn-investment-for-sewage-spills>

⁴ Nitrogen crisis from jam-packed livestock operations has 'paralyzed' Dutch economy | Science | AAAS

⁵ <https://www.theguardian.com/environment/2021/sep/15/pollution-is-damaging-uk-rivers-more-than-public-thinks-report-says>

Some synthetic pesticides can lead to the death of insects, pollinators, birds and mammals besides those that were targeted as pests. For instance, neonicotinoids have been widely linked to colony collapse disorder in honeybees.⁶ Pesticides also pose a direct risk to soil biodiversity by harming soil invertebrates and destroying organisms that perform key functions such as nutrient cycling, soil structure maintenance, carbon transformation, and the regulation of pests and diseases.⁷

A reduction in biodiversity above and below ground makes ecosystems less resilient and less effective at providing ecosystem services. The use of synthetic pesticides also reduces the potential for natural pest control and drives a cycle of further pesticide development and application, as pests develop resistance over time.

Beyond the direct impacts to biodiversity, pesticide runoff can cause widespread pollution and contamination of soils, water and air.

Beyond the direct impacts to biodiversity, pesticide runoff can cause widespread pollution and contamination of soils, water and air. Pollution in itself is one of the five main drivers of biodiversity loss. In 2020, one or more pesticides were detected above safe thresholds at 22% of monitoring sites in rivers and lakes across Europe, while 83% of agricultural soils tested in a study conducted in 2019 contained pesticide residues.⁸

There is also a high potential social risk associated with pesticide use. The population that is most at risk from pesticides are those that are directly exposed, especially agricultural workers. In addition, our food retains small amounts of the fertilisers and pesticides used in its production, potentially causing harm to those who consume it.⁹ A large-scale study in Europe across five countries detected at least two pesticides in the bodies of 84% of survey participants, with pesticide levels consistently higher in children than in adults.¹⁰



Although the toxicity of pesticides to human health is assessed, safety evaluations usually focus on individual chemicals. There is still limited understanding of how different types of pesticide residues on food may interact to potentially impact human health.¹¹ Given the significant known and unknown risks to both human and ecological health, the use of pesticides should become a greater focus for companies and investors.

Emerging policy and regulation

The policy landscape is evolving in response to the fact that the risks associated with pesticide misuse are becoming better understood. Target 7 of the Kunming-Montreal Global Biodiversity Framework (GBF)¹² explicitly mentions the need to reduce “the overall risk from pesticides and highly hazardous chemicals by at least half”. Countries will now need to

⁶ Neonicotinoids and Colony Collapse Disorder - Harvard School of Public Health ([chgeharvard.org](https://www.hsph.harvard.edu/news/insight/2015/05/20/neonicotinoids-and-colony-collapse-disorder/))

⁷ Frontiers | Pesticides and Soil Invertebrates: A Hazard Assessment ([frontiersin.org](https://www.frontiersin.org))

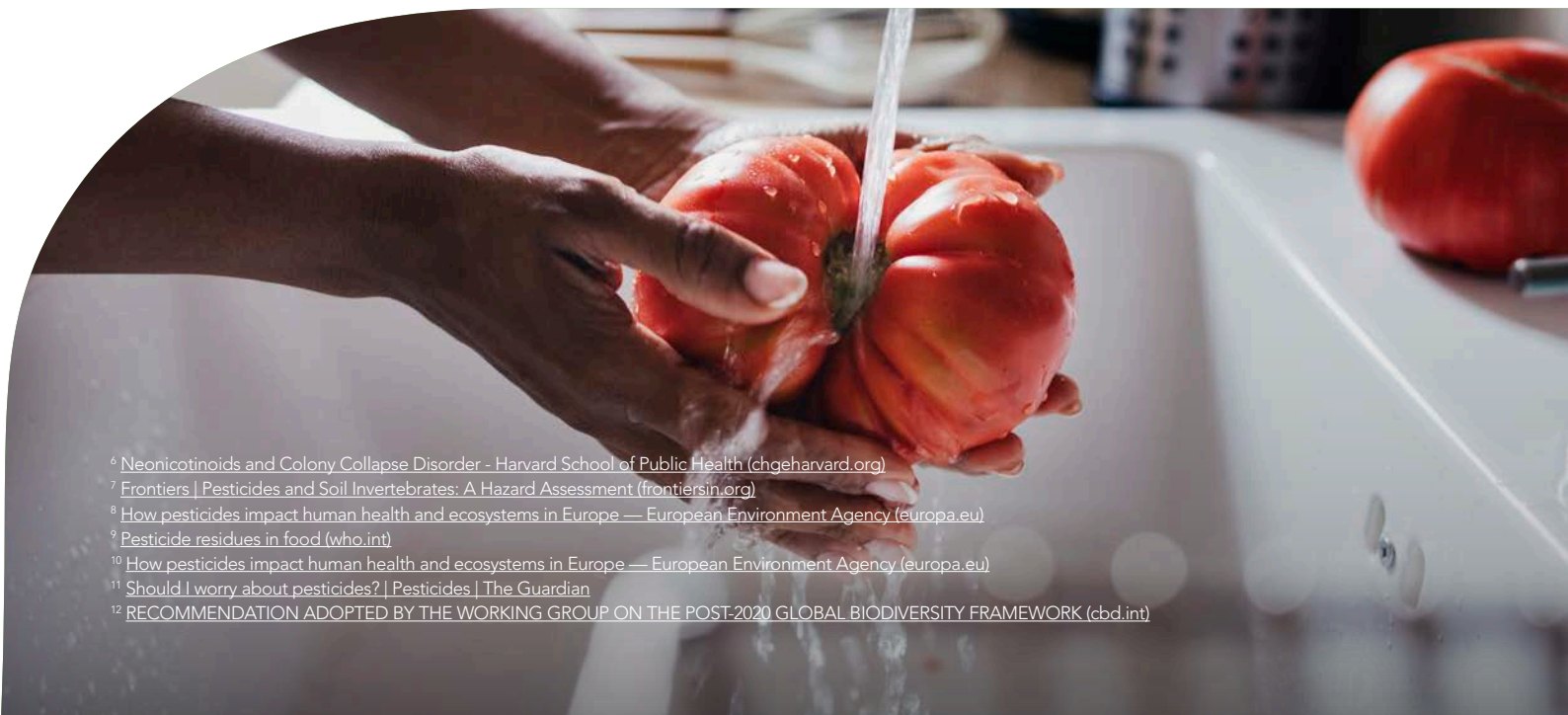
⁸ How pesticides impact human health and ecosystems in Europe — European Environment Agency ([europa.eu](https://www.eea.europa.eu))

⁹ Pesticide residues in food ([who.int](https://www.who.int))

¹⁰ How pesticides impact human health and ecosystems in Europe — European Environment Agency ([europa.eu](https://www.eea.europa.eu))

¹¹ Should I worry about pesticides? | Pesticides | The Guardian

¹² RECOMMENDATION ADOPTED BY THE WORKING GROUP ON THE POST-2020 GLOBAL BIODIVERSITY FRAMEWORK ([cbd.int](https://www.cbd.int))




translate the GBF into action at the national level, meaning that these expectations will increasingly be reflected in policy and regulation.


The European Union has already strengthened its focus on hazardous pesticides. Within the Farm to Fork and biodiversity strategies for 2030, the EU targets an overall 50% reduction in the use and risk of chemical pesticides and a 50% reduction in the use of the most hazardous pesticides. There is also a goal for at least 25% of EU agriculture to be organic by 2030. Companies should be actively monitoring and responding to the potential regulatory and reputational risks associated with the misuse and overuse of pesticides.

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Our engagement approach

Our biodiversity engagement with food and beverage companies includes a focus on the risks associated with pesticides. We expect companies to oversee how pesticides are used within their agricultural supply chain. This may include mapping their exposure and setting expectations for suppliers to limit pesticide use, starting with eliminating the most hazardous pesticides. For example, in 2022, we recommended supporting a shareholder proposal at Archer-Daniels-Midland that asked for further disclosure on the use of pesticides in the company’s supply chain, as this would promote better management of environmental and social risks.

In our biodiversity white paper, *Our Commitment to Nature*,¹³ we outlined our expectation for companies to assess, measure and disclose their impacts and dependencies on biodiversity and ecosystem services. For food and beverage companies, this includes understanding and managing the risk associated with their high dependency on healthy soils, pollination, and other ecosystem services that may be negatively impacted by pesticides.

We also expect companies to support and encourage their agricultural supply chains to transition to regenerative agriculture. We continue to engage with companies on their regenerative agriculture strategies,¹⁴ including how they can measure the outcomes for soil health, water, carbon, and biodiversity. For example, for the Canadian dairy producer Saputo, we have highlighted that regenerative agriculture and pollution from pesticide runoff should be key areas for consideration within its supply chain oversight.

We have also engaged Carrefour, the French supermarket, on regenerative agriculture. We pressed for further disclosure on the company’s impacts on biodiversity, including the effect of its agroecology work on pesticide use decline and soil health. The company is working with farmers and technical experts to measure pesticide use, which we support. We have encouraged the company to develop nutrient management plans with its farmers to assess the risks of runoff pollution from pesticides in water and soils. Nutrients from pesticides that are present in water sources can lead to eutrophication, which causes harmful algal blooms and results in biodiversity loss.

We also said that we wanted to see more disclosure around impacts on soil health, and regenerative agriculture practices, in engagements with Kellogg’s, the US cereal company. We encouraged Kellogg’s to report on the results of its Grower



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Survey, an annual farm management survey that compiles information on pesticide use and nutrient management from its suppliers.

We have engaged with Associated British Foods on the cotton used in its apparel business Primark since 2019. It is expanding the sustainable cotton programme that it started in 2013 to contribute towards its target of using recycled fibres or more sustainably sourced materials by 2030.

Within this programme, cotton farmers are trained over three years to address an over-dependence on chemical fertilisers and pesticides in order to preserve biodiversity and help mitigate against climate change. The company said that it is now working to demonstrate the impact in terms of water, pesticide use and the improvement in wildlife, which we welcomed.

We have challenged Germany's Bayer on assessing and reducing the negative impacts of its pesticides. Positively, Bayer has set a target to reduce the environmental impact of its pesticides, committing to reducing its global treated area weighted crop protection environmental impact per hectare by 30% by 2030 against a 2014-2018 average baseline.¹⁵ We also pressed the company to be more transparent in its product reformulation efforts.

We are looking forward to joining a collaborative engagement with agrochemicals companies, which we understand ShareAction plans to launch in due course.

Outlook

We will continue to encourage manufacturers to increase transparency on hazardous chemicals and commit to phasing out the use of PFAS or persistent chemicals. We will support public policy efforts to do the same.

Through our role on the IHC Steering Committee we will support collaborative engagement and sector policy on hazardous substances and improved performance by companies on ChemSec's annual ChemScore ranking.

With food and beverage companies, we will continue to focus on their role in addressing biodiversity loss, including oversight of pesticide use and the transition to regenerative agriculture. We look forward to joining collaborative engagement initiatives that target pesticide producers directly.

¹³ Our commitment to nature | Federated Hermes Limited (hermes-investment.com)

¹⁴ How regenerative agriculture can sow the seeds of change | Federated Hermes Limited (hermes-investment.com)

¹⁵ <https://www.bayer.com/en/agriculture/reducing-agricultures-impact-environment>

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