

Agrifood companies must take responsibility for nitrogen pollution

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Efforts to mitigate agricultural nitrogen pollution remain focused on the farm level. As a result, farmers bear the regulatory burden while agrifood companies are left out of mitigation discussions, despite influencing farmers' production decisions and profiting from agricultural intensification. Closing this accountability gap requires a shift from technical reporting metrics to normative governance that holds agrifood companies accountable for nitrogen pollution in their supply chains.

As tractors protested stricter nitrogen (N) regulation across multiple European capitals, agrifood companies showed very limited public engagement with this topic. While the transgression of the planetary boundary for N requires urgent and concerted action to bring flows within a safe operating space¹, the mitigation responsibility and consequent regulatory and economic burden have fallen almost exclusively on farmers. This concentration of responsibility has effectively placed farmers in an accountability silo for N pollution mitigation (Fig. 1). By contrast, agrifood companies, despite shaping production systems and benefiting from agricultural intensification, remain largely insulated from equivalent scrutiny. Although corporate accountability has been internalized for several environmental impacts, particularly climate change, it is almost entirely absent for N pollution, one of agriculture's most notable impacts. This absence creates an accountability gap for agrifood companies (Fig. 1).

Technical debates on reporting frameworks and standardized metrics will remain insufficient as long as this accountability gap persists. Closing it requires agrifood companies to be recognized as accountable actors capable of influencing N pollution mitigation. Here, we propose reframing N pollution not merely as a problem of measurement or farm-level compliance, but as a problem of shared responsibility and normative accountability across agrifood value chains.

How the responsibility gap plays out

There are a multitude of national and international policies aiming to reduce N pollution, especially nitrate leaching and run-off from agricultural land. These are particularly present in Europe, a global hotspot for N pollution. However, despite ambitious European Union (EU) targets under the Green Deal and Farm-to-Fork strategy to reduce emissions, progress remains limited².

These policies overwhelmingly focus on farmers, thereby assigning mitigation responsibility almost exclusively to them. While

farmers indeed apply synthetic fertilizers and manure, which causes leaching, and ultimately also implement most on-farm N reduction measures, this narrow responsibility lens overlooks other actors who can contribute substantially to mitigation efforts. This is illustrated in the ongoing Dutch *stikstofcrisis* (nitrogen crisis) and in similar protests across the EU, where farmers face immense regulatory pressure, yet powerful financial institutions and agrifood companies that incentivized the very intensification that created the problem do not assume responsibility. For example, critics argue that Rabobank, which finances 80% of Dutch farmers, explicitly pushed livestock farmers to scale up their operations over decades, effectively financing the N crisis while shifting the ultimate burden and political fallout onto individual farmers³. These farmers differ in farm size, ownership structure, specialization, capital access and contractual relationships with agrifood companies – both within individual countries and in the EU – which affects their agency and capacity to deal with being placed in an accountability silo. What they do share is the need to bear with concentrated responsibility given that the agrifood system lacks a shared norm recognizing N pollution as a collective outcome produced by multiple actors.

Simultaneously, agrifood companies benefit from a production system in which N impacts are framed as a farm-level problem. Research on collective decision-making shows that the responsibility of individuals and organizations is least likely to be voluntarily assumed when (1) outcomes are uncertain or costly, and (2) responsibility can be easily shifted to others⁴. These conditions describe the problem of N pollution perfectly, thereby allowing companies to enjoy revenue generation, market power and operational flexibility without exposure to blame or regulatory pressure. Importantly, the existence of strict N regulation at the farm level may itself contribute to corporate disengagement. Where environmental responsibility is perceived as already regulated 'at source', downstream actors can more easily frame N pollution as a compliance issue for farmers rather than a shared outcome of value-chain organization. In this sense, regulation does not substitute for corporate accountability but can crowd it out, reinforcing the accountability gap illustrated in Fig. 1.

The need to expand N pollution policies beyond the farm level has previously been highlighted⁵ but focuses primarily on public governance instruments. Here, we want to take a step back to focus on the underlying problem of an accountability gap, so that future discussions on mitigation options can become more fruitful and nuanced. Building on this, we argue that particular attention must be paid to agrifood companies, whose structural power within value chains confers substantial responsibility for N mitigation efforts. Increasing market concentration and monopolization in the agrifood sector give a small number of companies disproportionate influence over agricultural production practices⁶, making their accountability for mitigating negative environmental consequences all the more imperative.

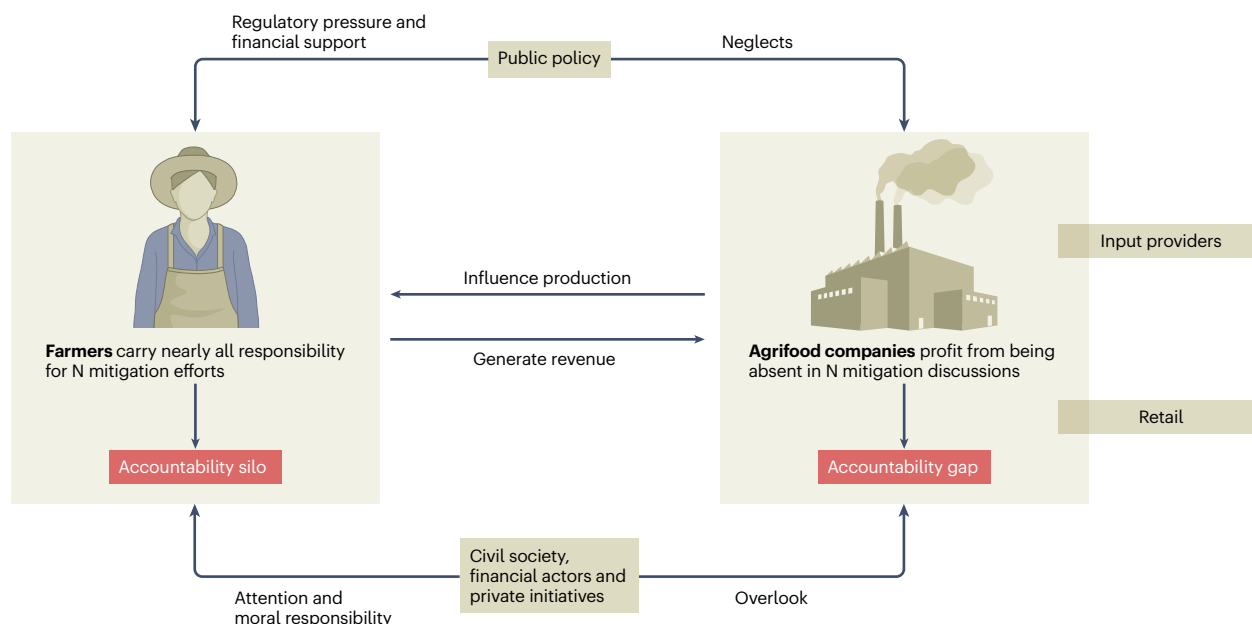


Fig. 1 | The accountability gap and silo in nitrogen pollution mitigation.

Current governance structures create an accountability silo (left), where farmers absorb the cumulative pressure of N pollution regulation, mitigation costs and public scrutiny. By contrast, downstream agrifood actors benefit from an accountability gap (right): they exert structural influence on production

methods (for example, through quality standards or debt financing) and extract value yet remain structurally insulated from the regulatory and normative pressures associated with N pollution. Closing this gap requires a stronger focus on holding agrifood companies to account through political, financial and normative pressures.

Addressing the nitrogen accountability gap

In their call for strengthening corporate accountability to recalibrate food systems towards more sustainable production methods, Bradbury and colleagues⁷ stressed the need for standardized metrics within a comprehensive food system reporting framework. Scholars and practitioners participating in discussions regarding corporate sustainability will observe that these often lean towards technical details of such frameworks.

Indeed, the EU's Corporate Sustainability Reporting Directive and the Corporate Sustainability Due Diligence Directive have substantially advanced the development of environmental, social and governance (ESG) frameworks and put discussions regarding corporate accountability and sustainability in the spotlight both in the EU and beyond. However, in practice, ESG disclosure in the agrifood sector still focuses narrowly on climate and neglects other major environmental impacts such as N pollution⁸. Several scholars therefore call for adjustments in reporting frameworks to overcome such accounting shortcomings, for example, by focusing reporting on a small set of essential environmental impact variables for which large agrifood companies certainly have negative environmental impacts⁹. We support these advancements but believe that recent regulatory backlashes, such as the EU Omnibus package, make further improvements in public reporting frameworks unlikely, and instead leave corporate accountability increasingly reliant on normative and mimetic pressures rather than coercive regulation.

We therefore stress that discussions around corporate sustainability must move back to a stronger focus on 'holding to account', the third step of the accountability cycle¹⁰ also used by Bradbury and colleagues⁷. The accountability cycle was initially developed to promote healthy food environments but is useful here to highlight shortcomings relating to N pollution and environmental reporting in general.

It consists of four steps: taking the account, sharing the account, holding to account and responding to the account¹⁰. Current debates around corporate sustainability focus strongly on the first two steps: taking the account (technical discussions about how to best measure and verify corporate impacts) and sharing the account (discussions around the form and structure of ESG disclosures), while neglecting the more normative step of holding to account. These technical debates around sustainability reporting frameworks, mostly present in taking and sharing the account, often deflect attention from broader questions of sustainability and responsibility¹¹. In the case of N pollution, holding actors to account through political, financial and normative pressures remains largely absent for agrifood companies, even as taking and sharing the account might expand through increasingly sophisticated environmental reporting and disclosure requirements.

N pollution acutely demonstrates this blind spot: an increase in technical accounting exercises cannot compensate for the absence of a shared norm that agrifood companies bear responsibility for their N footprint. At present, however, these companies remain isolated from such debates, even as they profit from production systems that externalize these environmental costs. This ultimately makes advancements in reporting frameworks unproductive.

Why nitrogen unaccountability matters

The sensitivity of the highlighted N accountability gap is underscored by farmer protests that have erupted across Europe in recent years, among other reasons driven by stricter N regulations¹², especially in the Netherlands, and often fuelled by the perception that environmental mitigation responsibility has been unfairly imposed on farmers¹³. These protests happen in an institutional setting of power imbalances, where nutrient regulation is layered on top of climate, biodiversity

and animal welfare regulation, as well as trade pressures, producing a perception of regulatory overload, income losses and increased financial risk for farmers. Stronger involvement of agrifood companies in accountability debates, and addressing them as powerful actors with institutional capacity, might help to diffuse these tensions. If multinational agrifood companies were recognized as accountable actors, mitigation discussions could become more balanced and legitimate. From an environmental governance perspective, addressing the problem further downstream in the value chain, rather than solely at the individual-farmer level, can often be more effective, as companies can internalize compliance costs, influence farmer behaviour and enforce sustainability standards across entire supply chains⁵. Further, it would help to promote corporate reporting on N pollution by creating normative pressures for agrifood companies.

The precedent for N corporate responsibility is already set. For climate change mitigation, major agrifood companies now commit to greenhouse gas (GHG) emission reduction targets under the Science Based Targets initiative, including emissions from farmers in their upstream value chain. For deforestation, companies adopt zero-deforestation pledges. We acknowledge that these initiatives also have flaws that should be debated¹⁴, but they have at least helped to institutionalize the principle that agrifood companies are accountable for their upstream value chain impacts. It is therefore inconsistent and untenable to treat N pollution differently by leaving agrifood companies out of mitigation discussions, given its status as a severely transgressed planetary boundary and agriculture's dominant role in driving it. There are manifold reasons for this omission, summarized in a lack of institutional pressures on agrifood companies to report relevant N information. Low stakeholder demands and underdeveloped accounting mechanisms have resulted in corporate N pollution disclosure currently not being seen as necessary to maintain legitimacy⁸.

Towards nitrogen-inclusive accountability

A diverse approach to increasing corporate accountability for N pollution is needed. First and foremost, there is a need to increase institutional pressures on actors beyond farmers, so that agrifood corporations are also seen as accountable for reducing N pollution.

These pressures can stem from a variety of stakeholders, such as civil society, governments, financial institutions and business partners. Specifically, financial institutions should integrate N risk into their loan covenants and portfolios. Just as banks now stress-test climate transition risks, they could similarly account for 'nitrogen transition risks'. Through this, they can reduce the likelihood that regulatory interventions or environmental consequences of N pollution will strand assets or bankrupt intensive livestock operations. Making capital conditional on verified N efficiency plans would instantly shift corporate behaviour.

Furthermore, for supply chain actors, accountability can be achieved through 'nitrogen inssetting', where companies directly invest in technologies improving N use efficiency (for example, precision application and manure processing) within their own supply chains in exchange for verified reduction claims. Based on this, price premiums could be paid to farmers to increase N use efficiency, accompanied with knowledge building capacities for farmers to do so. This shares the capital risk of mitigation rather than passing it solely onto farmers. The existing precedent for supply chain accountability, such as the commitment of major agrifood companies to GHG emission targets and zero-deforestation pledges, shows that this institutional and normative shift is feasible. To avoid confusion of yet another corporate

environmental initiative, N mitigation efforts could well be incorporated into the existing and increasing use of corporate regenerative agriculture strategies¹⁵, which currently fail to quantify progress towards the environmental problems that they claim to mitigate⁸.

For agrifood companies themselves, engaging in such frameworks and integrating them into existing regenerative strategies and sustainable business models would enable strategic advantages to respond to changing institutional pressures. Further, it assigns value to technological advancements as well as more systemic changes, such as efforts to a more circular bioeconomy, that reduce synthetic N fertilizer inputs into agricultural value chains. Collective efforts of agrifood companies with farmers and other value chain actors, such as input providers or retailers, can become more visible once a shared understanding and language of N pollution has been institutionalized.

The above suggestions ultimately require the development of an adequate accounting methodology for N pollution within agricultural supply chains. The design of such a framework will depend on a variety of factors, most importantly data availability, and could therefore follow a tiered approach similar to GHG reporting. First efforts in this are being made, for example, in the Step Up For Nature initiative of the Science Based Targets Network. Within these efforts, current power asymmetries in agricultural value chains must be kept in mind to assure that novel governance systems and frameworks do not reinforce the constrained agency of farmers in N mitigation discussions, as private standards have previously been used to reinforce agrifood companies' positions of power¹¹.

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