Kyoto Declaration

Sustainable Nitrogen Management For Future Generations

The Kyoto Declaration emerged from an extensive, months-long engagement process, drawing on insights from stakeholders around the world across academia, government, international organizations, the private sector, and civil society. The Declaration was endorsed by participants at the 10th International Nitrogen Conference in Kyoto, Japan, on November 6, 2026.

Executive Summary

Build resilience while reducing nitrogen pollution. Geopolitical instability and disruptions to fertilizer and energy markets have far-reaching consequences for fertilizer affordability and food security. Resilience must therefore become a core objective of the urgent case for sustainable nitrogen management: maintaining adequate nitrogen supplies under price, supply and climate shocks while reducing losses and their impacts on climate, ecosystems and human health.

Move from global ambition to national implementation and accountability. Achieving the goal of halving nitrogen waste requires comprehensive National Action Plans spanning agriculture, energy, industry, transport and wastewater, supported by clear responsibilities, financing and measurable targets. Governments and researchers must strengthen nitrogen monitoring and systematically evaluate what works, where, why and for whom, while addressing the political, socioeconomic and technical barriers to lasting change.

Make circularity and context-specific solutions guiding principles for action. Circular nitrogen management can reduce dependence on newly produced reactive nitrogen by making better use of nitrogen already circulating through food systems and economies, alongside reducing waste and demand. Innovation across sectors remains essential. Solutions must reflect the different challenges of nitrogen-rich and nitrogen-poor systems, supported by appropriate technologies, financing and institutional capacity.

Reorient nitrogen research towards transdisciplinary, stakeholder-driven solutions. Research must respond more directly to the needs of policymakers, practitioners and communities, recognizing farmers, the private sector, civil society and Indigenous peoples as contributors of knowledge. Natural sciences, social sciences and humanities must jointly shape research priorities, integrating diverse perspectives to develop more effective, equitable and transformative solutions.

Mobilize shared but differentiated responsibilities for action. Governments, the private sector, financial institutions, farmers, civil society and researchers all have distinct but complementary roles in advancing sustainable nitrogen management. This requires stronger coordination across sectors and international institutions, sustained investment in innovation and implementation, and greater support for the Global South in generating knowledge, setting priorities, developing solutions and accessing finance.

Preamble

The Kyoto Declaration from N2026 is the latest in a series of INI conference declarations that have marked the evolution of nitrogen research and the science-policy interface since the beginning of this century. Over this period, nitrogen has evolved from an emerging, multifaceted environmental concern to an increasingly urgent international policy issue, with ambitious targets to reduce nitrogen waste and growing recognition of its central role in major geopolitical crises and economic shocks.

The Kyoto Declaration represents an important step forward, not only in its content but also in the process through which it has been developed. For the first time, the Declaration has been informed by a public consultation process ahead of the conference, including multi-stakeholder roundtables with policymakers, practitioners, businesses, civil society and young people. The priorities emerging from these discussions, alongside insights from special sessions at N2026 on green ammonia and nitrogen governance, and a Special Task Force meeting of the UNEP Working Group on Nitrogen, are reflected in this Declaration.

The Delhi Declaration from N2024 welcomed the emergence of global targets to halve nitrogen waste and called for comprehensive strategies to achieve them, while acknowledging substantial socioeconomic barriers to progress. Its calls to action emphasized greater support for policy-relevant, transdisciplinary research; national focal points and ambitious National Action Plans; greater coordination across international environmental conventions; and the integration of local and Indigenous knowledge into nitrogen research and governance.

Progress has been made on several of these fronts. The UNEP Working Group on Nitrogen now has more than 100 national focal points, and several international research initiatives increasingly embed transdisciplinary, policy-relevant approaches. Nevertheless, substantial work remains to translate these developments into measurable reductions in nitrogen waste and to embed sustainable nitrogen management more firmly within national and international policy commitments.

Comprehensive progress in addressing multiple and connected environmental, geopolitical, social and human health crises cannot be achieved without a concerted focus on better managing our relationship with this essential element.

1. Why Kyoto? Why now?

N2026 brings together leading experts and stakeholders in nitrogen science, policy and practice in the city where, nearly three decades ago, the international community adopted the Kyoto Protocol under the UN Framework Convention on Climate Change. Just as the Kyoto Protocol marked a major milestone in international efforts to address climate change, we gather here to confront another defining environmental challenge of the 21st century: how to manage our complex relationship with nitrogen. Nitrogen is essential to food production and plays a central role across society, yet its production, use and release across multiple sectors contribute to a wide range of environmental and human health challenges. The connections between the Kyoto Protocol and N2026 extend further, given increasing appreciation of nitrous

oxide, a key nitrogen compound, as an important greenhouse gas and ozone depleting substance.

We applaud Japan's leadership in nitrogen science and policy, including the development of its National Action Plan for Sustainable Nitrogen Management and its co-chairing of the Global Partnership on Nutrient Management. Japan’s National Action Plan also serves as a significant example of cross-ministerial coordination, engaging ministries responsible for the environment, agriculture, economy, transport, and health. Alongside wider regional research and governance initiatives, Japan's experience offers valuable lessons for countries developing their own National Action Plans, while recognizing that nitrogen challenges, institutional capacities and socioeconomic circumstances differ substantially across countries.

2. Nitrogen in a rapidly changing world

Since N2024, geopolitical instability and disruptions to fertilizer and energy markets have had far-reaching consequences for fertilizer trade, affordability and food security, particularly for countries dependent on imported fertilizer and natural gas. These shocks compound an already challenging landscape for sustainable nitrogen management, shaped by increasingly frequent and intense climate extremes, changing diets and emerging uses of ammonia as an energy carrier.

Together, these developments raise fundamental questions about how to ensure a reliable nitrogen supply for global food production while meeting the ambitious, yet technically achievable, goal of halving nitrogen waste by 2030. How governments respond - through increased domestic fertilizer production, expanded subsidies or investments in more sustainable nitrogen management - could shape nitrogen production, consumption and infrastructure for decades to come. These decisions must also confront the political and socioeconomic barriers to reform, including the difficulties of repurposing fertilizer subsidies and concerns about livelihoods and regulatory burden reflected in farmer protests.

Against this backdrop, resilience must become a core objective of sustainable nitrogen management: the capacity of agrifood, energy and transportation systems to maintain adequate nitrogen supply under price, supply and climate shocks while simultaneously reducing losses. This requires considering the interconnected roles of nitrogen in agriculture, energy, private sector, wastewater and international trade, including competition for ammonia and renewable energy between fertilizer production, shipping, and other users, with implications for fertilizer affordability.

At the same time, nitrogen has gained political visibility since N2024. Initiatives such as the Belém Declaration at COP31 and the Nairobi Declaration from the 2024 Africa Fertilizer and Soil Health Summit reflect growing recognition of its importance across environmental policy agendas. The challenge now is to translate that political recognition into policies that strengthen resilience while reducing nitrogen pollution.

3. What the science now tells us

Nitrogen remains essential to global food and agricultural production, but the scale and consequences of nitrogen pollution continue to grow, as outlined in several assessments since the last INI conference, including the 2024 Global Nitrous Oxide Assessment and the forthcoming International Nitrogen Assessment. Despite important progress in reducing emissions from sectors such as transport and industry, as well as improvements in agricultural nitrogen-use efficiency, global nitrogen losses remain substantial and continue to increase. These losses impose significant economic costs, damage ecosystems and biodiversity, affect climate and stratospheric ozone, and threaten human health, with consequences that can be felt far from their original sources.

These challenges extend well beyond agriculture. Nitrogen emissions from energy production, industry and transport contribute significantly to air pollution, while nitrogen losses from wastewater treatment are a major source of water pollution. Addressing these sources alongside agricultural nitrogen losses is essential to meeting ambitious policy targets.

The interconnected nature of the nitrogen cycle also presents an important opportunity. Reducing nitrogen pollution can deliver benefits across multiple environmental, social and public health challenges simultaneously, from relatively immediate improvements in air and water quality to longer-term reductions in climate change and stratospheric ozone depletion. These benefits extend across generations.

Realizing these benefits requires action across the entire nitrogen cycle, including agriculture, energy, industry, transport and wastewater management. While existing technologies and management practices offer considerable opportunities for near-term progress, technological improvements alone will not be sufficient. Dietary choices and the organization of food systems remain major determinants of global nitrogen flows, suggesting that more fundamental changes in how we produce and consume food, generate energy and transport goods will also be necessary. Although significant gaps remain in nitrogen monitoring and data availability, particularly in lower-income countries, sufficient knowledge already exists to begin implementing effective measures.

4. From ambition to implementation

Over the past several years, national governments and the international community have made increasingly ambitious commitments to address nitrogen pollution. While these commitments represent important progress, attention must now turn more decisively towards implementation. This requires understanding and addressing the political, economic, institutional, technical and social factors that determine whether solutions can be adopted and sustained.

Building on recent scientific assessments, researchers must work with governments and other stakeholders to strengthen national nitrogen budgets, inventories, monitoring systems and shared indicators linking nitrogen use, surpluses, and emissions with air and water quality, climate, biodiversity, and health outcomes. Reliable, publicly accessible and

interoperable data should link national and subnational assessments, supporting the development and implementation of holistic national action plans for sustainable nitrogen management. Continuous monitoring is necessary to capture nitrogen pollution hotspots and moments, especially near affected communities. This requires sustained funding and locally relevant research capacity.

Greater emphasis must also be placed on evaluating what works, where, why and at what cost, including the effectiveness and distributional consequences of existing policies and interventions. Evaluations should assess whether existing strategies effectively reduce nitrogen surpluses and losses in areas of excessive use, while increasing nitrogen supply where limited inputs constrain agricultural productivity and food security. This should include the collection of long-term trend data to determine whether policies and mitigation measures result in measurable and meaningful progress. Implementation must be treated as an ongoing process of learning and adaptation. Where existing approaches fail to deliver meaningful progress, governments and the research community must be willing to reassess their assumptions and consider alternative strategies rather than simply reaffirming existing commitments.

5. Whole-system and circular approaches

Achieving ambitious reductions in nitrogen waste requires a “one nitrogen” approach that tracks nitrogen across forms and environmental media, reducing the risk of pollution swapping. Improvements in nitrogen use efficiency can deliver important near-term benefits, but must be assessed alongside complementary indicators such as absolute losses and social and environmental outcomes. Fertilizer recommendations should move beyond agronomic yield optimization towards estimating economically and ecologically appropriate nitrogen rates.

A central priority is to move towards more circular nitrogen management as a guiding principle, reducing dependence on newly produced reactive nitrogen by making better use of nitrogen already circulating through our food systems and economies. This includes improved manure management, crop- livestock integration, nutrient recovery and recycling, crop diversification with legumes, as well as cutting-edge innovation in biological nitrogen fixation, fertilizer and feed formulations, precision agriculture techniques and artificial intelligence. Reducing food loss and waste and shifting towards less nitrogen-intensive diets in high-consuming regions, with legumes contributing to protein diversification, could reduce nitrogen demand and losses while supporting human health.

At the same time, decarbonizing fertilizer production can reduce its climate impacts, while denitrification remains an important last line of defense where nitrogen recovery and reuse are not feasible. Beyond agriculture, opportunities also include nitrogen recovery from wastewater and industrial processes, and continued reductions in nitrogen emissions from energy production, transport and industry. Expanding circular approaches will require research and investment in diversified, locally appropriate nutrient sources, as well as the infrastructure to support demand for recovered nutrients. Research should explore how circular practices can generate win-wins across environmental, agriculture and socioeconomic dimensions.

There is, however, no single pathway towards sustainable nitrogen management. Countries and regions facing excessive nitrogen use and pollution confront very different challenges from those where insufficient nitrogen inputs constrain agricultural productivity and food security. Such conditions may also coexist within countries and regions, requiring policies that are tailored to specific production systems, geographic locations, and livelihood contexts. In lower-income regions in particular, efforts to improve nitrogen management must also safeguard livelihoods and ensure adequate access to nitrogen supplies for food production. This requires context-specific approaches, supported by greater access to appropriate technologies, practices, financing and institutional capacity.

6. Science that meets the moment

The nitrogen research community has a responsibility to ensure that its work responds more directly to the needs of policymakers, practitioners and other stakeholders. This requires sustained dialogue and partnerships to jointly identify research priorities, shape research questions and ensure that findings are accessible and actionable, including through assessments, policy briefs and data dashboards. Such dialogue should recognize farmers, practitioners, businesses and civil society as contributors of knowledge and experience, including Indigenous and local knowledge. Partnerships should support leadership from the Global South in generating data, developing solutions and setting priorities.

It also requires broadening the disciplines involved and the questions we ask. The social sciences and humanities must play a greater role in shaping research agendas from the outset, with greater attention to the political, economic and sociocultural barriers to change. This includes understanding how collaboration among researchers, farmers, governments, the private sector, civil society and other knowledge holders can lead to meaningful and lasting change, as well as the conditions under which participatory engagement and partnerships become genuinely transformative.

Education is a fundamental component of implementation. Enhancing nitrogen literacy among farmers, citizens, businesses, policymakers and researchers increases the likelihood that we can manage the challenge in the integrated and cross-sectoral manner that it requires. Innovation remains essential, with the private sector playing an important role in advancing industrial pollution abatement, precision agriculture, new fertilizer products, improved livestock and dairy management, nutrient recycling and recovery, plant breeding and genomic research. Alongside continued technological development, research must assess the conditions that enable the adoption of these innovations at scale.

Finally, the research community must be prepared to respond to emerging policy developments beyond traditional nitrogen policy arenas. International efforts to decarbonize shipping, including the potential use of ammonia as a fuel, and the EU's Carbon Border Adjustment Mechanism illustrate how decisions in other sectors can have significant implications for nitrogen production, consumption and pollution. Anticipating and informing these developments will require timely, independent and interdisciplinary scientific input.

7. Calls for action

Building on the commitments made in previous INI declarations, and recognizing the urgency of translating ambition into implementation, we call on:

National and subnational governments to develop and implement ambitious, whole-cycle National Action Plans for sustainable nitrogen management, encompassing a coherent approach to agriculture, energy, industry, transport and wastewater. These plans should specify implementing institutions, milestones, measurable targets and public reporting. They should be supported by the financial resources, institutional capacity and monitoring systems needed to deliver measurable progress. Finance and agricultural ministries should align incentives and subsidy reform with nitrogen objectives, working with local government and other relevant decision-making authorities. This should include a strong consideration of decentralized production as a key means of increasing farmer and societal resilience to geopolitical and economic shocks. Plans should be developed with the meaningful participation of farmers, affected communities, the private sector, civil society and other relevant knowledge holders. We further encourage all governments to nominate national focal points to the UNEP Working Group on Nitrogen and actively participate in its work.

International organizations, regional bodies, and multilateral environmental agreements to strengthen coordination on nitrogen across climate, biodiversity, ozone, air, water, food and maritime governance. This includes raising the profile of the nitrogen challenge and encouraging countries to more systematically integrate sustainable nitrogen management into national climate, biodiversity, food, and health strategies, in line with existing international commitments, and identifying opportunities for greater cooperation across conventions and institutions. Actions should strengthen alignment with just transition efforts already being implemented under the UN Framework Convention on Climate Change's Paris Agreement. Given the emergence and potential scale of ammonia as a fuel, the International Maritime Organization should pursue a scientific analysis of its possible impacts.

Farmers, agricultural organizations, Indigenous peoples and affected communities should contribute their knowledge and experience to the design, implementation, and evaluation of nitrogen policies and interventions. Their early involvement, including often underrepresented voices such as women, youth and smallholders, can help identify implementation barriers, strengthen legitimacy, and ensure that interventions reflect differing risks, needs, and capacities. Transformative changes in nitrogen management require addressing the challenges of an aging farmer population, which in part calls for paving the way for new generations of farming communities to emerge.

Research funders and the scientific community to prioritize transdisciplinary, stakeholder-engaged and implementation-oriented research that addresses the barriers to sustainable nitrogen management, evaluates the effectiveness of policies and interventions, and strengthens local research capacity in countries where it is most needed. This should include sustained monitoring support in lower-income countries and locally calibrated data, emission factors and models that reduce verification costs for smallholders. This means equal consideration for local and regional scientific assessments in addition to global assessments. It

should also include a concerted effort by scientists, in collaboration with relevant stakeholders, to develop models and other research tools that can help to simulate and evaluate a more transformative set of nitrogen futures. This can be done while acknowledging that understandings of wellbeing, sustainable agriculture, and desirable futures differ across communities, cultures, and generations.

Research organizations and funding bodies should allocate adequate resources and institutional support to enable meaningful, sustained participation by key stakeholders in the research process, including farmers and affected communities. There also needs to be more funding to support the meaningful participation of scientists in local, national and global policy processes.

The private sector and financial institutions to accelerate the development and deployment of effective, independently-tested nitrogen innovations, while accounting for the wider nitrogen implications of emerging technologies. The private sector should work towards reducing their contributions to nitrogen pollution to the greatest extent possible, in line with emerging regulatory requirements that require companies to address environmental impacts across their entire supply chains. We also call for greater mobilization of finance through both existing and new mechanisms, alongside investment in capacity building and technology access, particularly in the Global South.

INI and the wider nitrogen community to continue supporting governments and other stakeholders in translating the goal of halving nitrogen waste into measurable progress. We commit to advancing the research priorities outlined in this declaration, and to periodically reviewing progress against the priorities and calls to action set out in this Declaration, including at future INI conferences, to strengthen continuity, learning and accountability.