

Concept Note: Rationale and context for a proposed Nitrogen Resolution at UNEA-4

I. Overall Rationale

Human activities are massively altering the global nitrogen cycle, causing multiple threats to water quality, air quality, greenhouse gas balance, ecosystems and biodiversity, soil quality and stratospheric ozone. Part of this alteration is intentional: increased production of nitrogen fertilizers and biological nitrogen fixation has enabled much larger food and feed production, sustaining the human population. In addition, burning of fossil fuels, biofuels and wildfires further releases nitrogen pollution to the environment. As a result, multiple sectors of human activity are having multiple effects through alteration of the global nitrogen cycle. Altogether, it makes for an intractable challenge: we need nitrogen compounds to live, but our use of them is contributing to a web of local, regional and global environmental problems.

The consequence is that improving nitrogen management is critical to meet many of the Sustainable Development Goals (SDGs) – See Box 1. Yet current policy approaches to nitrogen are highly fragmented between nitrogen form and issue. The world lacks a coherent policy framework across the nitrogen cycle, which would be necessary to identify synergies and minimize trade-offs. Such a framework would be of benefit to help overcome barriers by demonstrating the multiple benefits of taking action. For example, a possible goal to halve nitrogen waste would make a major contribution to developing the Circular Economy, representing a saving of around \$100 billion (as fertilizer value), in addition to even larger benefits for ecosystems, health, climate and livelihoods.

Box 1: Example interactions of nitrogen with the Sustainable Development Goals.

Goal 2: Hunger – Fertilizer and biological nitrogen supply is vital to increase food production.

Goal 3: Good Health & Wellbeing – Nitrogen pollution in water and air threatens human health.

Goal 6: Clean Water & Sanitation – Wasted nitrogen threatens water quality with excess nitrate.

Goal 9: Industry & Innovation – Huge untapped potential to develop a circular nitrogen economy.

Goal 11: Sustainable Cities & Communities – Hotspots of unsustainable nitrogen consumption.

Goal 12: Responsible consumption & production – Opportunities to optimize nitrogen intake in food.

Goal 13: Climate Action – Nitrogen is the main source of nitrous oxide, contributing to net warming.

Goal 14: Life Below Water – Nitrogen waste contributes to coastal dead zones and coral bleaching.

Goal 15: Life On Land – Nitrogen deposition threatens biodiversity, affecting ecosystem services.

Goal 17: Partnerships for the Goals – Broad partnership is vital to address the nitrogen challenge.

Addressing the global nitrogen challenge is extremely timely under the theme of UNEA-4 on “*Innovative solutions for environmental challenges and sustainable consumption and production*”. Taking a holistic policy approach to nitrogen and the environment is both innovative and explicitly links consumption and production. Until now, most efforts to reduce nitrogen pollution (through air, land, water, climate) have focused on the production side, considering the role of technical measures including in industry, transport and agriculture. However, several recent reports have demonstrated the need to couple production and consumption, especially in considering the interactions with food security and dietary choice (e.g. *Our Nutrient World*, *Drawing Down N₂O*, *Nitrogen on the Table*, *Indian Nitrogen Assessment*). Such a holistic approach also offers increased flexibility in exploring solutions that link environment, food and energy.

The proposed Nitrogen Resolution adds significant value by recognizing the fragmentation of current programmes and policies relevant to the nitrogen cycle. The resolution proposes to address this by developing a more coordinated approach that will support progress toward multiple SDGs.

It is up to Member States as to how far they wish to go. The proposed resolution focuses on mandating UNEP to bring together Member States in developing improved policy coordination across the nitrogen cycle. In order to facilitate consensus, the draft resolution does not focus on specific time-bound goals. However, Member States may wish to take note of currently emerging national and international goals related to nitrogen.

II. Overview of policy options

A distinction needs to be made between a) the options for developing overarching coordination across the nitrogen cycle, the b) specific policies which may be developed. The draft Nitrogen Resolution focuses on the first of these. This can then provide a framework for better informed sharing of experiences of specific policies.

a) Options for Overarching Nitrogen Policy Coordination

The proposed nitrogen resolution does not specify the exact form that future coordination should take. Rather it seeks to bring Member States together to address the issue and agree a way forward. To inform this discussion, four options are summarized here as a starting point:

Option 1: Nitrogen fragmentation across policy frameworks.

This represents the status quo, where different nitrogen-related impacts are considered in different policy processes. For example, Air Pollution from ammonia (NH₃) and nitrogen oxides (NO_x) is addressed under the Geneva Air Convention (UNECE Convention on Long-range Transboundary Air Pollution), while nitrous oxide impacts on climate (N₂O) are addressed under the Framework Convention on Climate Change (UNFCCC). The effects of N₂O on stratospheric ozone are relevant under the Vienna Convention (though are not currently part of the Montreal Protocol), while the impacts of excess nitrogen deposition are considered under the UN Convention on Biological Diversity (CBD). The Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) addresses both the issues of nutrient management and waste water, including the leaching and run off of nitrates (NO₃⁻) and other nitrogen compounds. Conversely, the food benefits of nitrogen are relevant for the UN Food and Agriculture Organisation (FAO). The sum total of environmental impact associated with nitrogen is relevant for UNEP, but is not currently addressed as such. This status quo is far from satisfactory, as many synergies and opportunities are missed across the nitrogen cycle and between the existing policy processes.

Option 2: Nitrogen leadership under one existing policy framework

Under this option, one policy framework would take the lead to coordinate nitrogen issues and mitigation options on behalf of other policy frameworks. Experience shows that this is difficult to achieve, as each framework is limited by the extent of its mandate. For example, it may be considered out of scope for the UNFCCC to address air and water pollution effects of nitrogen. Future leadership by an individual policy process would require a change in mandate. For example, it has been discussed whether the Vienna Convention on Stratospheric Ozone, which already in-principle includes N₂O as an ozone depleting substance, could provide a policy home to address all nitrogen impacts.

Option 3: A new international convention to address the nitrogen challenge.

This option could deliver a strong coordinated approach to the global nitrogen challenge, with an appropriate mandate to cover all nitrogen-relevant issues. However, current feedback suggests that there is little appetite for such an approach, which would require substantial resources and could lead to tensions with existing topic-focused policy areas.

Option 4: A nitrogen coordination mechanism, e.g., under the mandate of UNEA.

Under this option, the focus is on facilitating improved coordination between the existing policy processes that address parts of the nitrogen cycle. This option would require regular sharing of experiences between conventions, which could also consider scenarios for mutual benefit, for example, which help meet multiple goals for air, climate, land, water, biodiversity, food, energy etc. One option would be to establish such a coordination mechanism under auspices of UNEA, for example, as a specific working group of the Committee on Permanent Representatives (CPR), although other options may be considered.

As a starting point for discussion, it is here suggested that Option 4 is most likely to be successful. However, it is emphasized that this is for Member States to decide. The current draft of the Nitrogen Resolution does not specify any one of the options, but simply resolves that UNEP should establish a process to agree and then implement, based on the results of discussion between Member States.

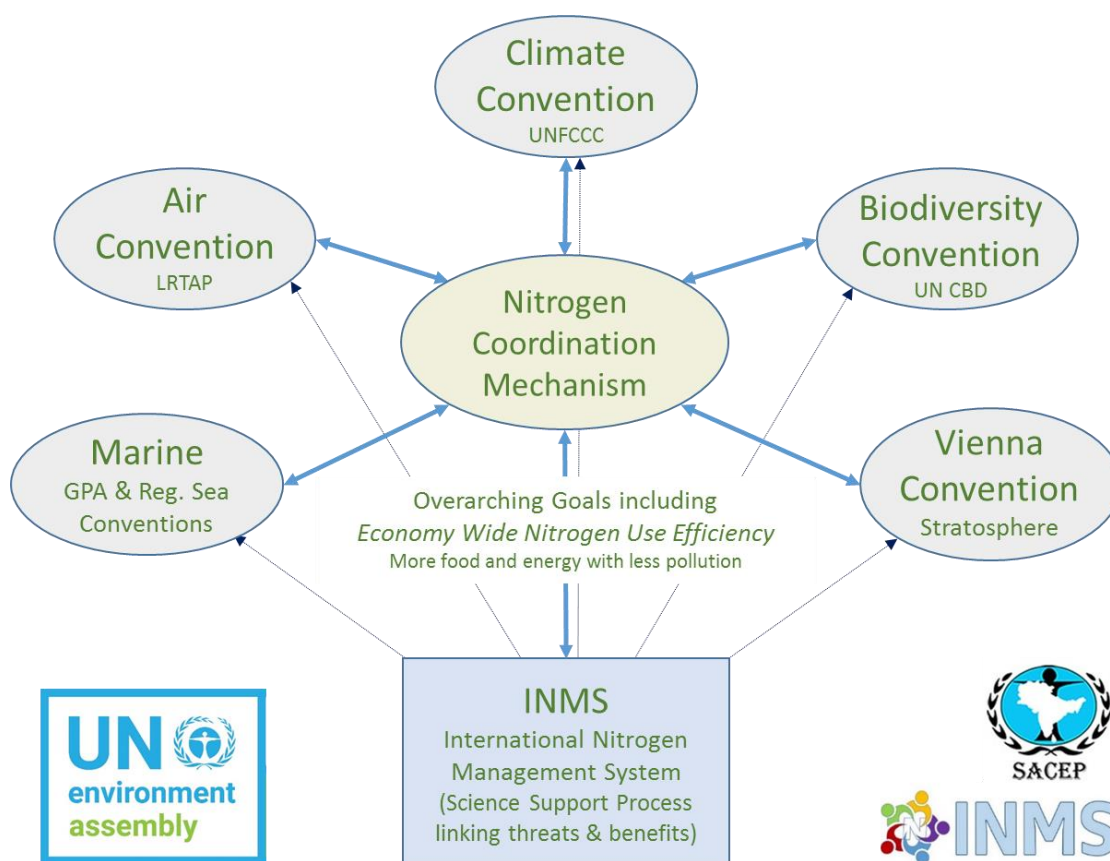


Figure 1: Illustration of how multiple policy areas across the nitrogen cycle could be brought together through a Nitrogen Coordination Mechanism (Option 4), under the auspices of UNEA, for example as a Working Group of the Committee of Permanent Representatives.

The above diagram illustrates the potential for linkages associated with Option 4. Other contributing groups may also be envisaged in such a framework, but this simple version should be sufficient to illustrate the connections. The figure also shows the contribution of the International Nitrogen

Management System (INMS), recently established by UNEP with support through the Global Environment Facility (GEF). It is important to make the distinction between INMS as a science support process for nitrogen policy (including multiple actor involvement), while the Nitrogen Coordination Mechanism primarily represents partnership of Member States coming together promote coherency and progress on nitrogen policies. Such a Nitrogen Coordination Mechanism (e.g. 'UN Nitrogen') should also be seen in the context of improving wider coordination across Pollution and Circular Economy (PACE) challenges.

b) Options for Specific Nitrogen Policies

While it is not the purpose of the draft Nitrogen Resolution to specify specific policies for nitrogen, it is useful to illustrate the broad relevance of the Resolution. This is shown below by summarizing the 10 Key Actions identified by the *Our Nutrient World* report (UNEP/CEH), each of which would contribute to a more circular and cleaner nitrogen economy (Box 2). The summary demonstrates the systemic nature of the Nitrogen Challenge, which calls for a multi-sectoral, multi-impact approach.

Box 2: 10 Key Actions identified by *Our Nutrient World* (UNEP/CEH) as a foundation to reducing to producing more food and energy with less nitrogen pollution.

Agriculture

1. Improving nutrient use efficiency in crop production,
2. Improving nutrient use efficiency in animal production,
3. Increasing the fertilizer equivalence value of animal manure,

Transport and Industry

4. Low-emission combustion and energy-efficient systems, including renewable sources,
5. Development of NO_x capture and utilization technology,

Waste and Recycling

6. Improving nutrient efficiency in fertilizer and food supply and reducing food waste,
7. Recycling nitrogen and phosphorus from waste water systems, in cities, agriculture and industry,

Societal consumption patterns

8. Energy and transport saving,
9. Lowering personal consumption of animal protein among populations consuming high rates (avoiding excess and voluntary reduction),

Integration and optimization

10. Spatial and temporal optimization of nutrient flows.

III. Relationship with other UNEA resolutions, Programme of Work & other UN initiatives

The draft Nitrogen Resolution has been developed through a partnership of South Asian countries facilitated through the South Asia Cooperative Environment Programme (SACEP) with the support of the International Nitrogen Management System (INMS) of UNEP, and with funding from GEF.

The activity of INMS is also linked to the Global Partnership on Nutrient Management (GPNM) which has its secretariat under the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA), hosted by UN Environment in Nairobi. The GPNM is a multi-actor forum (which produced the *Our Nutrient World* report) and which complements the Global Waste Water Initiative (GPI) and Global Partnership on Marine Litter (GPML) under the GPA. It should be noted that the future of the GPA is currently under review by the UNEP Committee of Permanent Representatives.

Under the UNECE Geneva Air Convention, the Task Force on Reactive Nitrogen (TFRN) has been established in 2007 with *"the long-term goal of developing technical and scientific information, and options which can be used for strategy development across the UNECE to encourage coordination of air pollution policies on nitrogen in the context of the nitrogen cycle and which may be used by other bodies outside the Convention in consideration of other control measures"* (Executive Body Decision, 2007/1). The technical work of the TFRN has underpinned development of the multi-pollutant, multi-effect UNECE Gothenburg Protocol on air pollution, including its supporting documentation, and supported development of the revised EU National Emissions Ceilings Directive (EU 2016/2284).

Several resolutions agreed at UNEA-3 point to the importance of nitrogen:

UNEP/EA.3/Res.4. Environment and Health. *"13. Invites member States to increase awareness of the risks posed to human, animal and environmental health from the **improper use of fertilizers and pesticides** and to promote measures to address them;" ... "16. Requests the Executive Director to present a report on the environmental and **health impacts of pesticides and fertilizers** and ways of minimizing them, given the lack of data in that regard, in collaboration with the World Health Organization, the Food and Agriculture Organization of the United Nations and other relevant organizations by the fifth session of the United Nations Environment Assembly;"*

UNEP/EA.3/Res.6. Managing soil pollution to achieve Sustainable Development, is relevant but does not mention nitrogen or nutrients explicitly.

UNEP/EA.3/Res.8. Preventing and reducing air pollution to improve air quality globally. *"4. Further encourages governments to pursue synergies and co-benefits between national clean air policies and policies in key areas such as transport, including vehicle emissions and fuel standards, urbanization, climate change, energy access and agriculture **and to take advantage of synergistic effects of efficient nitrogen management on reducing air, marine and water pollution.**"*

UNEP/EA.3/Res.10. Addressing water pollution to protect and restore water-related ecosystems. *"Recognizing the contributions of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities and recalling its three partnerships, namely the Global Wastewater Initiative, the **Global Partnership on Nutrient Management** and the Global Partnership on Marine Litter," ... "7. Invites member States, in collaboration with relevant stakeholders, the private sector, industry, academia, civil society and the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, including by encouraging platforms for wastewater and **management of nutrients**, to help in preventing and mitigating water pollution and to protect and restore water-related ecosystems in order to minimize adverse impacts on human health and the environment;"*

It should be evident that the division of these resolutions reflects the current fragmentation of nitrogen policies. Critically, the Air Resolution (EA.3/Res.8) explicitly recognizes the need to go further in taking advantage of the synergies to be found from efficient nitrogen management.

IV. Financial requirements and implications

The scale of financial requirements will depend on the direction taken by Member States. For example, if Option 4 is favoured, the major costs would be regular (e.g. annual meetings) which could be held back-to-back with key Open Ended meetings of the UNEP Committee of Permanent Representatives. Support for appropriate secretariat at UN Environment would be necessary.

Investment is already in place in providing the technical and scientific support through the International Nitrogen Management System (INMS), which is funded with 6M USD from for 2016-2021 from GEF, plus 54M USD contribution-in-kind from 80 partner organizations.

Overall, investment in developing a coordinated approach to nitrogen management provides excellent value for money. For example, achieving a global goal to halve nitrogen waste would be expected to save cash costs of around USD 100 billion per year (e.g. reducing subsidy requirements), while mobilizing investment in nitrogen circular economy opportunities (e.g. promoting cost effective recycling of available nitrogen resources).

V. Main addressees of the Nitrogen Resolution

Member States, UN Environment Programme

VI. Key expected actions and socio-economic impacts in the short and long-term

Short term

- The draft Nitrogen Resolution is formulated to foster an international policy focus on nitrogen, which allows sharing of options for further consideration. The aim is to encourage universal membership as a foundation for awareness-raising.

Medium Term

- **Establishment of an innovative focal area for policy coordination across the nitrogen cycle** seeking to take *“advantage of synergistic effects of efficient nitrogen management on reducing air, marine and water pollution”* (UNEP/EA.3/Res.8), while offering quantified co-benefits for climate, biodiversity, health as well as food energy security, as a contribution to meeting multiple sustainable development goals.
- **Providing a discussion forum for Member States** on the most appropriate ways to coordinate nitrogen policies, considering the relative merits of Options 1 to 4 (or other options) to achieve effective and coherent coordination across the nitrogen cycle.
- **Establishment of an intergovernmental coordination mechanism on nitrogen** that is focused on overcoming barriers, improving environmental protection, and fostering development of a more circular nitrogen economy.
- **Promote sharing of existing programmes and goals** by Member States and others

Long Term

- **Foster coherency of national and international policies** across the nitrogen cycle, by sharing of experiences and best practices between Member States.
- **Provide a foundation for Member States to consider possible future shared goals** considering the urgency of improving nitrogen management for climate, air quality, water quality, biodiversity, soil security, food security, health, sustainable food and energy, circular economy, and the relevant sustainable development goals.
- **Depending on ambition, to consider a goal to halve nitrogen waste, saving USD 100 billion per year with quantified co-benefits relevant across SDGs.**