**Clean Air Globally: The Nitrogen Challenge**

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The global nitrogen cycle is inextricably linked across multiple forms of pollution with multiple impacts. As part of this, human impact on emissions to the atmosphere as nitrogen oxides (NOx), ammonia (NH3) as well as the greenhouse gas nitrous oxide (N2O) arise from a mix of combustion sources from energy, industry and transport plus major agricultural sources. While substantial progress has been made in reducing NOx emissions from combustion sources, the important contribution of agriculture has been associated with much less progress to reduce emissions.  There are major barriers-to-change, with so far few major commitments to reduce emissions, which are relevant for their impacts on particulate matter, photochemical oxidants and impacts on natural habitats.   This context provides major challenges in order to make further progress. The following key points should be noted:

        Reactive nitrogen compounds (all N forms except N2) should not just be seen as forms of pollution, but also represent a lost resource that can be valued in relation to the market price of fertilizer. For example, global NOx emissions represent a lost resource worth 40 billion USD/year.  Efforts should be placed in developing future technologies to recapture and reuse NOx and not simply destroy it through denitrification back to N2.

        Globally, full chain nitrogen use efficiency in agriculture amounts to around 20%.  This means that 80% of the resource (worth c. 200 billion USD/year) is wasted as a combination of NH3, NOx, NO2, N2 emissions and NO3 leaching. Efforts to improve nitrogen use efficiency across food systems (including reducing food waste and optimizing human diets) can therefore contribute to better stewardship of a valuable resource.

        The full societal value of nitrogen pollution is even larger. The “Our Nutrient World” report estimated societal costs for health, ecosystems and climate at 400 to 4000 billion USD /year. However, this is based on willingness to pay, and polluting sectors may be less willing to pay than society as a whole. For this reason, focusing on the cash fertilizer value of lost N may provide a more powerful narrative.

        Where NOx emissions have been reducing from combustion sources in Europe and North America, this now means that agricultural sources are starting to provide a significant share of NOx emissions (since these have not substantially reduced).  This provides another argument of why we need to think across the nitrogen cycle.

        The recognition of major barriers-to-change to reduce nitrogen pollution, the nitrogen cycle linkages, and the major economic value of nitrogen, point toward the opportunity for mobilizing a stronger approach to air pollution management by emphasising a joined-up approach across the nitrogen cycle. Such an approach can be seen as offering multiple co-benefits between air pollution mitigation, helping to meet existing commitments for climate, water, biodiversity, stratospheric ozone, food and energy, for example linked to the Sustainable Development Goals.

        Action is now being taken in this direction by the recent establishment of the International Nitrogen Management System (INMS), jointly between UN Environment and the International Nitrogen Initiative (INI) with major funding through the Global Environment Facility (GEF) and a network of 80 partner organisations (including WMO, FAO, CBD, EU-JRC, IFA, etc).

        Recent achievements include the recognition of nitrogen in the UNEA-3 Air Resolution (UNEP/EA.3/L.23):  “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.*”

        INMS is also working with the South Asian Cooperative Environment Programme (SACEP) which is home to the Malé Declaration on Air Pollution.  At a joint SACEP/INMS workshop also in Malé (Sept 2017) a draft Nitrogen Resolution to UNEA was agree, which will now be passed to SACEP Governing Council for Adoption in March 2018.  (1-page Draft Resolution Attached).

        The overall programme of INMS is focused on four areas:

1) development of toods for understanding and managing the global nitrogen cycle;

2) Quantification of N flows threats and benefits,

3) Regional demonstration of the full nitrogen approach,

4) Awareness Raising and Knowledge Sharing.

In addition to examination of nitrogen impacts, solutions guidance and senarios assessment, INMS will establish the first International Nitrogen Assessment, to be prepared over the period 2018-2021.