

Kampala Statement-for-Action on Reactive Nitrogen in Africa and Globally

The messages below are targeted to policy, industrial, agricultural and civil society fora that are active in addressing issues of reactive nitrogen in food security, energy, health, environment, biodiversity and climate change, either directly or indirectly around the world.

The situation

Recognizing that Africa is entering a new green revolution, the International Nitrogen Initiative (INI) held their tri-annual conference in Kampala, Uganda, which was the first time in Africa. 161 delegates from 37 countries represented disciplines ranging from agronomic science and atmospheric science to medical science, and included private, public sector and civil society representatives.

Nitrogen is an essential nutrient to sustain life. The theme of the conference – “Let us aim for just enough N” – addresses both the crucial need for enough nitrogen input to grow crops and livestock and also the potential that too much, too little or poorly managed nitrogen inputs can result in environmental degradation, such as water and air pollution, climate change, stratospheric ozone depletion, human health risks, and biodiversity loss.

After five previous INI conferences in the last fifteen years that brought attention to the urgency of improving nitrogen management (see notes [1] and [2] in the Annexure), we note considerable recent momentum, including:

- the Rio+20 summit [3] in 2012, where the role of nitrogen in the green economy and for advancing the three equally important pillars for an “economically, socially and environmentally sustainable future” was emphasized;
- the UN Framework Convention on Climate Change, the UN Convention on Biological Diversity, the UN Convention to Combat Desertification, the Vienna Convention for the Protection of the Ozone Layer, and the Convention on Long-range Transboundary Air Pollution, where recognition of the role of nitrogen in these environmental challenges has grown;
- the UNEP Global Program of Action for the Protection of the Marine Environment from Land-based Activities (GPA), committing to sustainable management of nutrients (including N) and supporting Global Partnership on Nutrient Management [4, 5];
- the Maputo Declaration [6] on Agriculture and Food Security (2003) and the Abuja Declaration [7] on Fertilizer for an African Green Revolution (2006) that highlighted the importance for investment in agriculture and the essential role of nutrient inputs for advancing a new green revolution in Africa.

These international efforts and other accords such as the Amsterdam declaration [8], the Edinburgh declaration [9] and the Aichi targets [10], have created a momentum whereby major new achievements are now possible. Considerable economic, social and environmental benefits could be obtained across the world by implementing the best practices for sustainable nitrogen management more widely. Specifically, we call for implementation of policies consistent with the following:

Specific Messages for Sub-Saharan Africa

- I. **Improving Soil Fertility Status, Nutrient Use and Supply:**¹ Sub-Saharan African agriculture needs to be part of the solution to regional and world food security. Countries allocating 10% or more of their budget to agriculture, following their commitment spelled out in the Maputo Declaration, have been able to improve their food security status in recent years. However, continuing this positive trend will require restoring and sustaining the fertility of Sub-Saharan African soils through more and better use of fertilizers in combination with other nutrient sources, such as organic matter and biological fixation. This should be consistent with the concept of Integrated Soil Fertility Management. Management practices need to be tailored to the diversity of Sub-Saharan African soils, cropping and livestock systems. Improving reliable delivery of quality fertilizers to smallholder farmers is paramount to increase agricultural productivity per unit of land and water.
- II. **Acting on Nutrient and Fertilizer Policy:** Available regional examples can motivate good practice and sustainable high yields with higher grain protein content. Sub-Saharan African nations would be well advised to continue their efforts to increase their level of sustainable use of fertilizer consistent with the Abuja Declaration.
 - National authorities should foster enabling policies and a regulatory environment that encourage private sector investment in an effective value chain from fertilizer to products and farmer participation in value-added output markets.
 - Implementing smart input subsidy schemes compatible with fair competition and long-term investments in rural transportation, market infrastructures, agricultural research and knowledge transfer helps trigger greater, efficient and profitable nutrient use. Such actions would need to take care that increases in fertilizer inputs are applied properly to balance food security and reduce environmental effects (see global messages).
- III. **Reducing Nitrogen's Contribution to Degradation of Water Bodies and Air Pollution:** Some regions in Africa are already facing the environmental challenges of nitrogenous air pollution and nutrient inputs to water bodies from agricultural run-off, atmospheric deposition, sewage and industrial discharge.

Global messages

- I. **Improving Nitrogen Management**, including the “just enough N” concept for policies to promote food security while avoiding environmental degradation, should be incorporated as critical components of the new international Sustainable Development Goals (SDGs).
- II. Many societal benefits [11] can be obtained by reducing nitrogen losses to the environment[12]:
 - **Reducing Nitrogen Losses from Agriculture:** Concepts are available and success stories exist, demonstrating that a decrease of environmental impacts and an

¹ Nitrogen needs to be considered alongside other nutrients in balanced nutrient management because of multiple nutrient limitations

increase in food production is possible. Science-based sustainable intensification of farming systems can help optimize nutrient inputs, by applying the right nutrient source, at the right rate, at the right time, in the right place.

- **Reducing Nitrogen Losses from Industry, Transport and Energy Sectors:** Nitrogen emissions from fossil fuel burning and industrial processes can be reduced by adopting existing technologies and innovation.
- **Improving Treatment of Waste:** Sewage treatment and solid municipal waste (household wastes) are sources of nitrogen losses that could be reduced by treatment and/or recycling.
- **Informing Individuals and Institutions:** Enabling consumers to adjust lifestyle choices with equity, including diet [13], transportation and energy consumption will have important impacts on nitrogen losses to the environment [14].

- III. There is a clear need for innovation and increased awareness among the different stakeholders through information, communication, education, training and extension, modeling and providing policy briefs.
- IV. Policies and technologies for solutions to the nitrogen issue should be tuned to regional and local conditions and require cross-ministerial, trans-disciplinary and multi-sectoral cooperation and coordination. This will enable countries to create effective policies and fulfill their regional and global commitments. Agencies such as the Global Environmental Facility (GEF) can facilitate the regional/global linkages in this regard [15].

Annexure: Notes, Relevant Documents, Previous Activities

1. The Nanjing Declaration (2004) of the 3rd International Nitrogen Conference on Nitrogen Management (2004) understood reactive nitrogen as a critical nutrient for food, feed and fibre security. Its accumulation has negative effects on the environment and human health, as anthropogenic reactive nitrogen production exceeds natural rates of production in many regions of the world. Other areas including most of Africa and parts of South America and Asia suffer from the opposite problem of N deficiency in the soil, contributing to food insecurity and malnutrition. Therefore international efforts towards N assessment and efficient N management are urgently required for sustainable development.
2. The Delhi Declaration (2010) on Reactive Nitrogen Management for Sustainable Development stresses the leakage of reactive nitrogen from crop, animal, aquatic and industrial production systems into the environment as a cause for concern. Anthropogenic contribution of reactive nitrogen varies hugely between and within countries and economic sectors and accordingly the responsibility to mitigate the damage (due to excess N) varies proportionately. Sustainable nitrogen management should be built on five key pillars namely: food security, energy and industry, human health, ecosystem services and biodiversity, and climate, with efforts to integrate between these pillars. This would allow optimization for the efficient use of inorganic and organic fertilizers world-wide, and facilitate enhanced access and sustainable use of N inputs in the predominantly N-deficient soils of Africa and parts of Latin America and Asia.
3. The Rio+20 declaration (2012) titled ‘The Future We Want’ included the principle of common but differentiated responsibilities, as set out in Principle 7 of the Rio Declaration. It emphasized the importance of the three Rio Conventions (UNFCCC, CBD, UNCCD) to advance sustainable development and sustainable use of natural resources and ecosystems. Moreover, it stated as a key priority for the international community to support Africa’s sustainable development. It referred to green economy in the context of sustainable development and poverty eradication and emphasized the Global Environmental Outlook process for informed decision making. It included the concept to promote, enhance and support more sustainable agriculture, including crops, livestock, forestry, fisheries and aquaculture, that improves food security, eradicates hunger, and is economically viable, while conserving land, water, plant and animal genetic resources, biodiversity and ecosystems, and enhancing resilience to climate change and natural disasters. The Rio+20 Outcome document also noted “with concern that the health of oceans and marine biodiversity are negatively affected by marine pollution, including marine debris, especially plastic, persistent organic pollutants, heavy metals and nitrogen-based compounds, from a number of marine and land-based sources, including shipping and land run-off. We commit to take action to reduce the incidence and impacts of such pollution on marine ecosystems, including through the effective implementation of relevant conventions”.
4. The Global Partnership on Nutrient Management (GPNM) was set up at the UN Commission on Sustainable Development in 2009 and is supported by a growing number of countries under the UNEP Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, “to promote effective nutrient management, minimising negative impacts on the environment and human health, while maximising their contribution to global sustainable development and poverty reduction”. Its scope is to promote sustainable use of nutrients, notably nitrogen, reduce nutrient losses, and improve overall nutrient use efficiency and effectiveness for enhanced food security, safer environment and greener economy,

through global partnerships between countries and stakeholders, through its foundation document (2010), via key messages for the policy makers presented during the Rio+20 (2012), and most recently the Global Overview on Nutrient Management under the title “Our Nutrient World”(2013).

5. The Manila declaration adopted by 65 participating national governments and the European Commission during the Third Intergovernmental Review Meeting (IGR3) of the UNEP ‘Global Programme of Action for the Protection of the Marine Environment from Land-based Activities’ in January 2012 committed to “develop guidance, strategies or policies on the sustainable use of nutrients so as to improve nutrient use efficiency” and to “support the further development of the Global Partnership on Nutrient Management and associated regional and national stakeholder partnerships.”
6. The Maputo Declaration on Agriculture and Food Security in Africa (2003) committed to the allocation of at least 10 percent of national budgetary resources to agriculture and rural development policy implementation within five years.
7. The Abuja declaration (2006) on Fertilizer for an African Green Revolution adopted by the Africa Fertilizer Summit of the African Union Ministers of Agriculture, emphasized the crucial role of fertilizers in restoring soil fertility and achieving the African Green Revolution for food security and other relevant Millennium Development Goals. It called for increasing the level of use of fertilizer in Sub-Saharan Africa from 8 kg/ha to an average of at least 50 kg/ha by 2015, declaring fertilizers (both organic and inorganic) as strategic commodities without borders. Moreover, it resolved to set up agro-dealer networks, agro-input credit mechanisms, smart subsidies, fertilizer manufacture, procurement and distribution systems, as well as an Africa Fertilizer Development Financing Mechanism through the Africa Development Bank by 2007.
8. The Amsterdam Declaration (2001) of the Global Change Open Science Conference on the Challenges of a Changing Earth, held by IGBP, IHDP, WCRP, and Diversitas, found that human activities are significantly influencing Earth's environment in many ways in addition to greenhouse gas emissions and climate change, well outside the range of the natural variability exhibited over the last half million years. An ethical framework for global stewardship and strategies for Earth System management are urgently needed, including a new system of global environmental science.
9. The Edinburgh declaration 2011 on reactive nitrogen, adopted at the international conference ‘Nitrogen and Global Change’, recognized the main messages of the European Nitrogen Assessment (ENA) launched at the same conference, specifically the ENA review of benefits and threats that provides options for improved N management. Nitrogen related risks and opportunities are well represented in the ENA for the geographical area of Europe. Five key threats of excess reactive nitrogen were identified in the ENA as Water quality, Air quality, Greenhouse gas balance, Ecosystems and biodiversity and Soil quality (WAGES). The Edinburgh declaration agreed that an overall mitigation strategy should focus on improving nitrogen use efficiency, particularly in agriculture.
10. Parties to the Convention on Biological Diversity, in 2010 in Nagoya, Japan, adopted the Strategic Plan for Biodiversity 2011-2020 – Aichi Target 8: ‘By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity’

11. Specific benefits to society are:

- Protection of inland and coastal waters from N outflow from agriculture and sewage can significantly reduce impacts on human health (e.g. cardio-vascular disease, effects on infants and occurrence of cancer) and the environment (algal blooms and changes in biodiversity). The contribution of reactive N from sewage, industrial effluents etc., could be very significant in some countries/regions and even most significant in poorly managed towns/cities and tourist sites, including many small island nations.
- Reduction of N emissions to the air using existing technologies can reduce impacts on human health (via particulate matter (PM2.5), nitrogen dioxide and tropospheric ozone), climate change and ozone layer depletion (via nitrous oxide) and the environment (soil and water acidification and eutrophication and effects on biodiversity).

12. “Our Nutrient World – the challenge to produce more food and energy with less pollution”, is a report published 2013 by the Global Partnership on Nutrient Management and the International Nitrogen Initiative (available at <http://initrogen.org/uploads/rte/ONW.pdf>). This report calls for a global effort to address ‘The Nutrient Nexus’, where reduced nutrient losses and improved nutrient use efficiency across all sectors simultaneously provide the foundation for a Greener Economy to produce more food and energy while reducing environmental pollution. It calls for agreement between all relevant stakeholders of the global community on which existing inter-governmental process is considered best suited to take the lead in improving nutrient management for the 21st century, or whether a new policy process is needed. Nutrient use efficiency is named a key indicator to assess progress towards better nutrient management, with an aspirational goal for a 20% relative improvement in full-chain NUE by 2020, leading to an annual saving of around 20 million tonnes of nitrogen (‘20:20 by 2020’)

13. The Barsac declaration (2009) on Environmental sustainability and the demitarian diet highlighted the importance of our own food choices impacting the environment by altering the requirements for different agricultural activities. In many developed countries and increasingly in some developing countries, individuals eat more animal products than is necessary for a healthy balanced diet. Reducing *per capita* consumption of animal products in such populations has the potential to improve nutrient use efficiency, reduce overall production costs and reduce environmental pollution, apart from significant health benefits. This can be achieved through promoting the ‘demitarian’ option, which is a meal containing half the amount of meat or fish compared with the normal local amount of affluent diets, combined with a correspondingly larger amount of other food products, along with the normal veg/non-veg meal options.

14. An option to quantify such nitrogen losses could be linked to the concept of nitrogen neutrality. This concept requires to first minimize the nitrogen release associated with anthropogenic activities (nitrogen footprint) and to balance remaining emissions by achieving measured reductions of the reactive N release elsewhere and contributing to sustainable land management where this is not yet achieved.

15. The Global Environment Facility (GEF) has been successful in funding nutrient assessment & management activities under the Global Partnership on Nutrient Management that e.g. have become visible in the report “Our Nutrient World”.