

## Nitrogen emissions going up: study

Nitrogen particles make up the largest fraction of PM<sub>2.5</sub>, the class of pollutants closely linked to cardiovascular and respiratory illness, says the first-ever quantitative assessment of nitrogen pollution in India.

While the burning of crop residue is said to be a key contributor to winter smog in many parts of North India, it contributes over 240 million kg of nitrogen oxides (NO<sub>x</sub>: a generic term for the nitrogen oxides that are most relevant for air pollution, namely nitric oxide and nitrogen dioxide) and about 7 million kg of nitrous oxide (N<sub>2</sub>O) per year.

The Indian Nitrogen Assessment assesses the sources, impacts, trends and future scenarios of reactive nitrogen in the Indian environment, says N. Raghuram, Dean, School of Biotechnology, GGS Indraprastha University, who is one of the authors of the report.

Though agriculture remains the largest contributor to nitrogen emissions, the non-agricultural emissions of nitrogen oxides and nitrous oxide are growing rapidly, with sewage and fossil-fuel burning — for power, transport and industry — leading the trend.

Indian NO<sub>x</sub> emissions grew at 52% from 1991 to 2001 and 69% from 2001 to 2011.

Annual NO<sub>x</sub> emissions from coal, diesel and other fuel combustion sources are growing at 6.5% a year currently, the report says.

“As fertilizer, nitrogen is one of the main inputs for agriculture, but inefficiencies along the food chain mean about 80% of nitrogen is wasted, contributing to air and water pollution plus greenhouse gas emissions, thereby causing threats for human health, ecosystems and livelihoods,” Dr. Raghuram said at a conference to mark World Environment Day.

Agricultural soils contributed to over 70% of N<sub>2</sub>O emissions from India in 2010, followed by waste water (12%) and residential and commercial activities (6%). Since 2002, N<sub>2</sub>O has replaced methane as the second largest Greenhouse Gas (GHG) from Indian agriculture.

Chemical fertilizers (over 82% of it is urea) account for over 77% of all agricultural N<sub>2</sub>O emissions in India, while manure, compost and so on make up the rest. Most of the fertilizers consumed (over 70%) go into the production of cereals, especially rice and wheat, which accounts for the bulk of N<sub>2</sub>O emissions from India.

### **Cattle emissions**

Cattle account for 80% of the ammonia production, though their annual growth rate is 1%, due to a stable population.

India is globally the biggest source of ammonia emission, nearly double that of NO<sub>x</sub> emissions.

But at the current rate of growth, NO<sub>x</sub> emissions will exceed ammonia emissions and touch 8.8 tonnes by 2055, the report says.

The poultry industry, on the other hand, with an annual growth rate of 6%, recorded an excretion of reactive nitrogen compounds of 0.415 tonnes in 2016.

That is anticipated to increase to 1.089 tonnes by 2030.

The authors suggest that nutrient recovery/recycling from waste water for agriculture could cut down N<sub>2</sub>O emissions from sewage and waste water by up to 40%.

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