

'Sewage to replace agri as top source of nitrogen pollution'

MANDULA RAGHURAM, professor at Indraprastha University, who recently took over as the next chair of the International Nitrogen Initiative (INI), an international body of scientists working to understand and reduce nitrogen pollution, speaks to **Ankur Palival** about how severe nitrogen pollution is and his plans to clean it up. Edited excerpts:

What is nitrogen pollution?

Nitrogen is present in two forms in nature: inactive and reactive. Reactive nitrogen compounds such as nitrate, ammonia, and nitrous oxides flow as nutrients through air, water, and soil, but their excess causes pollution. This reactive nitrogen is building up fast in the environment. What's alarming is that its accumulation rate has over-exceeded the rate of natural repair in the environment. Nitrous oxide is 300 times more powerful greenhouse gas than carbon dioxide. Nitrogen boosts the growth of algae and pollutes water. And, much of the particulate matter or PM 2.5, which is a popular air pollutant, is actually reactive nitrogen compounds collected over dust particles.

Is it harmful for human health?

There is scientific evidence from animal models, but not enough population-level studies to directly link nitrogen to health disorders. Studies have shown that PM 2.5 causes respiratory disorders, but we need to do more research on which nitrogen compounds in PM 2.5 causes what kind of problem. Evidence is building up that consistent exposure of water contaminated with nitrogen can be harmful, especially to infants. Their haemoglobin binds more strongly with nitrogen than oxygen, which

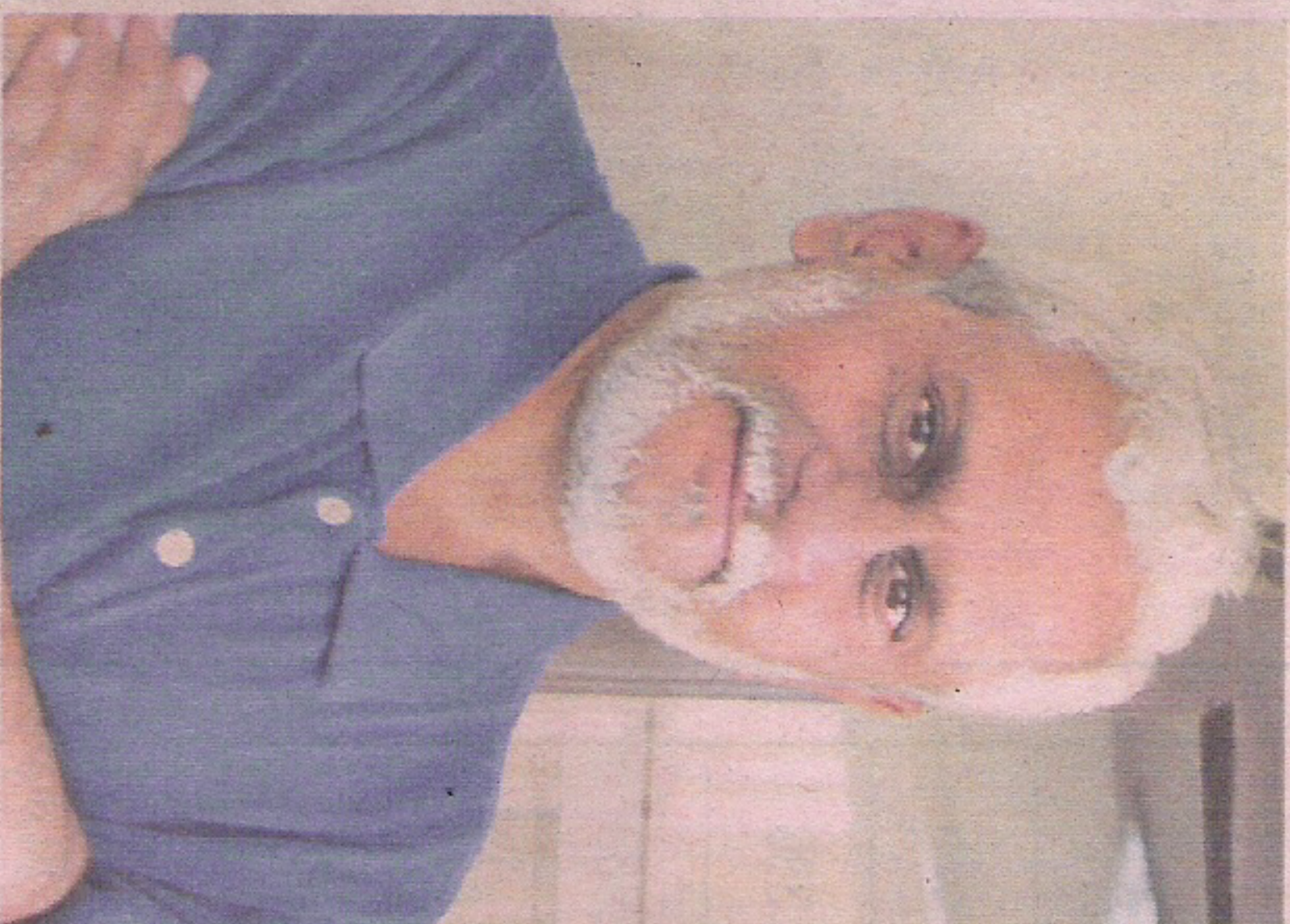
leads to lack of oxygen in their bodies and causes the blue baby syndrome. That could be fatal. Nitrogen pollution is as much a health problem as it is an environment one.

What are the main sources of nitrogen pollution in India?

The data collected by us shows that as much as 70 per cent of the nitrogen pollution is from agriculture, and most of it is due to the excessive use of fertilisers, specifically urea. Crops only take up about 25-30 per cent of the nitrogen from the urea, the rest goes waste and pollutes the environment. India uses about 27 million tonnes of urea every year, and the government subsidises 75 per cent of urea cost. What's interesting is that about the same percentage is lost to the environment. But we are told (we don't have the figures though) that since the neem-coated urea has been brought into the market, less nitrogen is getting wasted because neem-coated urea ensures plants utilise most of the nitrogen. So, probably the contribution of agriculture to nitrogen pollution is not going to grow.

However, the contribution of untreated sewage, which is the second-largest source of nitrogen pollution, is growing almost 10 times faster than agriculture. At this rate, sewage can replace agriculture as the

Q&A



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largest contributor in the next five years. This is more worrisome - an important finding that nobody has known.

What are your goals as INI chair during your term for the next three years?

My first goal is to collect robust regional data of nitrogen pollution because that helps in building a clearer global picture of nitrogen pollution. That is crucial to design and advocate for targeted interventions. This is important in international negotiations where countries commit how much pollution they will reduce and in which sector. For example, sewage may not be the second-largest contributor of nitrogen pollution in Europe. I will also focus on building scientific engagement as the main driver of talks with the public and the government, and not the other way round where governments tell you what to do.

You say carbon has taken over people's imagination and little attention is paid to nitrogen. Why?

There is excessive focus on carbon in the international climate change negotiations and negotiators haven't really gone down the list of greenhouse gases to reach nitrous oxides. Understandably, dealing with carbon emissions itself has taken decades. So, with so much time lost in getting carbon talks to work, how does one even open another discussion on nitrogen? And even if negotiators give importance to nitrous oxides, that is not the only reactive nitrogen compound causing nitrogen pollution. There are other international conventions such as biodiversity and desertification conventions, which also have nitrogen component, but it needs to be given the attention it deserves. We will be happy to support if a single intergovernmental body on nitrogen can come up.