

# Study finds nitrogen pollution a growing problem in China

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Credit: Alfred Palmer/Wikipedia

(Phys.org)—A team of researchers with members from several countries around the world, and led by Chinese agriculturalist Fusuo Zhang has found that nitrogen deposition over China has increased by over 60 percent over the past 30 years, leading to widespread environmental

damage. In their paper published in the journal *Nature*, the team describes how nitrogen pollutants such as ammonia and nitrogen oxides are converted to ammonium and nitrates which then fall to Earth as part of natural precipitation. The result, they say, is the widespread deposition of nitrogen pollutants across large swaths of the country.

Nitrogen pollutants get into the air through two main human processes: manufacturing and farming. A variety of [nitrogen oxides](#) result from making things, including electricity through burning coal and power to run automobiles. The other main avenue is via fertilizer applied to crops that contains large amounts of [ammonia](#). Both wind up in the air and then fall to the ground when it rains or snows.

The research team looked at data from 270 monitoring facilities located around the country and found that over the years 1980 to 2010, the amount of nitrogen found in precipitation samples increased by 8 kilograms per hectare per year, which translates to a whopping 60 percent rise. That precipitation, in the form of rain, sleet, ice or snow falls everywhere of course, including on the leaves of plants, which the researchers say, absorb more nitrogen when more is present. Wood based plants and those of a herbaceous nature, were, the team found, absorbing up to 33 percent more nitrogen in 2010 than they were in 1980. Also, agricultural plants such as maize, rice and wheat were found to be absorbing approximately 16 percent more. Many plants grow bigger or faster as a result, including algae, though all have a tipping point and will die once a certain level is reached.

The team also found that the nature of the pollutants has been changing as well. In 2010, for example, they report, about a third of all nitrogen depositions were [nitrates](#)—the rest were ammoniums. In 1980, only 17 percent of depositions were nitrates. This means that as China's economy grows, nitrogen pollution from manufacturing and driving cars is growing faster than it is from agricultural practices—either way the

result is excess amounts of nitrogen causing damage to ecosystems.

The problem of nitrogen [pollution](#) is not restricted to just China, of course, its damaging effects can be seen in both advanced and developing countries and those who study its impact say it's a problem that needs to be taken more seriously and dealt with before it becomes unmanageable.

**More information:** Enhanced nitrogen deposition over China, *Nature* (2013) [doi:10.1038/nature11917](https://doi.org/10.1038/nature11917)

### **Abstract**

China is experiencing intense air pollution caused in large part by anthropogenic emissions of reactive nitrogen. These emissions result in the deposition of atmospheric nitrogen (N) in terrestrial and aquatic ecosystems, with implications for human and ecosystem health, greenhouse gas balances and biological diversity. However, information on the magnitude and environmental impact of N deposition in China is limited. Here we use nationwide data sets on bulk N deposition, plant foliar N and crop N uptake (from long-term unfertilized soils) to evaluate N deposition dynamics and their effect on ecosystems across China between 1980 and 2010. We find that the average annual bulk deposition of N increased by approximately 8 kilograms of nitrogen per hectare (P

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