

Europe's Nitrogen Problem

The European Nitrogen Assessment and NitroEurope

For the last five years, scientists across Europe have chronicled the little-known nitrogen dilemma and the threats it poses to our environment and health – as well as how we can solve the problem. Here's a preview to the launch of the European Nitrogen Assessment which will be available from 11th April 2011:

The good, the bad and the unreactive

- Most of the air we breathe is made up of nitrogen but it's not in a very reactive form and so is of little interest to most people.
- Other forms of nitrogen such as nitrate, ammonia, nitrous oxide, and other oxides of nitrogen are more reactive, have more benefits but cause more problems.
- In agriculture, the benefits of nitrogen, as a principal component of fertilisers, are greater crop productivity and better crop quality.
- However, the nitrogen not used by the crop is at risk of 'leaking' into the environment contributing to a wide range of environmental problems.
- Industry, transport and sewage treatment plants also release reactive forms of nitrogen into the environment, making matters worse.
- The threats to the environment posed by reactive nitrogen can be summarised into the five groups shown below.

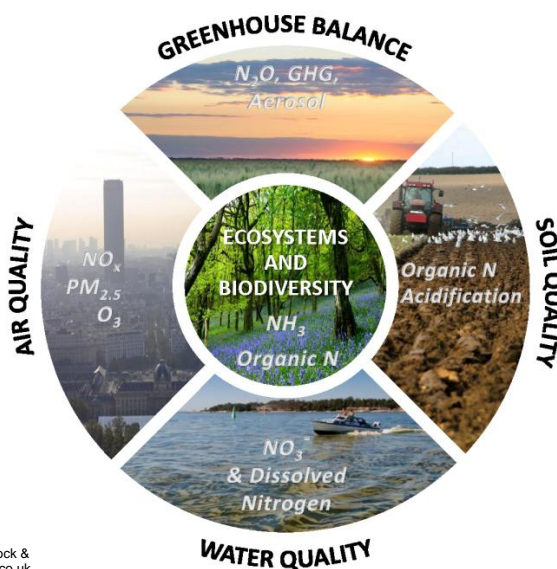


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The five key threats of excess reactive nitrogen

- Most existing environmental policies aimed at tackling these threats deal with individual pollutants or individual sources, solving one problem but often making others worse. A more holistic approach that considers

interactions between the different forms of reactive nitrogen and their resulting threats would be more effective.

A landmark report

In a five year project funded by the European Science Foundation programme “Nitrogen in Europe”, 200 scientists/experts in the field produced “**The European Nitrogen Assessment**”, which explains the state of these threats in Europe and highlights the possible solutions.

- **Water quality:** More than 10 million people in Western Europe alone are estimated to be exposed to drinking water with nitrate concentrations above recommended levels. Reactive nitrogen flowing from rivers into the sea is responsible for toxic algal blooms and dead zones, especially in the North, Adriatic and Baltic seas and along the coast of Brittany.
- **Air quality:** Ammonia and nitrogen oxides released into the atmosphere from agriculture, industry and urban areas contribute to high levels of particulate matter, ground level ozone, and nitrogen oxides in the air we breathe. Particulate matter is estimated to reduce life expectancy by over 6 months across most of central Europe.
- **Ecosystems and biodiversity:** It is likely that European biodiversity has been in decline for many decades due to the deposition of reactive nitrogen from the atmosphere. Losses of up to 20% of plant diversity are estimated, with the sensitive species the first to go. In the UK, for example, studies have shown that polluted sites have only a half of the wildflower species of cleaner sites.
- **Soil quality:** Reactive nitrogen entering the soil either through fertilisation or atmospheric deposition can make soils more acidic, leading to reduced crop and forest productivity and the release of heavy metals into drinking water supplies.
- **Greenhouse gas balance:** Although the release of nitrous oxide into the atmosphere from soils represents about 4% of European greenhouse gas emissions, there are several other warming and cooling effects. The EU-funded project “**NitroEurope**” has spent the last 5 years studying this problem in detail. Overall the warming and cooling effects tend to balance. However, the cooling effects are the result of particulate matter and nitrogen deposition to forests, which have impacts on human health and biodiversity, respectively.

Solutions

The outcome of these interactions is that climate mitigation efforts must focus on reducing the warming effects of nitrogen, while managing these other nitrogen pollution threats. A more integrated approach linking the five key threats is needed.

The problems highlighted above are estimated by the European Nitrogen Assessment to be costing Europe between 70-320 billion Euros, with the largest costs related to effects on human health. Many of these problems can be reduced and significant progress has already been made by several European countries to combat the problems.

The ENA identifies the following key actions policymakers and individuals can take to further reduce the nitrogen problem:

- **Agriculture:** Optimizing the use of nitrogen in organic and synthetic fertilizers through improved management and technology will reduce the release of nitrogen into the environment.
- **Transport:** Building on current measures to encourage fuel efficiency and use of renewable energy sources such as solar and wind power.
- **Wastewater:** Utilizing new sewage management technology to recycle nitrogen and phosphorous.
- **Individual Efforts:** Taking action to reduce one's energy and fuel use will reduce nitrogen pollution as well as being a climate-friendly action. Limiting consumption of animal protein, in both meat and dairy products, is also a way we can all limit our 'nitrogen footprint'.

FURTHER INFORMATION

Read the European Nitrogen Assessment published by Cambridge University

Press: www.cambridge.org/ena

Also available on line at the web site of the Nitrogen in Europe (NinE) programme of the European Science Foundation that coordinated the Assessment: <http://www.nine-esf.org/ENA>

Information on the NitroEurope Integrated Project, funded by the European Commission, Sixth Framework Programme: www.nitroeuropa.eu

Information on the COST Action 729 which contributed to the Assessment: <http://cost729.ceh.ac.uk/>

The European Nitrogen Assessment is reported to the Air Convention of the United Nations Economic Commission for Europe through its Task Force on Reactive Nitrogen: <http://www.clrtap-tfrn.org/>

National Contact Points (UK)

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