

## **Tracking changes in nutrient cycling from the past to the present: Is the world awash with nitrogen?**

**By Dr Elizabeth Jeffers**

Dr Jeffers, who is a palaeoecologist working at the Oxford Long-Term Ecology Laboratory at the University of Oxford, presented a detailed analysis of the changes to the nitrogen cycle resulting from climate change and other factors to the joint November meeting of the Cirencester Science and Technology Society and the Royal Society of Chemistry.

The speaker explained that Nitrogen (N), which is an essential nutrient for life, is now being produced in far greater quantities due to the widespread use of fertilizers as well as the massive increase in the burning of fossil fuels since the early 1900s. While the increased supply of N to crops through the “green revolution” has enabled global food production to keep pace with human demands, it also has negative consequences for air and water quality as well as plant species diversity. There is also some evidence that it may exacerbate global warming.

The talk dealt briefly with the factors affecting the N cycle from creation through lightning and biological fixation to losses to atmosphere and water, the increasing application of nitrogen fertilizers for agriculture and the fact that some 50% of “new” N has an anthropogenic source.

Posing the question “where does the N go to?” Dr Jeffers highlighted the negative effects of air pollution through smog and acid rain and the creation of marine dead zones when river run-off contaminates the sea, as occurs in the Gulf of Mexico. Mentioning a number of studies examining what has happened to “new” N over past centuries, it appears that over the past 70 millennia changes to carbon dioxide levels have been largely well synchronised with changes to levels of N.

Dr Jeffers focused on ways in which society could manage anthropogenic N in the future. These included; matching N supply to N demand at crop level, the restoration of wetlands and selection of locations where N deposition increases the capacity for increased carbon storage.

### **References:**

The European Nitrogen Assessment: [www.nine-esf.org/ENA](http://www.nine-esf.org/ENA)

Philosophical Transactions of the Royal Society B on the global N cycle in the 21<sup>st</sup> century:  
<http://rstb.royalsocietypublishing.org/content/368/1621.toc>