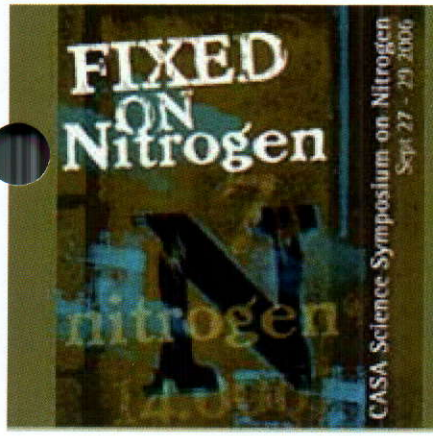

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Abstract

The General Science of Nitrogen Eutrophication:

Dr. Bridget Emmett

Nitrogen eutrophication can be considered as the unintended enrichment of terrestrial and aquatic systems by nitrogen such that changes are observed which are considered harmful or undesirable in the long term. Many factors can influence the impact and fate of nitrogen deposited to an ecosystem and therefore sensitivity can vary between different ecosystem types. Considering depositional factors first, the form of nitrogen deposited is known to affect the responses observed. In general, dry deposition is considered more damaging and some recent evidence from a large scale field experiment will be presented to illustrate this. Reduced nitrogen is also often considered more damaging than oxidised nitrogen due to its acidification potential and effective retention in the soil. However, this may be system specific as some studies suggest oxidised forms of nitrogen can result in faster species change in some habitats. The rate nitrogen enters the system may also be important although syntheses of experimental studies indicate surprising robustness of response to nitrogen load irrespective of frequency of dose. Once deposited, a range of responses are observed some of which are specific to ecosystem type. These include changes in foliage chemistry and nutritional imbalances, loss of sensitive species and vegetation composition change, increased incidence of pathogen and herbivory attack, and enhanced nitrate leaching. Uncertainties remain including controls on soil nitrogen storage and links to vegetation change, underlying mechanisms leading to increased sensitivity to stresses, impacts on animal populations and changes in soil biodiversity and implications for soil function including carbon turnover and storage. Major emphasis in Europe is now being placed on the development of dynamic ecosystem models to help determine the timing of changes forecast as this can be an important factor to consider for policy makers.