

The Social Cost of Nitrogen: Evidence from Germany

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Abstract

Excessive emissions of nitrogen into the air, soils, inland waters and oceans lead to ecosystem degradation with the consequence of eutrophication of inland waters and marine ecosystems, a significant loss of biodiversity and high costs for drinking water treatment. Furthermore, nitrogen compounds are directly harmful for human health: e.g. ammonia leads to the formation of particulate matter, nitrogen oxides encourage the formation of ground-level ozone, nitrate residues and carcinogenic nitrosamines can occur in foods.

Most nitrogen emissions into the environment are caused by agriculture, in particular the use of synthetic fertilisers. In Germany agriculture is responsible for about 80 percent of nitrogen emissions into surface water bodies and 50 percent into the air. The policy instruments applied so far, e.g. land management rules established within the framework of the Common Agricultural Policy or Germany's Fertilizer Ordinance, have not succeeded in lowering Germany's nitrogen surplus. With respect to groundwater bodies the EU target of 50 mg per litre was violated at more than 28 percent of the monitoring stations for the 2012 – 2014 reporting period, so that the EU started infringement procedures against Germany.

The paper focuses on the social costs of nitrogen by presenting evidence from Germany. Firstly, an overview about impacts of nitrogen compounds on human and environmental health will be given. Where available, quantitative figure will be provided illustrating nitrogen loads in Germany, emission pathways and threats to ecosystem services and human health. Secondly, based on available data we will provide estimates of the social (economic) costs of nitrogen emissions, with a special focus on groundwater pollution and the cost of drinking water treatment.

An economic perspective on the social costs of nitrogen emissions seeks to inform political debates and support decision-making with regard to regulating nitrogen emissions. This is in line with other attempts to use economic arguments for nature protection and biodiversity protection brought forward by international assessments such as the Stern-Report on climate change or the UNEP-initiative TEEB (The Economics of Ecosystems and Biodiversity). In a final part we will reflect on options and limitations of informing political processes by taking an economic perspective on the social cost of environmental degradation.

Keywords: social costs of nitrogen, pollution from agriculture, science-policy-dialogue
