

Effects of climate change on nitrogen leaching from upland ecosystems

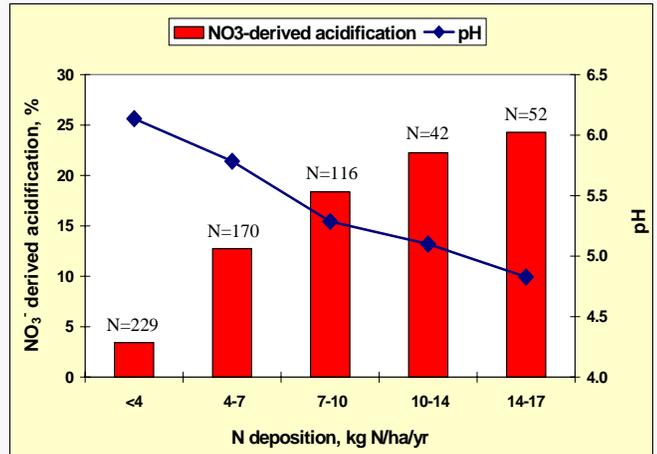
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Environmental impacts of N leaching.

In acid-sensitive areas, leaching of nitrate (NO_3^-) contributes to surface water acidification by mobilising hydrogen and inorganic aluminium ions from soil. In upland areas of SW Norway, where N deposition is highest, NO_3^- might equal the contribution of sulphate to surface water acidification.

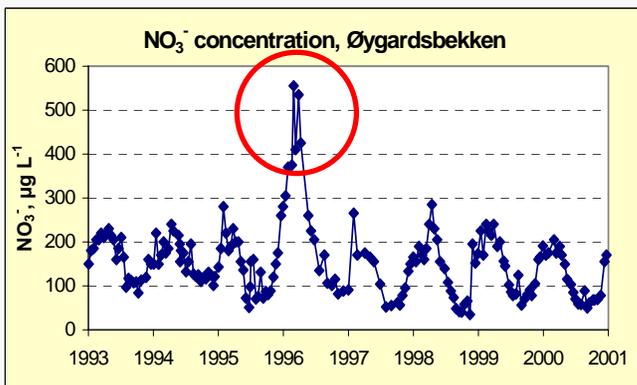
Additionally, increased NO_3^- output to surface waters will alter the nutrient balance and possibly cause eutrophication problems in coastal waters, where N commonly is the limiting element for primary production.



Contribution of NO_3^- to acidification (the equivalent ratio of NO_3^- to $\text{SO}_4^{2-} + \text{NO}_3^-$) in 609 Norwegian lakes (Kaste et al 2002)

What happens if the climate changes? Upland catchments often have a restricted capacity to retain N from atmospheric sources. In such marginal areas, the predicted change in ambient climate might have significant effects on catchment N cycling and subsequent losses of inorganic N to surface waters.

As part of the **CLUE project**, two major hypotheses will be tested: (1) increased frequency of freezing-thawing events (due to reduced snow accumulation in marginal areas) will increase the leaching of N from soil to water; (2) more frequent drought and re-wetting events during summer will increase decomposition/mineralisation and subsequent losses of N from the soils. These hypotheses will be tested by large-scale manipulation experiments (snow removal, insulation, irrigation) of upland mini-catchments (30-300 m²) at Storgama, Telemark.



Streamwater NO_3^- concentrations in Øygardsbekken, Rogaland, showing the effect of an anomalously cold winter in 1995-96 (SFT 2001)



“Mini-catchment” at Storgama, Telemark (photo: J. Håvardstun)

Project info: The CLUE project (‘Effect of climate change on flux of N and C: air-land-freshwater-marine links’) is a five-year (2003-2007) research project, funded by the Research Council of Norway. For further information, see project web page (<http://www.nlh.no/ijvf/forskning/CLUE/index.htm>) or contact project leader Arne O. Stuanes (arne.stuanes@ipm.nlh.no)