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Recovery from acidification of lakes in Finland, Norway and Sweden 1990–1999

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Abstract. Sulphate deposition has decreased by about 60% in the Nordic countries since the early 1980s. Nitrogen deposition has been roughly constant during the past 20 years, with only a minor decrease in the late 1990s. The resulting changes in the chemistry of small lakes have been followed by national monitoring programmes initiated in the 1980s in Finland (163 lakes), Norway (100 lakes) and Sweden (81 lakes). These lakes are partly a subset from the survey of 5690 lakes in the Northern European lake survey of 1995. Trend analyses on data for the period 1990-1999 show that the non-marine sulphate concentrations in lakes have decreased significantly in 69% of the monitored lakes. Changes were largest in lakes with the highest mean concentrations. Nitrate concentrations, on the other hand, were generally low and showed no systematic changes. Concentrations of non-marine base cations decreased in 26% of the lakes, most probably an ionic-strength effect due to the lower concentrations of mobile strong-acid anions. Acid neutralising capacity increased in 32% of the lakes. Trends in recovery were in part masked by large year-to-year variations in sea-salt inputs and by increases in total organic carbon concentrations. These changes were most probably the result of climatic variations. Nordic lakes, therefore, show clear signs of recovery from acidification. Recovery began in the 1980s and accelerated in the 1990s. Reductions in sulphur deposition are the major "driving force" in the process of recovery from acidification. Further recovery can be expected in the next 10 years if the Gothenburg protocol on emissions of acidifying pollutants is implemented.

Keywords: Nordic countries, sulphur deposition, lakes, recovery

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