The 2011 National Acid Precipitation Assessment Program Report to Congress

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The National Acid Precipitation Assessment Program (NAPAP) was established by the Acid Precipitation Act of 1980 to lead a multi-million dollar research program to determine the causes and environmental consequences of acid rain and to report these results to Congress. NAPAP has continued since completion of that first major task in 1991 (as enabled by the Clean Air Act Amendments of 1990) by providing a quadrennial report to Congress that: (1) summarizes the costs and benefits of the Acid Rain Control Program, (2) documents trends in acid deposition, (3) summarizes the state-of-science regarding the effects of acid precipitation on ecosystems, and (4) reports on reductions in SO_2 and NO_x emissions needed to protect ecosystems from acidification. The current report provides updated trends in the emissions, atmospheric deposition, and surface water chemistry of S and N air pollutants and related chemical constituents. This report also provides for the first time, an assessment of critical loads and exceedances for acid-sensitive regions of the eastern US, and a synthesis of current scientific understanding regarding the interactions of S and N air pollutants with changes in climate and the carbon cycle. The report documents large decreases in SO_2 and NO_x emissions and in wet and dry deposition of S and N since the early 1990s across much of the US. Parallel trends of lower magnitude than those of deposition have been observed in acid-neutralizing capacity (ANC) values of surface waters in regions sensitive to acidification. Soil acidification from decades of acid deposition has been identified as a key reason why surface water recovery has been sluggish to date. Despite some improvement in surface water chemistry in many sensitive regions of the US, widespread biological recovery in aquatic ecosystems is not yet evident, and the steady-state critical load is exceeded by current deposition rates in about 30% of surface waters in the Adirondacks and Central Appalachians. Model results for three different scenarios with progressively greater decreases of SO_2 and NO_x emissions by 2020 to levels below those required by air quality laws in place as of 2005 indicate progressively fewer surface waters with ANC values in the ranges of <50 □eq/L by the year 2050 in the Adirondacks, Northeast, and Southeast, but also that more than half the surface waters with ANC <50 □eq/L would remain below this level of elevated concern.

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