



New Perspectives on Nitrogen Cycling in the Temperate and Tropical Americas: Report of the International SCOPE Nitrogen Project

Alan R. Townsend

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Inputs of nitrogen to terrestrial and aquatic ecosystems have increased several-fold over the last one hundred and fifty years, with the steepest increases during the last four decades. The expansion of fertilizer manufacture and use, the increase in fossil fuel combustion, the intensification of animal husbandry, and widespread cultivation of N₂ fixing crops have all contributed to the dramatic increase in N inputs. The increase has been most rapid in Northern Hemisphere (NH) temperate ecosystems, but presently subtropical and tropical regions of Asia are also experiencing an explosive increase in N inputs to terrestrial ecosystems (W. Chameides, pers. comm. ; Galloway et al. 1996). Projected increases in N deposition for these tropical and subtropical regions, with a high natural background of N inputs, exceed increases projected for temperate and arctic regions (Cleveland et al. submitted; Galloway et al. 1994; Holland & Lamarque 1997a). Compared to biological N fixation, N deposition is becoming a proportionately greater source of N to terrestrial and aquatic ecosystems worldwide (Vitousek et al. 1997). The nitrogen contained in the atmosphere as N₂, 3.9×10^{15} g (Tg = 10^9 g), is the largest reservoir of N in the Earth system (Warneck 1988). However, this paper focuses on the nitrogen emissions and deposition that have been transformed from N₂ into reactive forms that are biologically available (e. g. Vitousek et al. 1997).

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