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Abstract

Nitrogen and sulfur deposition as a result of fossil fuel burning has affected numerous ecosystems globally. Documented impacts to terrestrial ecosystems include changes to soil chemical properties and processes, plant growth, plant productivity and surface water quality. The soils of the Mpumalanga Highveld grasslands in South Africa have been identified as sensitive to acidic atmospheric inputs. This study aimed to investigate nitrogen and sulfur cycling in the soils of a grassland site in the Sandspruit catchment (Mpumalanga) to assess the consequences of increased nitrogen and sulfur deposition on the potential for nitrate and sulfate leaching into nearby streams. Monthly vegetation, litter and soil sampling and analyses from October 2010 to May 2011 were used to construct nitrogen and sulfur input-output budgets that represented the inputs, cycling and outputs of nitrogen and sulfur in the Sandspruit system. The nitrogen and sulfur mineralization rates were found to range between -1.03 ± 0.15 and 1.05 ± 0.23 µg N g^{-1} soil day^{-1} and -1.06 ± 0.20 and 0.91 ± 0.21 µg S g^{-1} soil day^{-1} respectively. The nitrogen and sulfur input-output budgets showed sulfate leaching as the greatest threat to the Sandspruit system under the current and future modelled nitrogen and sulfur deposition rates.