

The Increase in Streamwater DOC Concentrations may not Necessarily Imply the Increase of DOC Fluxes, an Example from Central European Catchments.

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Surface waters recovering from acidification often show an increase in DOC concentrations. This increase is driven by a decline in acidic deposition, leading to a decrease in the soil and surface waters ionic strength and a subsequent increase in the solubility of humic substances. Over 30 years of observations (1993-2022) in the Slavkov Forest catchments (Czech Republic, Central Europe) sulfur deposition declined from 34 kg ha<sup>-1</sup> yr<sup>-1</sup> in 1993 to 2.6 kg ha<sup>-1</sup> yr<sup>-1</sup> in 2022 and inorganic nitrogen deposition from 13.4 kg ha<sup>-1</sup> yr<sup>-1</sup> to 6.1 kg ha<sup>-1</sup> yr<sup>-1</sup> respectively.

Three Norway spruce dominated catchments – Černý potok (CEP), 15.2 ha peaty catchment, Lysina (LYS), 27.3 ha granitic with riparian peats and Pluhuv Bor (PLB) 21.6 ha serpentinite catchment were investigated. Peaty CEP showed lowest relative annual increase (0.013 mg DOC per mg DOC yr<sup>-1</sup>), despite having very high concentrations. The annual 3-year average between 1993-1995 was 48.2 mg L<sup>-1</sup> increasing to 68.3 mg L<sup>-1</sup> for 2020-2022. The granitic adjacent LYS showed an annual increase of 0.014 mg DOC per mg DOC yr<sup>-1</sup> with concentration increase from 16.9 mg L<sup>-1</sup> to 25.4 mg L<sup>-1</sup>. The largest relative increase was observed at PLB; 0.031 mg DOC per mg DOC yr<sup>-1</sup> with concentration increasing from 15.7 mg L<sup>-1</sup> to 36.7 mg L<sup>-1</sup> over 30 years.

Annual runoff declined significantly at CEP and LYS, from 465 to 331 mm as a result of rising air temperature, reduced precipitations and increased evapotranspiration. PLB did not show a statistically significant runoff decline, with an average of 266 mm. PLB experienced significant deforestation during the last years, which likely decreased transpiration and thus increased catchment runoff.

As a result, DOC fluxes did not change significantly from CEP and LYS (average 210 kg ha<sup>-1</sup> yr<sup>-1</sup> and 90 kg ha<sup>-1</sup> yr<sup>-1</sup>). However, PLB's flux more than doubled increasing from 44 to 106 kg ha<sup>-1</sup> yr<sup>-1</sup>.

The combined effect of geochemically controlled rise of stream water DOC and climatically derived runoff reduction may thus result in limited changes in DOC fluxes.