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Nutrient concentrations and fluxes for podzolic and gley soils at Plynlimon, mid-Wales: implications for modelling inorganic nitrogen and phosphorus in upland UK environments

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Abstract. The effect of felling on stream nitrate, ammonium and soluble reactive phosphate (SRP) concentrations is examined for acidic and acid sensitive Sitka Spruce afforested catchments with podzolic and gley soils in mid-Wales. For the streams draining the felled podzolic areas, the concentrations of nitrate can be up to an order of magnitude higher than pre-fell values and post-fell concentrations can even be lower than the pre-fell values. Felling for the podzolic soils barely leads to any changes in ammonium or SRP concentration. For the gley soils, felling results in an order of magnitude increase in nitrate, ammonium and SRP for a small drainage ditch, but the pulse is much reduced before it reaches the main Nant Tanllwyth channel. Rather, within-catchment and within-stream processes not only imbibe nitrate, ammonium and SRP fluxes generated, but in the case of nitrate, concentrations with- and post-felling are lower than pre-felling concentrations. The flux changes involved are described in terms of (a) input-output relationships and (b) "felling disruption" and "felling recovery responses". The findings are linked to issues of hydrobiological controls and forestry management.

Keywords: Plynlimon, Hafren, Hore, streams, nitrate, ammonium, SRP, phosphorus, soluble reactive phosphorus, phosphate, orthophosphate, Sitka spruce, forestry, felling, podzol, gley

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