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Carbon budgets of a peatland managed by prescribed fire

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Although there are now considerable numbers of studies that can claim to present a complete carbon (or GHG) budget for a peatland, these studies are limited to what might be considered as pristine bogs: no study can claim to present a complete carbon budget for a managed or damaged peatland. This study presents the carbon budget of a blanket bog, North Pennines, UK, subject to grazing and prescribed burning for vegetation management. The budget considers both fluvial and gaseous carbon fluxes and the following uptake and release pathways: dissolved organic carbon, particulate organic carbon, excess dissolved CO2, release of methane (CH4), net ecosystem respiration of CO2, and uptake of CO2 through primary productivity. Measurements of CH4 were not directly measured as part of this study but were estimated from hydroclimatic variables measured within the study and calibrated elsewhere.

The results show that, if management combinations were extrapolated across the catchment, then over a 3 year period, the catchment would be a net source of carbon of between 62 and 206 gC m-2 yr^{-1}. The action of both burning and grazing was to significantly decrease the magnitude of the carbon source relative to unburnt controls. Over the study period burnt sites were a mean source of approximately 117.8 gC m-2 yr^{-1} compared to unburnt sites with a mean source of 156.7 gC m-2 yr^{-1}. Even when including the loss of carbon during the vegetation combustion, there are conditions under which the long-term loss of carbon is less than if no burning had occurred. If total combustion of vegetation occurs, provided burning occurs at cycles longer than 32 years, then less carbon is predicted to be lost than in a no-burn scenario.