



## **The short and long term effects of conifer afforestation on a sensitive freshwater system**

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Our study was driven by concerns that afforesting the headwater catchments of the Upper Halladale River in the Scottish Highlands would affect water quality and the local salmon fishery. The main uncertainty, on the sensitivity of the catchment to acid deposition, led to a preliminary study in 1993 by a consortium of research organisations; they concluded that the site was not significantly acidified and not at risk of acidification from the planned afforestation.

The planting, therefore, went ahead and presented us with an opportunity to look at the short, medium and long-term effects of afforestation on the chemistry and biology of a sensitive freshwater system, to review the conclusions of the preliminary report and assess the efficacy of good management practices employed. Water samples were taken from six sites in the Upper Halladale Catchment and analysed for a wide range of chemical parameters to monitor changes in water quality due to cultivation (ploughing, drainage, road building and planting), fertiliser application and forest growth.

The results demonstrate that water quality remained high during site preparation with little or no adverse chemical or biological impacts in the short-term (4 years) after planting. We do find significant changes in hydrochemistry in the long-term data (15+ years); some of these were expected, a decrease in non-marine sulphate and a general increasing trend for dissolved organic carbon, for example, but there are fluctuations within the long-term data for these and other parameters that warrant further explanation and discussion. We found that the most significant changes in hydrochemistry occur after marked meteorological events and that the effects are not always short-lived, sometimes lasting for years; the results indicate that climate, not land use, exerts the greatest control on chemistry within the Upper Halladale catchment.