

## Potential phosphorus loss from a low ASC soil to groundwater

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The Maniototo Basin in Central Otago has low anion storage capacity (ASC) soils of poor P retention and high infiltration rates due to coarse textures. Coupled with the expansion of dairying in the basin, resulting in an increase in the use of P fertiliser and irrigation, these soils have a high potential to lose phosphorus (P) down the soil profile to groundwater located within 3-m of the topsoil. Streams derive most baseflow from groundwater. Hence, the P-enrichment of groundwater may increase algal growth.

A lysimeter trial of topsoil and column trial of aquifer gravels were carried out to determine the relative magnitude and form of P losses associated with irrigated dairy farming from a stony sandy loam soil of low (19%) ASC. The addition of superphosphate and dung exacerbated losses, but only for 60 days compared to the control (no P soil). Different forms of dissolved organic P were leached through the soil at rates greater than orthophosphate (the largest constituent of dissolved reactive P) and also through the aquifer gravel. Data from the lysimeter and column trial have been used to estimate the likelihood of P losses to 2-m and were calibrated against losses recorded at 2-m from a channel lysimeter within the Basin. These estimates were used to determine the rate of groundwater P enrichment and in turn the time taken for the Basin's streams to reach a baseflow-P concentration that would promote algal growth.