PREDICTING LAND-BASED NITROGEN LOADS AND ATTENUATION IN THE RANGITIKEI RIVER CATCHMENT – THE IMPLICATIONS FOR LANDUSE

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Regional Councils are required to produce a set of 'freshwater resource accounts' for defined individual Freshwater Management Units (FMUs) in their regions. One of the benefits of these accounts is that they can assist in the management of the impacts of landuse on freshwater quality.

Accounting exercises need to predict the attenuation in nitrate-nitrogen (NO_3-N) that occurs along flow pathways from farms to rivers and lakes. This nitrogen attenuation capacity is often highly variable between, and within, catchments and is dependent on characteristics like; land use, topography, rainfall, soil type, underlying geology, and subsurface geochemistry. A simple model was developed to account for the influence of different soil types and underlying geology on the transformation of nitrogen (N) in the Rangitikei River catchment.

The model was then used to investigate the effects of changing landuse intensity, i.e. nitrogen leaching from farm systems, on water quality in the Rangitikei River. Three scenarios were considered; decreasing nitrogen leaching from low N-attenuation areas, increasing nitrogen leaching in high N-attenuation areas, and a combination of these two strategies.

Decreasing the intensity of landuse in low N-attenuation areas in the Rangitikei catchment decreased N leaching from farms slightly but substantially lowered the N load in the River. Increasing the intensity of landuse in high N-attenuation areas in the catchment generated a large increase in the quantity of N leached from farms but resulted in a relatively small increase in N load in the River. Where both the intensity of landuse in high N-attenuation areas was increased and the intensity of landuse in low N-attenuation areas was decreased, N loss from agricultural land was greater but, importantly, N load to the River was lower. The approach described here is useful to identifying the potential (so-called) 'head space' for increased N leaching from farms within catchments and more efficiently allocating landuse intensity to contrasting landscapes.

Editor's Note: An extended manuscript has not been submitted for this presentation.