

Farm-scale nutrient flow pathways and their potential attenuation in Rangitikei sand country

Miss Genevieve Smith¹, Dr Ranvir Singh¹, Ms Abby Matthews²

¹Massey University, ²Horizons Regional Council

Recently, there has been significant agricultural development in lower North Island coastal dune areas, including the Rangitikei. With the introduction of irrigation, coastal dune areas have become viable for production. These mainly sandy soils with low organic material present a nutrient leaching risk, particularly nitrate-nitrogen (N) and phosphorus (P) from the root zone. However, little is known about transport and fate of nutrient loss from intensive farms on these soils.

We are conducting farm-scale measurements, in collaboration with Horizons Regional Council (HRC), to assess transport and transformation of N and P below an irrigated dairy farm within Rangitikei sand country. The land was previously sand dunes, but is now in pasture under centre pivot irrigation. Eight shallow groundwater piezometers and twelve surface water sample sites form a monitoring network. The piezometers are divided between four sites at depths of 3 and 6 m below ground level. The surface water and groundwater samples are collected fortnightly and monthly respectively, and analysed for nitrate, ammonium, total N, dissolved reactive P and total P to monitor seasonal changes concentrations. Dissolved organic carbon, manganese, iron and dissolved oxygen parameters are also analysed to assess the reducing potential of the shallow groundwater. A reducing environment has the potential for greater denitrification of nitrate to less harmful forms, and therefore potential for better N mitigation in groundwater.

Our preliminary results indicate a reducing environment in shallow groundwater, but suggest there may be potential loss of nutrients via surface drains from the farm. This paper will present analyses of nutrients in the surface and groundwater system, which will help to improve Horizons' understanding of the effects of intensive land use on freshwater resources in coastal sand country.