Geology and soil health of the Kaituna/Maketū and Pongakawa/Waitahanui catchments

Summary

The Kaituna/Maketū and Pongakawa/Waitahanui catchments have two distinct soil and geological zones. The upper catchment is comprised of pumice and allophanic soils over ignimbrite. Lower catchments are comprised of organic, recent and gley soils over gravel.

Both soil zones have very distinct chemical and physical characteristics which impact on their ability to support different land uses.

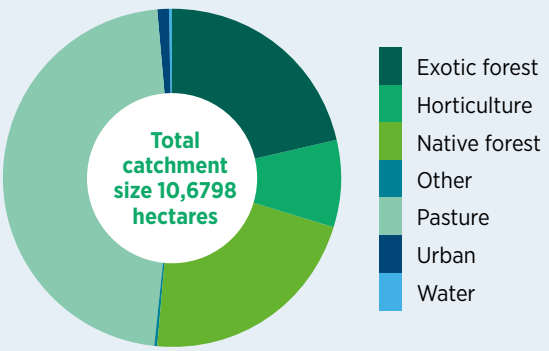
Soil

The upper areas of the Kaituna/Maketū and Pongakawa/Waitahanui catchments are made up of pumice soils formed by flows of hot gas and rock from the numerous volcanic centres in the region. High rainfall and rapid drainage in the Mamaku Ranges has caused excessive leaching of nutrients from the surface layers of the soil forming what are called podzol soils in these areas. These soils have a distinctive white leached layer below the upper soil horizon.

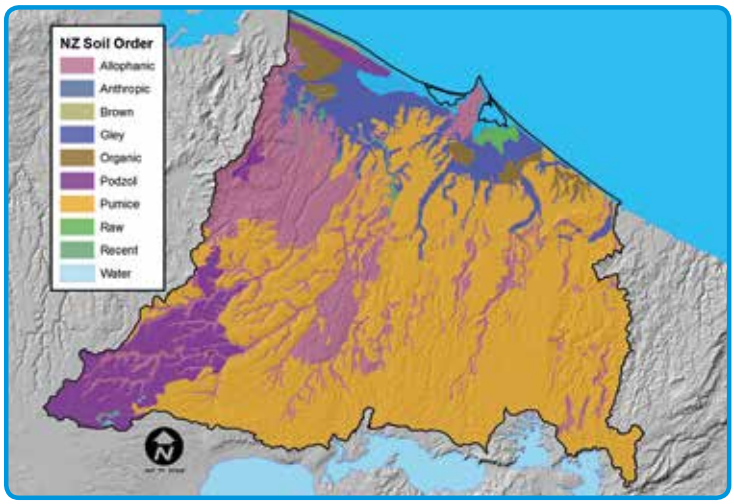
Pumice soils, which make up the majority of the catchment, have coarse soil fragments causing them to drain water rapidly. This can assist with faster recharge of local groundwater but can also create a higher risk of excess nutrients leaching through the soil profile.

The lower catchments have a higher water table in relation to the soil surface, forming large areas of gley and organic soils. These soils typically have higher organic matter and drain more slowly.

Land use in the Kaituna/Maketū and Pongakawa/Waitahanui catchments



Soil types in Kaituna/Maketū and Pongakawa/Waitahanui



Geology

The Bay of Plenty region has a rich geological history from the Ōkataina and Taupō volcanic centres. Flows of hot gas and rock (pyroclastics) from the Ōkataina Volcanic Centre have formed large ignimbrite sheets throughout the region.

The geology of the Kaituna/Maketū and Pongakawa/Waitahanui catchments is mainly ignimbrite with gravel deposits forming around the estuary coastal areas. Areas of gravel and peat have formed by erosion of parent materials being deposited in low lying areas. These landscapes are very young in geological terms with some being only a few thousand years old.

Kiwifruit vines.

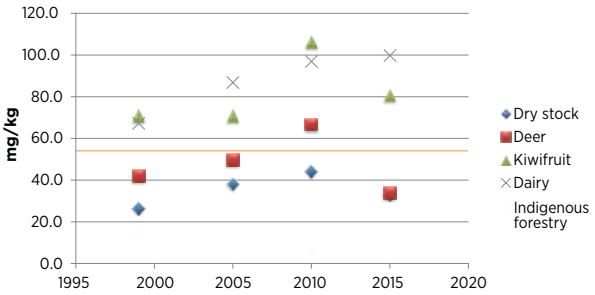
Soil nutrients

The graphs below show nutrient levels found in the topsoil at 77 permanent monitoring sites in a range of land uses in the Bay of Plenty.

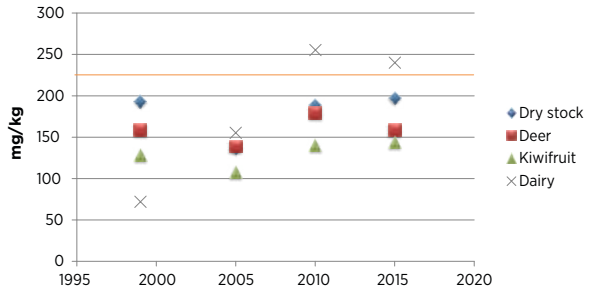
Higher concentrations of nutrients indicate the use of more intensive agricultural or horticultural systems.

The orange lines on the graphs indicate maximum plant requirements for phosphorous or nitrogen. Levels above this line generally exceed pasture requirements and indicate an increased risk of excess nutrients entering waterways through surface run-off or leaching.

Average phosphorous concentration



Average nitrogen concentration



Land is an important interface between nutrients and water as well as its productive capacity.

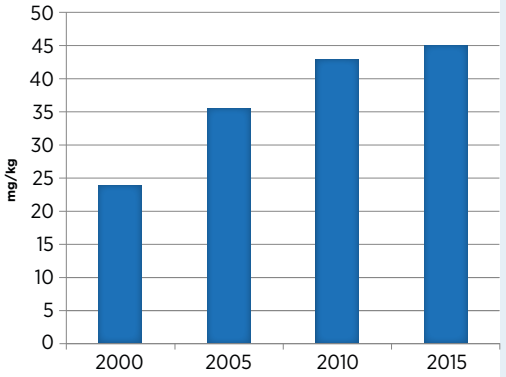
CASE STUDY

Trace elements in kiwifruit orchards

With the outbreak of the bacterial kiwifruit vine disease Pseudomonas syringae pv. actinidiae (PSA) in the Bay of Plenty in 2010, many treatments that emerged were copper based. Copper kills bacteria on contact by disrupting the biological processes of the cell. Copper from these treatments will potentially accumulate in soil over time, however it binds strongly with soil particles and is not often freely available in soil.

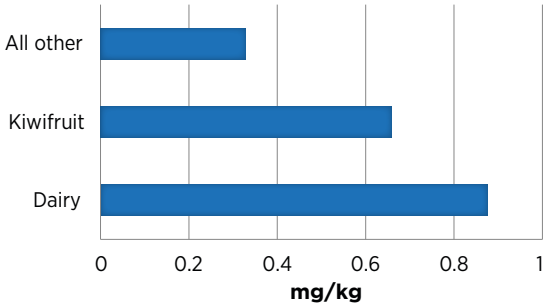
The results of Regional Council's long term soil monitoring at six kiwifruit sites shows that while the average copper concentration level has increased over time to 52.6mg/kg in 2015, levels are still below the recommended safe maximum value of 100mg/kg. Orchardists need to continue to exercise judicious use of copper based treatments.

Average soil copper concentration in Bay of Plenty kiwifruit orchards (2000-2015)



Cadmium levels on kiwifruit sites monitored by the Regional Council in 2015 were high when compared to other land uses. This is most likely due to long term accumulation from the use of phosphate fertilisers which can be high in cadmium, although historic land use practices can play a significant role. Cadmium use should be carefully monitored and managed into the future.

Average soil cadmium concentration by land use in Bay of Plenty region (2015 sampling)



12% of sites exceed guideline value (1mg/kg)

GD154465

For more information

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