Soil Quality

Monitoring Summary 2011

Key points

- Soil quality monitoring has highlighted that for sites sampled in 2011 in general soil quality is acceptable. However there are some issues with soil compaction and cadmium accumulation which will need monitoring over time.
- The Rai, Ronga and Pelorus soils are all well drained, moderately deep to deep, have moderate to moderately rapid permeability and have high water storage capacities.
- Sites receiving winery wastewater had higher soil pH, K and Na, base saturation percentage and electrical conductivity values than soils at control sites.
- We all have a part to play in maintaining soil quality.

Why do we monitor soils?

- Soils are the protective skin of our planet – they store water and nutrients, mitigate greenhouse gas emissions, filter and breakdown pollutants and act as a buffer between the atmosphere and aquatic environments.
- Soils are at the heart of our economy, underpinning our agriculture, viticulture, forestry and tourism industries.
- Not least, soils are the platform on which we live and build our houses.
- However, soils are fragile and if they are not carefully managed they are at risk of degradation.
- It is therefore vital we have detailed information on what effect we are having on our soils.

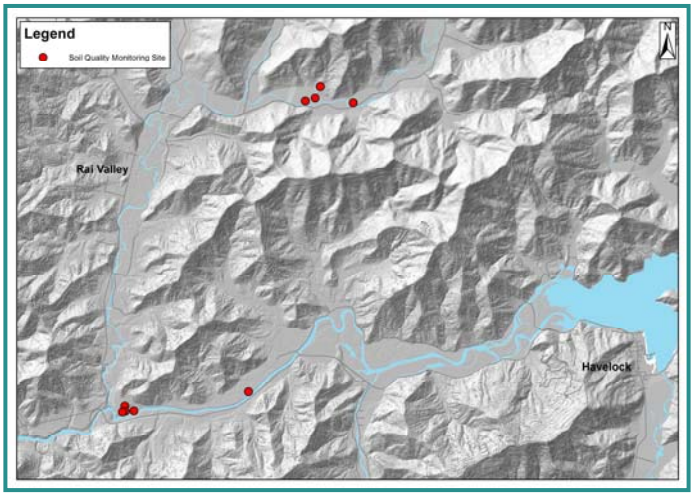

Figure 1. Location of soil quality monitoring sites sampled in 2011.

What happened in 2011?

Soil quality monitoring

To determine what effect land use practices are having on the quality of our soils, the Council undertakes a soil quality monitoring program.

The monitoring program involves collecting soil samples from sites that represent the main land use activities and soil types within our region and testing them for physical, chemical and biological properties shown to be robust indicators of soil quality.

Currently there are 75 soil quality monitoring sites across our region.

In 2011, nine new monitoring sites that included eight dairy sites and one under native lowland forest were sampled and soils analysed. These sites represented 3 different soil types from 2 soil orders.

What have we found?

- Results indicate that in general the soils are in fairly good condition. For example indicators of soil acidity, organic reserves and soil fertility were all within currently acceptable soil quality target ranges.
- Several sites showed signs of poor physical condition i.e. low macroporosity. These results put these soils at risk of poor aeration and impeded drainage which may potentially affect pasture production and predispose the soil to surface runoff, nutrient loss, erosion and flooding.
- Trace elements were within suggested upper limits for concentrations in soils, although on average cadmium concentrations were about double those of typical background concentrations for soils.

Soils in the Rai/Pelorus catchment

- Currently Council has no information on important soil parameters such as water holding capacity, drainage, and permeability for soils in the Rai/Pelorus catchment.
- This kind of information is critical if we want to help landowners manage their soils for activities such as irrigation scheduling and effluent application.
- Sampling of 17 soil profiles in the Rai/Pelorus catchment identified 3 soil families i.e. Rai, Ronga and Pelorus.
  - The Rai family of soils occurred on the higher terraces and fan surfaces above the floodplain.
  - The Ronga family of soils occurred on the lower valley floodplain surface.
  - The Pelorus family of soils occurred on the strongly undulating or hilly land in the transition zone between the steeply sloping valley sides and valley floor.
- All three soils were well drained, moderately deep to deep, had a moderate to moderately rapid permeability and have high water storage capacities.
- If this kind of fundamental information can be tied to real time soil moisture monitoring, it will allow landowners to match soil conditions with the optimal amount of irrigation and effluent applied to land.

Soils receiving winery wastewater

- One issue which has recently been highlighted as a result of land based application of winery wastewater is the potential for soils to accumulate sodium and potassium to concentrations which may adversely alter soil physical properties such as aggregate stability and hydraulic conductivity.
- Soils have been sampled from 27 sites used by wineries to dispose of wastewater to land and analysed for a bunch of soil properties.
- Sites receiving winery wastewater had higher soil pH, exchangeable K, exchangeable Na, base saturation percentage and electrical conductivity values than soils at control sites.
- These differences largely reflect the fact that Na and K based cleaning products are used in wineries, and grape lees and juice contain significant amounts of K.
- A commonly used measure of the potential for Na and K to cause soil physical deterioration, i.e. clay dispersion and structural instability, is the Exchangeable Sodium Percentage and Exchangeable Potassium Percentage.
- Values were significantly higher on soils receiving winery wastewater than the control sites.

Figure 2. Example of deep, well drained Rai soil in the Tunakino Valley

What else is the Marlborough District Council doing?

- Sampling and testing soils under various land uses to monitor the quality of soils across the region.
- Undertaking specific soil monitoring programs including:
  - Nitrogen leaching from soils
  - Development of Na and K thresholds in soils
  - Investigation of landscape re-contouring in South Marlborough

What can you do?

- Get your soil fertility right to meet your production goals by undertaking a nutrient budget for your farming system.
- Maintain or enhance soil organic matter by growing annual cover crops between productive crops and reducing cultivation and soil disturbance in cropping soils and applying compost, organic manure or effluent to the soil.
- Look after soil structure by avoiding working the soil when it is wet.

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For more information on soil quality go to
www.marlborough.govt.nz

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