MARLBOROUGH DISTRICT COUNCIL

Soil Quality - Monitoring Summary 2012

Key Points

- Soil quality monitoring has highlighted on the whole soil quality is generally acceptable, although there are some issues around soil structural damage, nutrient and contaminant accumulation.
- The Koromiko, Manaroa and Kaituna soils are all well drained, moderately deep to deep, have moderate to moderately rapid permeability and have high water storage capacities.
- Current loading and accucmualtion of K and Na to soils receiving winery wastewater are unlikely to result in soil structural damage.
- 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.

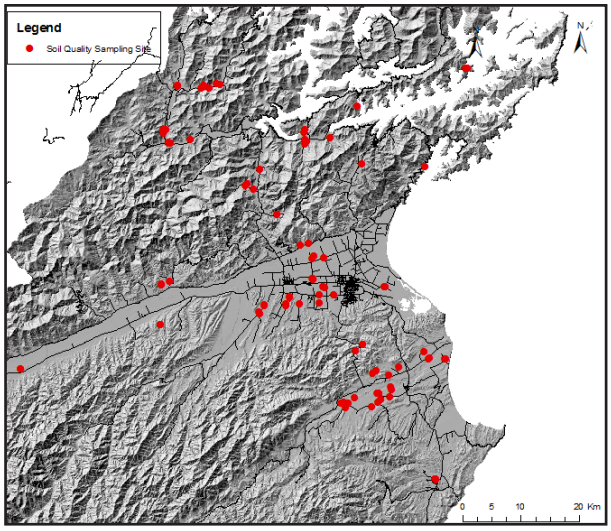

Figure 1. Location of soil quality monitoring sites sampled between 2007-2012.

What happened between 2007-2012?

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.

Monitoring involves collecting soils 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 118 soil quality monitoring sites across our region that represent 6 landuse activities and 4 soil orders.

What have we found?

- Monitoring indicates that 48 sites met all their targets, 43 had one indicator outside their range while the remaining 27 sites had two indicators that didn't met their target range.
- Several different landuses i.e. dairy, viticulture and cropping showed signs of poor physical condition. This included soil compaction and low aggregate stability. This puts these soils at risk of poor aeration and impeded drainage which may potentially affect plant performance and predispose the soil to surface runoff.
- Several of the dairy sites have elevated mineralisable nitrogen and total soil N approaching upper limits and Olsen P values higher than those required for optimal pasture production. High N and P have the potential to negatively affect water quality if they end up in ground/surface water bodies.
- Some of the dairy pasture sites had elevated soil cadmium concentrations, while some of the drystock pasture sites have elevated fluorine.

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 Linkwater/ Kaituna districts.
- 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 19 soil profiles in the Linkwater/Kaituna districts identified 3 soil families i.e. Koromiko, Manaroa and Kaituna.
  - The Koromiko family of soils occurs on the lower land surfaces – on stream and river floodplains and low terraces.
  - The Manaroa family of soils occurred on surfaces intermediate between the lower floodplains and remnant terrace and fan surface.
  - The Kaituna family of soils occurred on terraces and fans that occur above the 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.
- A laboratory experiment was set up whereby two bulk soil samples were equilibrated with a range of solutions that contained variable concentrations and ratios of cations i.e. K and Na.
- After equilibrium the percentage of soil dispersion was measured which was our measure of soil structural stability.
- Soil dispersion was extremely low (<1.2%) across the two soils investigated despite high K and Na loadings which is good.
- This was likely because of the low clay content (high silt) of these soils which is typical of most soils receiving winery wastewater in the Marlborough region.

Figure 2. Example of deep, well drained Kaituna soil at Linkwater

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:
  - Measure nitrogen leaching losses in under viticulture.
  - Determining temporal changes in soil properties receiving winery wastewater.
  - 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

Marlborough District Council

15 Seymour Street, Blenheim. Telephone 03 520 7400 Fax 03 520 7496