Bioeconomy Science Institute™

Te Uru Kahika Regional and Unitary Councils Aotearoa

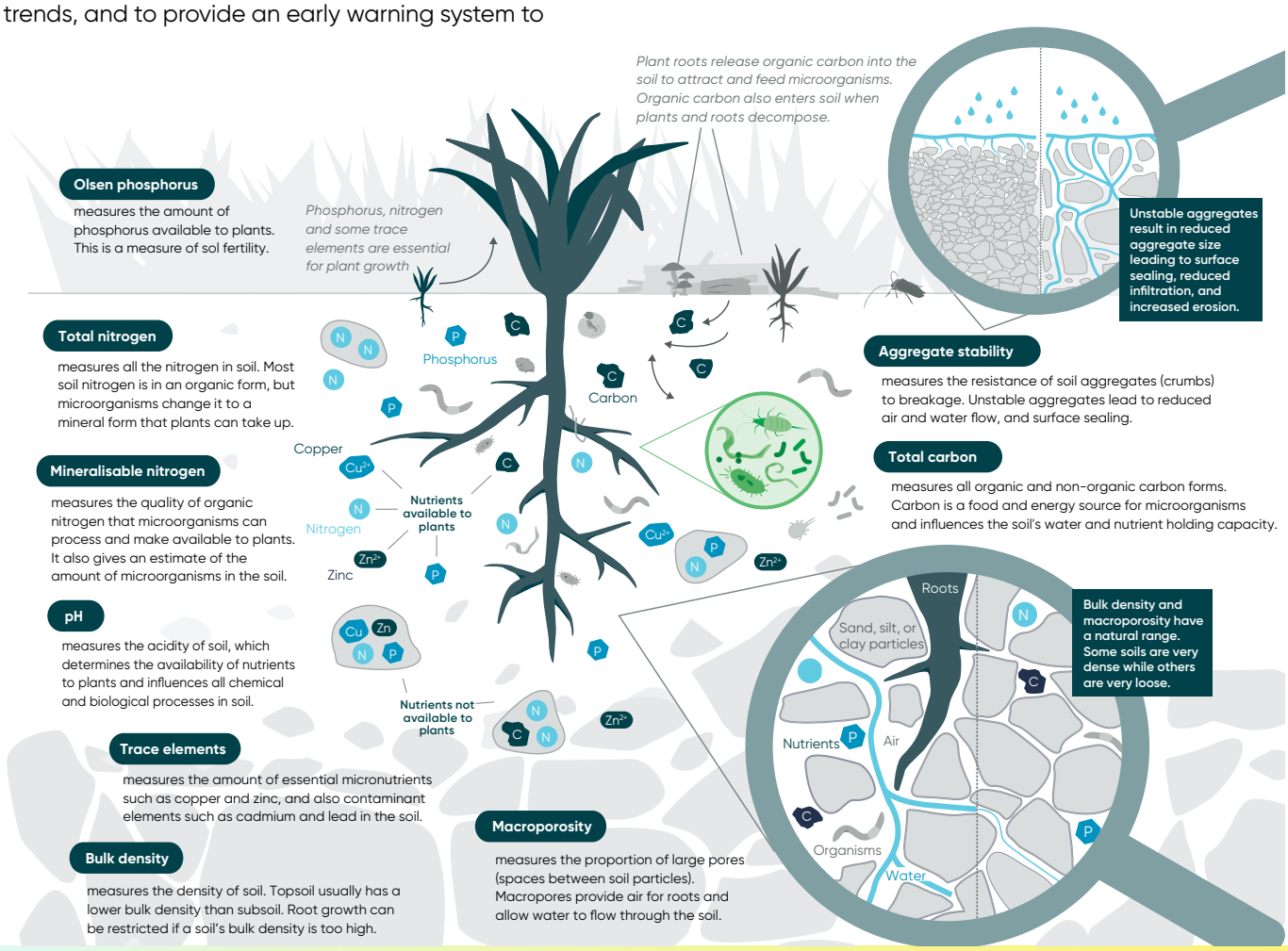
Keeping track of soil health

This factsheet provides an overview of *State of the Environment (SOE) soil quality monitoring and reporting*, for local policy-makers such as councils, land managers, and the general public.

Healthy soils produce 95% of the food we eat, are home to more than 59% of global biodiversity, and represent the largest store of terrestrial carbon on the planet. Healthy soils also deliver other vital ecosystem services, such as nutrient cycling and water filtration. But soil is a limited resource. Soil health is often considered to be broader than soil quality, which is typically associated with measurement of soil physical, chemical and occasionally biological properties.

Regional and unitary councils undertake ***State of the Environment (SOE) soil quality monitoring*** across a range of land uses and soils representative of a region's soil resources, to provide an assessment of state and trends, and to provide an early warning system to identify the effects of primary land uses on long-term soil quality. Local policy-makers such as councils can use soil monitoring results to inform regional planning and environmental goals.

Monitoring is primarily undertaken on private land. Landowners who are part of the soil monitoring network can access data to understand both productivity potential and environmental capacity of their land. Sites include those under pasture, cropping, perennial horticulture, commercial forestry and urban land uses, as well as sites with indigenous vegetation, typically on the dominant soils of the individual regions. A core set of indicators (see image) are measured at these sites.

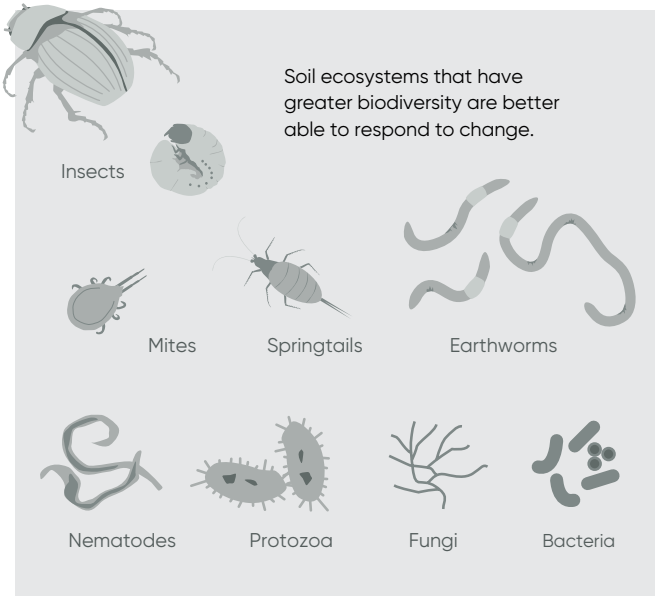


Reference ranges or target values are used to assess whether soils are within acceptable limits. These may be grouped by land use and soil order, or by grouped soil orders.

Soil biodiversity

Healthy soils support active, diverse, and abundant populations of microorganisms and fauna, such as nematodes, springtails, beetles, fungi and microscopic life. These organisms play critical roles in nutrient cycling, organic matter decomposition, plant pest suppression and more. Soil microorganisms can free up nutrients for plants to grow and can protect them from disease.

The biodiversity of soil is not currently routinely monitored in New Zealand. However, the Hot Water Extractable Carbon (HWEC) test and Anaerobically Mineralisable Nitrogen (AMN) tests used in SOE monitoring provide indirect measures of microbial activity.



Soils in urban environments

The value of soils in urban environments should not be underestimated. These soils underpin our green spaces, and act as a sponge to help mitigate flooding. Urban soils include residential and community gardens, which are also important spaces for food production and environmental stewardship.

Soil monitoring for other purposes, and by farmers and communities

Soil testing for primary production

Soil testing is important for farmers and growers to inform when and how much lime and fertiliser to apply to optimise plant growth and limit environmental impacts. These tests may differ from those used for SOE soil quality monitoring, because the test results are generally interpreted against target ranges based on agronomic considerations.

The Fertiliser Association of New Zealand (FANZ) provides resources for pastoral, arable, and vegetable farming on soil testing and managing soil fertiliser/lime requirements based on soil test results.

Soil testing is not as routine or common in plantation forestry, except when establishing a new plantation, or occasionally for diagnosing a nutrient deficiency (foliar testing is more common).

Soil monitoring by farmers and communities, including kaupapa Māori approaches

More broadly, soil monitoring will help inform what testing may be relevant to undertake and if additional testing available through commercial laboratories is relevant. Kaupapa Māori approaches for assessing soil health are generally broad and holistic, typically based on a value-knowledge perspective, not just a range of indicators. For national, regional, and local monitoring and reporting we are likely to see science-based indicators working alongside kaupapa Māori indicators and narratives to explain the characteristics, values, and changes in soils, as a part of a wider statement of soil and whenua health.

Visual soil assessment (VSA) is a valuable, accessible tool for farmers and communities to observe changes in soil quality. VSA has also attracted much interest from Māori groups because of its practicality for on-land assessment, monitoring and soil management. It aligns well with te ao Māori perspectives and Māori conceptual approaches for understanding soil health and developing indicators. VSA creates an awareness of the state of the soil, and can be inclusive of assessing soil biology. It can enable a direct connection between changes in management practices with changes in soil state.

Free guides and resources are available to help with undertaking VSA.

This factsheet is part of a series produced by the Bioeconomy Science Institute, for the Regional Council Land Monitoring Forum in 2025.