



**LAND, SOIL  
AND BIODIVERSITY**



## SOIL EROSION

Soil is one of Taranaki's most important resources sustaining the region's agricultural industries. Soil erosion rates vary throughout the region according to geology, slope, vegetation cover and land use. Land uses that are sustainable are those that match the capabilities of the land class. Monitoring undertaken by the Taranaki Regional Council shows that:

- 87.4% of the hill country is being used sustainably with no significant soil erosion problems;
- there has been a 2.4% increase in sustainability over the past five years;
- the area of land in sheep and beef farming has continued to decline;
- 30.8% of hill country land is now reverting to scrub;
- the area in plantation forestry has doubled since 1994;
- a total of 269 comprehensive farm plans and 24 agroforestry plans have been prepared; and
- 178,580 ha, or 58% of privately-owned hill country land, and 5,233 ha, or 41% of privately-owned sand country, are now included in the Council's sustainable land management programme.

The *Regional Soil Plan*, made operative in 2001, addresses soil erosion issues in Taranaki. The sustainable land management programme involves supporting hill country farmers to farm in a sustainable way, including identifying areas where forestry (plantation or reversion) are preferred over pastoral farming. The Council will continue to monitor soil erosion in Taranaki.

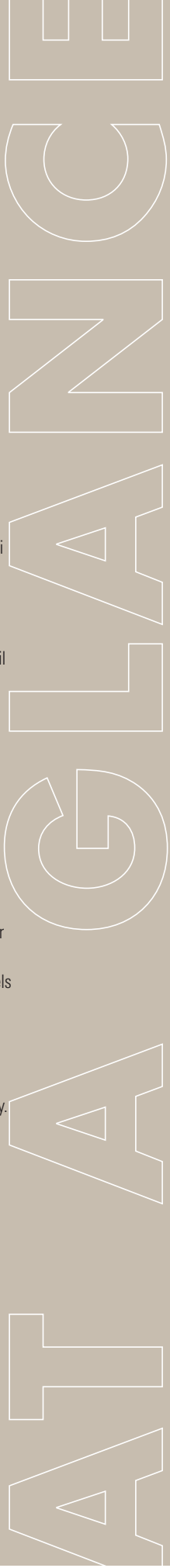


## SOIL HEALTH

Soil health refers to the biological, chemical and physical state of the soil. The region is fortunate in that soil types commonly found here are naturally robust and able to retain nutrients and organic material. The Council has continued soil quality investigations and monitoring projects to ascertain whether there are any emerging trends in Taranaki relating to soil compaction, depletion of soil nutrients, and residual soil contamination, each of which would affect soil health. This research shows that:

- 97% of Taranaki soils are of very low to moderate vulnerability to soil compaction;
- there is evidence of soil compaction on some Taranaki farms during wet weather, but this compaction is generally reversible with appropriate pasture and stock management;
- the carbon content of Taranaki soils is not changing, suggesting that soils are not becoming depleted of their organic content;
- phosphate levels, whilst increasing, are considered appropriate;
- total nitrogen levels are higher than optimal on all dairy farms surveyed, although most nitrogen is in the organic form which does not so readily leach out of the soil;
- nitrogen levels indicate vigorous pasture growth and have only minor implications for nutrient balancing;
- levels of cadmium available for uptake by plants are well below levels that would give rise to environmental concerns although they are increasing slowly;
- there is no evidence of any issue of residual or cumulative agrichemicals in the soils of the region; and
- baseline studies have been undertaken to explore soil fauna diversity.

The *Regional Soil Plan*, includes policies and methods to address soil health issues in Taranaki. Actions include working with landowners on sustainability issues. The Council will continue to monitor soil health.





## CONTAMINATED SITES AND HAZARDOUS SUBSTANCES

Contaminated sites are those that result from historical activities and industries where hazardous substances have been inappropriately stored, used or disposed of. The Council's register of selected land uses records 1,281 sites where past or current activities could have resulted in contamination. Of these:

- 757 sites (59%) have been investigated and no contamination found to be present;
- 16 sites have been remediated, so levels of contamination no longer pose an unacceptable environmental risk;
- 480 sites contain hazardous substances, but based on current knowledge, not at levels that would pose an unacceptable environmental risk, or they are currently being managed so that there is no unacceptable risk (e.g. such as the Pātea site case-studied in this report);
- 28 sites have been classified as being low-risk, but require further investigation to complete classification; and
- No sites have been deemed 'contaminated', i.e. found to pose an unacceptable risk.

The *Regional Fresh Water Plan* and *Regional Air Quality Plan* contain rules controlling the discharge of contaminants, thus avoiding new sites being contaminated. Hazardous substances are managed under the Hazardous Substances and New Organisms Act 1996, and discharges under the RMA. Council inspects industries and businesses to assess compliance with regulations under these acts. Potentially contaminated sites are managed through the register of selected land use and through district plans.



## BIODIVERSITY

The Taranaki region, despite its modest size, is a biologically diverse region. It has four distinctive ecological districts which give it its biodiversity characteristics. In summary:

- Over 140,000 ha, or 20% of the region, is set aside as public conservation land;
- 3,374 ha of indigenous vegetation on private land is protected by landowners through Queen Elizabeth II National Trust (QEII) covenants, and this area is increasing;
- 57% of remaining indigenous vegetation is either in public conservation land or private land protected by a QEII covenant;
- 40 birds, mammals, reptiles and invertebrates have been identified as threatened in Taranaki, about seven of these are either stable or improving;
- predator control programmes, aimed at protecting threatened birds, are undertaken by a range of agencies, landowners and community groups;
- research into kererū and tūī in New Plymouth highlighted the importance of both native and exotic flowering and fruiting trees in the city;
- threatened plants often occupy coastal cliff edge habitats and are threatened by weed species such as giant gunnera;
- possum levels are kept low by landowners through the Taranaki Regional Council's self-help possum control programme on the ring plain and by Department of Conservation programmes in priority conservation areas;
- areas with goat control are healthier with higher numbers of regenerating seedlings of plant species vulnerable to goat browse;
- restoration of riparian (or stream side) vegetation results in an increase of both plant and bird biodiversity; and
- the number of community-led biodiversity projects is increasing.

Biodiversity on land is managed by a number of agencies. The Department of Conservation is the key agency and sets out its programmes in its *Conservancy Management Strategy*. District Plans and the *Proposed Regional Policy Statement* contain policies about biodiversity on private land. The Taranaki Regional Council has prepared a *Biodiversity Strategy* to guide all the various biodiversity actions undertaken by the Council for working alongside landowners to maintain and enhance biodiversity on private land.



Mount Taranaki and ring plain, South Taranaki.

## OUR LAND, SOIL AND BIODIVERSITY

Soil is one of Taranaki's most important resources. The region's rural-based wealth depends on the amount of grass produced which is dependent on the sustainable management of our soils. The region is fortunate to have naturally robust soils that retain their structure, nutrients and organic matter, a product of their volcanic nature. However, good land and soil management is still required to retain this advantage and this has been recognised by the community as a vital step towards seeing a 'prosperous Taranaki', a region that boasts a sustainable, resilient and innovative economy. A prosperous Taranaki was considered as one of the top priorities that Taranaki needs to work on over the next 10 years<sup>1</sup>.

Taranaki has a wide range of soil types, from the fertile well-drained soils on the ring plain and coastal terraces to the steep, erodible and relatively infertile soils of the inland hill country and on the upper slopes of Mount Taranaki. While erosion is a natural process, human activities may increase its rate. Accelerated erosion leads to the loss of the topsoil, and so reduces the land's productivity and capability, as well as lowering water quality, degrading aquatic habitat and increasing the risks of floods from river beds filling up with silt and gravels.

Retaining soil on the land is one thing, but safeguarding the health of our soils is equally important. Soil health refers to the biological,

chemical and physical state of the soil and the maintenance of soil ecosystems. Unlike the impact of accelerated erosion, soil health problems are not immediately evident, but are no less important.

Market forces and policies from both central and local governments have influenced changes in land use patterns. Vegetation change and land use pressures are driven largely by economics and have fluctuated with export prices and past government subsidies – land clearance occurred more frequently in past years when such land development was subsidised. Encouragingly, some of that cleared land, that was never going to be feasible to farm sustainably (economically or environmentally), has been allowed to revert back to scrub, even during times when

the market was relatively buoyant. Current government policies may further accelerate this trend to retire unsustainable land or convert it to plantation forestry through carbon emissions trading schemes which may make economic the retiring or reforestation of steep hill country.

Livestock farming is one example of a land use that has the potential to cause pressures on soil health of the region through soil compaction, nutrient depletion and residual soil contamination. Council investigations confirm that Taranaki has no evident significant or immediate soil health problems with respect to these matters. This is largely attributed to the resilient nature of the volcanic soils of the ring plain, although they can still be susceptible to the long-term effects of soil compaction. The environmental impacts can be short-term and reversible if appropriate stock and land management practices are in place.

Wise management of the land includes not only the management of soil erosion and soil health, but also the management of biological diversity, or 'biodiversity'. Biodiversity describes the variety of all biological life large and small, including micro-organisms, fungi, ferns, trees, plants, insects, and the ecosystems they come from - forests to grass lands as well as the genetic diversity within species.

Biodiversity is important not only from an intrinsic perspective, but also from economic, social and cultural perspectives. Biodiversity provides economic benefits in the form of ecosystem services (such as pollination, soil stability and fertility, and maintaining water



Umutekai bush, a remnant swamp forest, managed within a productive landscape.

<sup>1</sup> Community Outcomes Project Team, 2004. *Future Taranaki: A report on Community Outcomes for Taranaki*.

quality), tourism opportunities, and potential commercial and medical uses. Biodiversity, is significant to the people of Taranaki. It is a key component of a 'sustainable Taranaki', a community outcome which includes the importance of understanding, valuing, maintaining and enhancing biodiversity for future generations. Protecting native bush and wildlife was considered as very important by 70% of people across the region<sup>2</sup>.

Biodiversity is particularly significant to tangata whenua who, through their long occupation of New Zealand prior to European settlement, have a strong relationship to native plants and animals, and to their habitats. This relationship with biodiversity is woven into Māori culture and traditions.

Safeguarding Taranaki's biodiversity is considered important for Taranaki people because some species, habitats and ecosystems exist here and no where else in New Zealand. For example, a native land snail that lives only on Mount Taranaki. Protecting Taranaki's biodiversity is up to Taranaki people who either actively support actions that will safeguard or restore that local biodiversity or conversely, support or make decisions to place pressure on our biodiversity.

The pressures placed on Taranaki's biodiversity stem from a history of human use of our native biodiversity. Before human settlement, native forest covered almost the entire region. The clearance and development of land for farming, particularly on the Taranaki ring plain and fertile river valleys elsewhere, led to the loss of large areas of indigenous vegetation. The most significant loss in indigenous habitat in Taranaki occurred on the ring plain and coastal terraces. Damage to our biodiversity goes well beyond habitat loss. The condition (or quality) of remaining areas of indigenous biodiversity has suffered from the introduction of pest plants, such as old man's beard, and animals such as possums, goats, rats, cats and stoats.

The challenge is to find ways to manage Taranaki's biodiversity within the context of a productive landscape. A carefully managed farm, for instance, with wetlands and forest remnants protected, animal pest species controlled, streams fenced and planted with riparian buffer zones, erosion-prone soils protected and with stocking rates matching the land's carrying capacity, can both restore and enhance biodiversity and be economically and socially sustainable.

### 3.1 SOIL EROSION

#### 3.1.1 WHAT IS THE CURRENT STATE OF SOIL EROSION IN TARANAKI ?

The extent and rate of soil erosion in Taranaki is determined by geology, slope, climate and vegetation cover. Different levels of natural erosion rates in the region are set out in Table 3.1<sup>3</sup>.

Soil erosion impacts on water quality, increases flood risk through rivers filling up with silts and gravels, as well as reducing the general health and productivity of the soil. Land that is susceptible to severe erosion in Taranaki is illustrated in Figure 3.1. The erosion potential of land

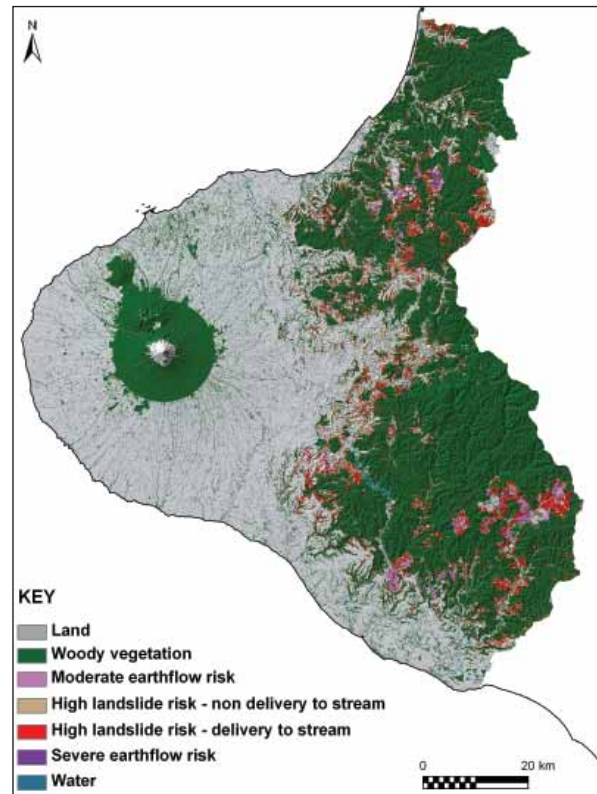


Figure 3.1: Land susceptible to severe erosion in Taranaki.

Table 3.1: Natural erosion rates in the region.

Part of the region	Natural erosion rates	Reasons for accelerated erosion rates
Mount Taranaki	High	Erosion rates may be accelerated where animal pests damage vegetation, although this is managed through the animal pest control programme in Egmont National Park.
Taranaki ring plain and western fringe of the hill country	Low	Any accelerated erosion is insignificant when compared with the long-term soil accumulation beneath vegetation that has occurred in the past, and which has been augmented by volcanic ash during eruptions of the Taranaki volcanoes.
Inland hill country	High	Erosion rates can be accelerated by land use activities – highest in areas cleared for pasture, less in areas planted in plantation forestry and even less in areas that remain bush-clad.
Coastal sand country	Moderate	Erosion rates can be exacerbated by land use activities that expose topsoil to wind causing blow-out and the re-deposition of the underlying sand in localised areas.

2 Community Outcomes Project Team, 2004. *Future Taranaki: A report on Community Outcomes for Taranaki.*

3 Hicks, D.L, 1998. *Soil Erosion in Taranaki – A summary of research findings.* Prepared by Ecological Research Associates for the Taranaki Regional Council.