

Trees and Soil Health

Trees encourage healthy soil as a vital part of farming ecosystems.



Healthy soil is the key to agricultural productivity and the sustainability of farm operations.

Farms rely on productive soil; however, some farming activities can contribute to soil degradation over time. Trees support and improve soil health in multiple ways, including preventing erosion, reducing salinity and enhancing soil fertility.

Soil and agricultural systems

Healthy soil on farms supports agricultural production, while delivering ecosystem services and long term sustainability.

On-farm functions of healthy soil include:

- Providing water and nutrients for plant growth
- Capturing and storing carbon to reduce emissions
- Increasing ground stability to mitigate flood and landslide risk
- Minimising nutrient run-off into waterways for improved water quality
- Reducing landscape degradation through erosion and salinity
- Lowering required input costs by encouraging efficient nutrient use.

A range of factors can indicate the health of soil, including texture, nutrients and moisture levels.

Degraded soil in agricultural landscapes typically presents itself in the form of:

- Eroded land
- Loss of organic matter
- Increased salinity
- Chemical contamination.

How trees support soil health

EROSION

Some of the leading causes of soil erosion are wind and rain. Trees offer physical protection from both, playing a vital role in preventing the loss and degradation of soil.

RAIN EROSION

Rainfall displaces farmland soil through raindrops (splash erosion), surface flow (sheet or gully erosion) and subsurface flow (tunnel erosion). This can also contribute to 'runoff', where nutrients and sediments flow into, and pollute, nearby waterways.

Tree foliage and dropped organic matter – such as leaves, twigs and branches on forest floors – intercept rainfall and provide a protective layer against water penetration and erosion. Trees and dense foliage also act a physical barrier to prevent the flow of water down slopes; while tree roots bind and stabilise soil, to minimise the risk of landslips.

WIND EROSION

Wind can carry soil particles away, physically damaging crops and causing the loss of fertile top soils, which hold the majority of essential nutrients.

A well-designed planting that includes a mixture of trees and dense vegetation provides shelter, which helps to control wind speed and prevent the loss of top soils. Dropped organic matter from trees can also offer a layer of physical protection.

FERTILITY

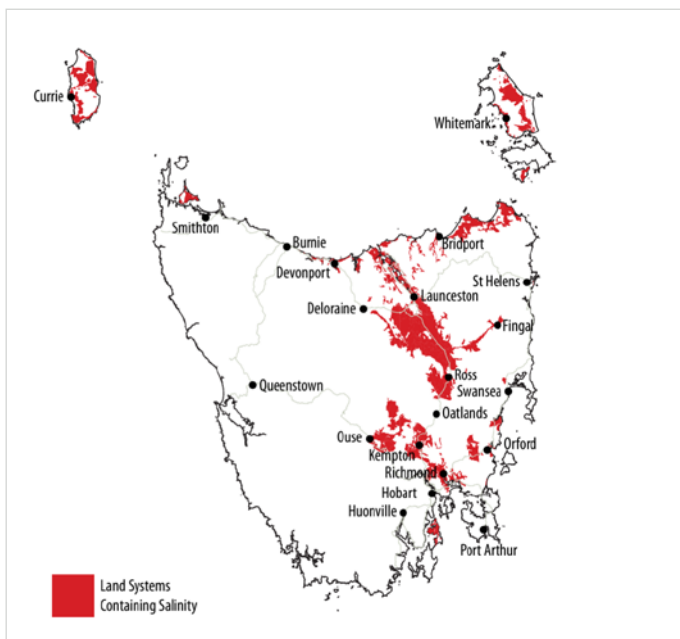
Agriculture activities such as cropping and grazing can contribute to a nutrient depletion in soil, which in turn reduces growth and production rates.

Trees maintain and improve soil fertility by increasing nutrient inputs (e.g., from dropped organic matter) and reducing nutrient losses (e.g. by preventing erosion and run-off).

Organic matter dropped from trees – such as leaves, twigs and branches – falls to the ground and decomposes to release nutrients. Tree roots also contribute to the take-up of nutrients from a weathering process that facilitates soil formation deep in the ground.

Where soil is degraded, carefully selected tree species can be integrated into farm landscapes to replenish soil nutrients. Known as ‘fertiliser trees’, these species can inhabit poor soils where other trees are unable to grow, and transfer nutrients such as nitrogen from the air into the soil.

Trees can also provide vital habitat for beneficial animals that support soil health. This includes decomposers such as dung beetles, which relocate dung and bury it, incorporating essential nutrients into the soil.



Private freehold land in Tasmania that contains areas affected by salinity. Source: NRM North, Salinity Glove Box Guide

SALINITY

Salinity on farms occurs when water (from rainfall and irrigation) leaks downwards into groundwater, causing watertables to rise. Salts in the water then move upwards to the soil surface and may run-off into waterways, which can significantly impact landscape health and productivity.

Salinity is far easier to prevent than to treat. Trees are vital tool in preventing salinity, as roots intercept and uptake water, which reduces leakage and controls watertable levels.

Landholders should monitor for signs of salinity through visual observation and/or soil testing. Indications of salinity includes:

- Bare areas, patchiness or signs of erosion
- Waterlogged soil or soil with dark greasy patches
- Visible salt crystals in soil or stock licking surface soil
- Poor growth or high mortality of crops and trees
- Growth of salt-tolerant indicator species such as Sea Barley Grass (*Hordeum marinum*), Buck’s Horn Plantain (*Plantago coronopus*), and Water Buttons (*Cotula coronopifolia*)
- Soil and water sampling results demonstrating high salt content.

Salinity is most common in areas where annual rainfall levels are less than 800mm and evaporation rates are very high. It can, however, occur anywhere. Landholders can check the government tool, LISTmap, which includes a layer showing salinity levels across Tasmania.

Term	Definition
Watertable	The surface below which all spaces are filled with water
Groundwater	The saturated zone below the watertable
Leakage	Water that moves downward past plant root zones
Groundwater recharge	Water that enters the saturated groundwater zone
Groundwater discharge	Water that leaves the saturated groundwater zone, which can occur as evaporation, seepage or evapotranspiration.

Salinity terms of reference

Keeping on top of soil health

Landowners should monitor the health of their soil over time, as changes often happen incrementally and can be hard to notice. Strategies include:

- Monitor water flows – find out where water collects and flows on your farm, as these areas are most vulnerable to erosion
- Take photographs – taking regular photographs once or twice a year will help to highlight groundcover changes and indicators of erosion or salinity
- Test your soil – taking soil samples and testing at a laboratory can provide information on nutrient levels, salinity and overall soil health.

To access support in monitoring soil health and responding to issues, visit the Directory of Tasmanian Forestry Services at treealliance.com.au.

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Next Step



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