

Preventing and managing salinity

When dealing with salinity it is important to keep in mind that many assets (natural or built) have varying levels of tolerance to increases in salinity. Therefore the value and the context of the asset at risk must be considered.

We use 2 main terms when assessing whether salinity may be a problem:

- salinity hazard—the inherent characteristics of the landscape that predispose it to land and water salinity
- salinity risk—the probability that land or water salinity may develop if certain management practices or land-use changes occur.

Assessing salinity risk

The Salinity Risk Assessment Framework (Grundy et al. 2007¹) is the preferred method to assess salinity risk in Queensland. It uses multiple lines of evidence to assess whether salinity will occur and what impact it could have on an asset.

The 4 components of the risk assessment are:

- biophysical hazards—the inherent features of a landscape that may contribute to salinity processes
- management influences—the level of risk due to land management practices
- salinity stage—the progression of salinity processes in the landscape and the amount of time before salinity may impact on an asset
- assets—the value of the asset under threat.

Salinity risk assessments have been undertaken in 4 catchments across Queensland:

- Strategic Salinity Risk Assessment in the Condamine Catchment
- Salinity Risk Assessment for the Fitzroy Basin
- Salinity Risk Assessment for the Queensland Murray–Darling Region
- Burdekin Dryland Salinity Project (undertaken by [NQ Dry Tropics](#)).

The first 3 documents referred to above are available from the [library catalogue](#).

Methods of prevention

In high-risk areas:

- monitor groundwater levels and the amount of salt in the land and water
- encourage preventative actions to stop salt moving towards the surface
- stop further loss of deep-rooted native vegetation in high-risk areas as well as areas that contribute groundwater to them.

In at-risk areas:

- retain and regenerate native vegetation
- avoid building dams at sites where the water table is high
- locate roads along ridges where disruption to water tables will be minimal
- site houses (and septic systems) away from areas with high water tables
- maintain good pasture cover through conservative stocking rates
- adopt cropping practices that minimise deep drainage.

Testing and monitoring salinity

Monitoring bores, windmills or piezometers can be useful to assess changes in groundwater level, although levels can vary with seasonal and land-use changes. These instruments can also be used to determine the direction of groundwater flow and the estimated flow capacity of the aquifer material.

Depth to the water table can be measured using a tape measure and bell shaped plover. A plover can be an old valve from an engine or a similar object with a concave face. It should make a sound when it strikes the water surface.

Soil and water **testing** is necessary to confirm a salinity problem. A variety of meters can measure [electrical conductivity](#) but detailed soil tests should be done through registered soil testing laboratories to determine the concentration of a range of salts. Take a 500g sample for testing from representative areas across the site. Repeat this exercise for the subsoil.

Water analysis can provide information on the likely sources of groundwater recharge, which is an important consideration when developing management strategies. When doing a water analysis, collect at least 500ml of water in a clean bottle.

Units

Conductivity varies with the type of salt. Salinity is caused by a range of salts made up of [cations](#) (e.g. sodium, calcium and magnesium) and [anions](#) (e.g. chlorides, bicarbonates and carbonates).

The preferred unit for electrical conductivity is deciSiemens/metre (dS/m).

Conductivity values (for a soil saturation extract) may vary from 0.1dS/m (low salinity hazard) to 9.0dS/m (very high).

The conversions in table 1 are based on the estimate that 670mg of a mixture of salts in 1L of water will have a conductivity of approximately 1dS/m.

Table 1. Conversion factors—Conversion table for measurements of soil and water salinity

Soils and water salinity units	dS/m	mS/cm	µS/cm	mg/L or ppm	grains/gal
deciSiemens per metre (dS/m)	–	1	1000	670	40
milliSiemens per centimetre (mS/cm)	1	–	1000	670	40
microSiemens per centimetre	0.001	0.001	–	0.67	0.04

Table 1. Conversion factors—Conversion table for measurements of soil and water salinity

Soils and water salinity units	dS/m	mS/cm	µS/cm	mg/L or ppm	grains/gal
(µS/cm)					
milligrams per litre (mg/L) or parts per million (ppm)	0.0015	0.0015	1.5	–	0.06
grains per gallon (grains/gal)	0.02	0.02	20	14	–

Example: To convert dS/m to mg/L multiply it by 670—i.e. 7 dS/m = 4690 mg/L

Managing salinity

Managing salinity involves striking a balance between the volume of water entering (recharge) and leaving (discharge) the groundwater system.

The [water table](#) can be lowered by:

- planting, regenerating and maintaining native vegetation and good ground cover in recharge, transmission and discharge zones, where possible
- using more groundwater in recharge areas by pumping water from bores and redirecting it to other storages
- installing bores and interceptor drains in discharge areas—water of suitable quality can be used to irrigate adjacent areas
- installing sub-surface drainage

- maximising cropping opportunities and minimising fallow land.

Salinity Management Handbook

The [Salinity Management Handbook](#) provides a comprehensive description of salinity processes and management in Queensland landscapes.

It addresses many of the questions land managers and advisers ask about salinity.

The handbook is split into 3 sections:

- understanding salinity
- investigating salinity
- managing salinity.

The handbook has been provided in sections to enable faster download and as a complete PDF to facilitate printing.

Salinity Management Handbook in sections

- [Contents and foreword](#)

Understanding salinity

- [Chapter 1—Salinity and sodicity](#)
- [Chapter 2—Hydrologic controls on salinity](#)
- [Chapter 3—Salinity and hydrology management](#)

Investigating salinity

- [Chapter 4—Features of salinity investigations](#)
- [Chapter 5—Measurement techniques and relationships](#)
- [Chapter 6—Landscape characteristics and salinity mapping](#)

- [Chapter 7—Vegetation](#)
- [Chapter 8—Climate and rainfall patterns](#)
- [Chapter 9—Soils](#)
- [Chapter 10—Waters](#)
- [Chapter 11—Water quality](#)
- [Chapter 12—Human activities](#)

Managing salinity

- [Chapter 13—Management issues](#)
- [Chapter 14—Vegetation management](#)
- [Chapter 15—Engineering methods](#)
- [Chapter 16—Irrigation management](#)

End matter

- [Appendixes](#)
- [References, glossary and index](#)
- [Useful conversions and relationships](#)

If you experience difficulty downloading any of these documents, or would like a copy sent in the mail please email soils@qld.gov.au.

Read more

- [Managing dryland salinity on your property](#) (PDF, 192KB)
- [Managing salinity with vegetation](#) (PDF, 416KB)
- [Managing salinity with engineering](#) (PDF, 74KB)
- [Brymaroo catchment—salinity case study](#) (PDF, 175KB)

¹ Grundy MJ, Silburn DM, Chamberlain T (2007). A risk framework for preventing salinity. *Environmental Hazards*. 7: 97–105.

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