Salinity in Queensland

Salinity is the presence of salts such as sodium chloride, magnesium and calcium sulfates, and bicarbonates, in soil and water.

Salinity is a major threat in many parts of Australia including Queensland. Its harmful effects include lost agricultural production, stream salinity and damage to infrastructure, urban households and environmental costs.

Saline soils occur naturally in parts of coastal, south-west and northern Queensland. However, salinity is induced by unsuitable land management practices.

Extent of the problem

A 2001 survey in Queensland estimated 48 000 hectares of land were seriously affected by induced salinity (Figure 1).

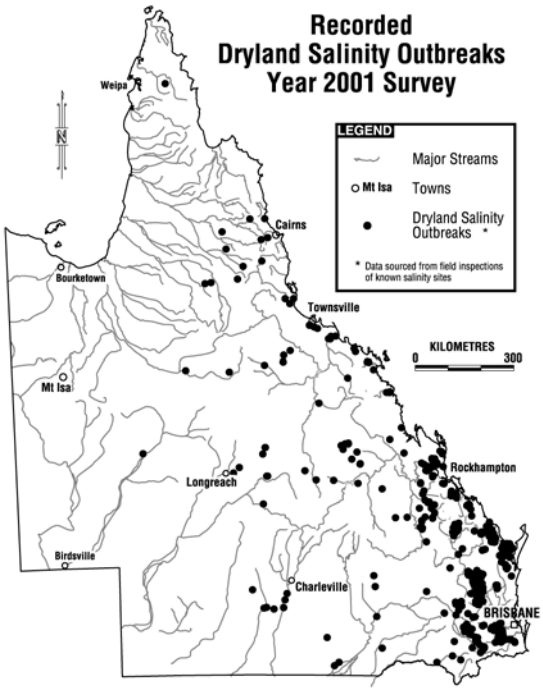

Figure 1. Location of salinity outbreaks

The most affected areas in Queensland are coastal or sub coastal—generally associated with basalt or granite geology, where the average annual rainfall is 400–1200 millimeters.

An assessment undertaken for the National Land and Water Resources audit found 3.1 million hectares of land in Queensland could be affected by salinity by 2050. Under the National Action Plan for Salinity and Water Quality a salinity hazard mapping program has completed hazard maps for priority catchments:

- Burdekin River catchment and adjoining coastal plains
- Burnett Mary and western catchments of South East Queensland
- Fitzroy Basin
- Murray-Darling Basin.

The risk of salinity in Queensland may be lower than that for southern states because its summer dominant rainfall ensures high rates of water-use through evaporation andtranspiration, rather than as deep drainage (water seeping through the soil profile into groundwater flows).

The geology and soil types in many areas are also less conducive to the development of salinity.

Localised areas of salinity due to rising watertables have occurred under irrigation around Emerald, Bundaberg, Mareeba, Ayr, Proserpine and Theodore.

Poor quality irrigation water has led to some salinity problems in the Lockyer valley and the Darling Downs. In recent years there has been an increase in the irrigation of soils derived from geologically old marine basins that are naturally high in salts.

Factors contributing to salinity

The likelihood of salinity problems developing can be affected by soil types, rainfall, topography and location within a catchment. Figure 2 shows the three zones of groundwater movement in a catchment.

The upper catchment is the intake or recharge zone—rainwater either runs off or soaks into the soil. Water that is not used by plants in the intake zone enters the groundwater system and passes through the transmission zone in the mid slope area.

Where the watertable is high, groundwater may seep onto the soil surface at discharge areas. Salts occurring naturally in soils and groundwater may also move towards the soil surface by capillary action. Surface evaporation and use of water by plants concentrates these salts in the root zone.

In uncleared catchments, deep rooted trees use much of the rainfall, and the watertable lies well below the surface. When shallow rooted crops and pastures replace trees, deep drainage increases and the watertable may rise.

A high salt level in soil adversely affects plant growth, and in some cases the structure of the soil. Salts may enter streams via spring flow or when run-off removes salts previously deposited on the surface by evaporation.

Tree clearing can result in a rise in groundwater levels with salts being concentrated at the soil surface by evaporation.

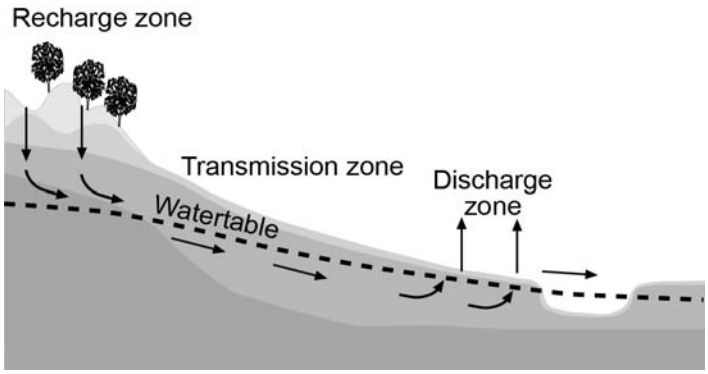

Figure 2. Model showing recharge, transmission and discharge zones

Irrigation can lead to salinity if water with high salt levels is used or if the excessive use of water, (particularly from surface waters) results in a rise in the watertable.

The inappropriate siting of off-stream water storages and their leaking may also contribute to salinity.

Salinity indicators

Salinity may become apparent over a long period of time or may occur as an outbreak after extended periods of rainfall. It is important to monitor the changes in land salinity in order to assess the resource condition—look for the following indicators:

- rising groundwater levels in bores
- ground surface becoming permanently/seasonally damp, waterlogged or remaining damp after extended rain
- intermittent streams flowing for longer periods
- dieback of vegetation in low-lying areas, or plants failing to germinate or grow
- areas of bare soil or an increase in salt tolerant plants growing on the area

- changing pasture composition and reduced diversity with couch grass and other salt tolerant plants dominating
- buildings affected by rising damp
- deterioration in surface and groundwater quality
- road deterioration and crumbling.

Prevention and control

Managing salinity requires a combination of options, which aim to achieve a balance between the volume of water entering the groundwater system (recharge) and the volume of water leaving the groundwater system (discharge).

Different management options exist for the three zones of water movement shown in Figure 1.

Lowering the watertable can be achieved by:

- planting, regenerating and maintaining native vegetation and good ground cover in recharge, transmission and discharge zones
- increasing groundwater use in recharge areas by pumping water from bores and using drainage to redirect water to other storages
- installing bores in discharge areas—water of suitable quality can be used to irrigate adjacent areas
- installing sub surface drainage
- maximising cropping opportunities and avoid fallowing land.

Other methods of preventing salinity include:

- avoid building dams at sites where the watertable is high
- locating roads along ridges where disruption to watertables will be minimal
- siting houses (and septic systems) away from areas with high watertables
- maintaining good pasture cover by conservative stocking rates.

Further information

This and other science notes are available from the Queensland Government website www.qld.gov.au – search ‘science notes’. For further information about this science notes series phone **13 QGOV** (13 74 68) – ask for science notes – Land series L51.

For further information on salinity in Queensland visit < http://www.qld.gov.au/environment/land/soil/salinity/> or email soils@qld.gov.au.