What is salinity?

Salinity means ‘saltiness’, or how salty something is. When the term is used in reference to the environment, it means how much salt is in the soil, waterways and ground water. In Australia, salt has built up in some places to damaging levels. Salinity is now one of Australia’s biggest environmental problems. It has already affected at least 2.5 million hectares of farmland, as well as many towns. Salinity has also affected freshwater rivers. This causes serious problems for towns that rely on rivers for their drinking water.

Types of salinity

Australia is affected by three types of salinity:

- dryland salinity, which occurs in rural areas, and is caused by land clearing
- irrigation salinity, which also occurs in rural areas, and is the result of continued watering, or irrigation, of crops
- urban salinity, which occurs in cities and towns, and is caused by a combination of land clearing and over-watering.

Of these, dryland salinity is by far the most widespread.

Signs of salinity

Salinity is often called the ‘white death’, because it leaves behind large areas of white crystallised salt. Areas affected by salinity are also often dotted with dead, white tree trunks. Other less dramatic signs of salinity include areas of waterlogged soil in paddocks; and paddocks that are dried-out in places, while remaining green in others. Plant growth is another good indicator of salinity. Plants affected by salinity are slow to grow and look unhealthy. They also suffer from dieback, which is when plants die from the branches or shoots back towards their main trunk or stem.

Cattle and sheep can also indicate if an area is affected by salinity. These animals like some salt in their diet, and you might find them licking or digging up the soil in an area affected by salinity.

Salinity may leave its mark on buildings and other structures, too, such as roads and bridge supports. It can leave white salt traces, which, if left untreated, eat away at these structures, causing them to break up. Salinity can create holes the size of a fist in brick houses.

Australia’s salinity hot spots

Every Australian state and territory has a salinity problem. The areas hardest hit include southeastern Western Australia and large areas of the eastern states, including central and western Victoria, southeastern South Australia, and southern New South Wales. The map below shows the regions where salinity is an urgent issue.

Salinity snapshot

- Around 2 million hectares of agricultural land are affected by salinity.
- Some 800,000 hectares of this land are no longer able to be used for agricultural production.
- Western Australia is the state most affected by salinity, with 7000 farms and 1.2 million hectares affected.

Dryland salinity

This diagram shows how the water cycle and land clearing affects the level of ground water and the amount of salt in the soil.

The water cycle and dryland salinity

Healthy landscape

- Trees use ground water and rainfall, keeping the watertable at a normal depth.
- Evaporation
- Surface runoff is minimal.
- Transpiration
- Water infiltration is moderate.
- Low watertable does not bring salts to the surface.
- This is a healthy environment for agriculture.

Dryland salinity

- There are no trees to use rainfall or ground water.
- Evaporation
- Surface runoff is high.
- Saline waterlogging
- Lack of vegetation and high runoff cause erosion.
- Water infiltration is high.
- Ground water levels rise, bringing salts towards the surface, killing existing vegetation.
- Stream becomes saline. This is a poor environment for agriculture.
- The watertable meets the surface, causing salinity and waterlogging.
Salinity and water quality

Salinity levels have a huge impact on the quality of water available for drinking, domestic, industrial and agricultural use. This is because when saline ground water rises it does not just affect the land, it flows into rivers and other water sources as well. Ground water that runs into surface water is called baseflow.

Salt that has been brought to the Earth’s surface by ground water is also washed into rivers when it rains. This is called washoff. In areas that use irrigation, leftover water from irrigation can also drain back into rivers, carrying salt from the ground. All this further increases the salinity levels of the rivers. Throughout Australia, organisations have been formed to combat water salinity.

Water authorities
The North Central Catchment Management Authority (NCCMA) and the Murray–Darling Basin Commission (MDBC) are two of the many bodies formed to combat water salinity. The NCCMA is dedicated to improving the condition of Victoria’s waterways, including the Avoca, Avon, Campaspe, Murray and Richardson rivers. The MDBC is dedicated to saving the Murray and Darling rivers from salinity and other environmental problems. It is a partnership between the South Australian, Victorian, New South Wales and Queensland governments and the federal government.

Case study: The Murray–Darling Basin
The Murray–Darling Basin is an enormous area of 1,060,000 square kilometres that runs across Queensland, New South Wales, the Australian Capital Territory, Victoria and South Australia. It encompasses the river system of the Darling, Lachlan, Murray and Murrumbidgee rivers and the areas that surround them. This important area supports 11 per cent of Australia’s total population. The Murray and Darling rivers are the lifeblood of the eastern states of Australia, and South Australia. The Murray River is Australia’s most important source of fresh water.

The Murray–Darling Basin is a naturally saline environment. In 1829, Charles Sturt (the first European to discover the Darling River) recorded that he could not drink the water in the Darling because it was too salty. The salts come from ground water, the weathering of rocks and precipitation.

The Murray–Darling Basin is affected by both irrigation and dryland salinity. Over the past 100 years, at least 15 billion trees have been cleared from the Murray–Darling Basin. As a result of this, ground water levels have been rising, and this is increasing the salinity of the rivers in the basin.

The Murray River is a regulated river, which means that people control how the river flows. During the 1920s, dams were built along the river to control the river’s flow by storing and releasing its water. Almost 80 per cent of the river’s flow is used by people, mostly for irrigation. This has two effects on salinity. First, the water that is diverted from the river for irrigation is redistributing salt across the landscape. Secondly, diverting water away from the river causes the Murray to be in drought more often than it would be under natural conditions. When the river is in drought, the flows of water in it are very low. There is a clear relationship between river flow and salinity levels – the lower the river flow, the higher the level of salt.

Over the next 20 to 30 years, at current levels, salinity will increase to a point where water from the Murray–Darling Basin will be outside World Health Organization recommended levels for drinking water for much of the year.
How you can help combat salinity

We can all help stop the spread of salinity, whether we live in the country or the city. Here are some ideas.

* Take a look around your local area to see if there are any creeks, rivers, parks, paddocks or vacant council land that could do with some tender loving care. Contact your local Landcare group and ask them to organise a community action day to clean up and revegetate the area. If there is not a Landcare group in your area, see if you can start one yourself!
* Encourage people to water their gardens wisely. In 2007, much of Australia was under water restrictions, which meant that gardens could only be watered once or twice a week and only early or late in the day. In fact, we should be doing this all the time, even when dams are full and there are no water restrictions. This stops over-watering, and so helps to keep the watertable low and prevent salinity.
* Encourage your family, friends and neighbours to plant more native trees and plants in their home gardens. The natives, with their longer roots, are able to take their water from the watertable instead of having to be watered. This helps to keep the watertable low and prevent salinity.

Native plants in home gardens reduce salinity because their long-root system feeds off existing ground water and stops the watertable from rising.

* Write to your local council and tell them you would like them to be more salt conscious. Ask them to make sure that native vegetation is planted in any parks or gardens they set up, and that native plants are included in the plans for new building projects.
* Ask your school principal if any ugly or under-used parts of the school ground can be converted into native gardens. You could also ask for student volunteers to make the gardens, if permitted. Consider ways of letting others know why the project is being undertaken.
* Read up on the types of native plants that are suitable for your area so that next time you go to a garden nursery with your family or friends, you can tell them about the beautiful natives they could buy instead of more traditional imported plants.
* Lobby your local council to replace old terracotta or metal underground pipes with plastic piping. Doing this helps stop water leakage through broken or corroded pipes.