www.savethemurray.com
SAVE THE MURRAY

Save the Murray

The Savethemurray Project Manager
Phone: +61 8 8226 4402 Email: info@savethemurray.com
PO Box 75 West Richmond, ADELAIDE SA 5033

Salinity

Salinity is basically the amount of salt in water. Technically, it is a measure of the concentration of dissolved salts in solution (measured as milligrams per litre or EC units). An EC or electrical conductivity unit refers to the capacity of medium (for example water) to pass an electric current.

Where does salt come from?

The salt in the Murray-Darling Basin is not the same as the salt on your table at home! Many different types of salts occur naturally in the environment. Salt is a natural feature in many Australian landscapes including the Murray-Darling Basin.

Salts have accumulated over the past 65 million years through cyclic changes in sea-level and the natural processes of weathering and erosion combined with wind-blown salt from other areas. The natural features of the Basin, being flat terrain with a low rainfall and high evaporation, combine with land uses such as irrigation to concentrate salt in the soil and groundwater of the Murray-Darling Basin.

The increasing levels of salts in the rivers and landscape of the Murray-Darling Basin is being driven by rising groundwater levels. Existing land practices such as irrigation and land clearing are contributing to the mobilization of salt stored in sub soils and bringing it to the soil surface or sometimes carrying it sideways into waterways. It is important to understand that rising groundwater tables do not automatically cause salinity problems. The wide distribution of salty sub soils throughout the Basin means that in practice, rising groundwater tables indicate a high likelihood of increased salt mobilization.

The development of irrigation along the Rivers, the construction of water control structures and additional leakage from basins accepting saline drainage water from irrigation areas have contributed to elevated groundwater levels in much of the Murray-Darling Basin, and consequently, increased salty groundwater discharge into the River itself.

When groundwater levels are close to the soil surface, capillary action carries salt upward to the plant root zone causing land to become saline. Streams and rivers become saline when salt is washed from the soil surface or where groundwater levels with high salt loads begin to permanently intersect with the base of the stream or river. This process dramatically increases water salinity levels.

Clearing and replacing of deep-rooted native trees and grasses with shallow-rooted annual crops and pastures have meant that naturally occurring salts are brought to the surface with rising water tables. As a result, the water-table gradient tends to drive groundwater towards the River.

The effects are not just economic, but environmental too. Rising salinity in the water and soils, changes the habitats of native flora and fauna, many of which may not cope with increases in salinity levels.

Causes of increased groundwater levels and salinity

- Removal of deep rooted native vegetation
- Replacement with shallow rooted annual crops and pastures
- Inefficient and excessive irrigation
- River regulation

LAST UPDATED 29.06.2007

www.savethemurray.com
SAVE THE MURRAY

Save the Murray

The Savethemurray Project Manager
Phone: +61 8 8226 4402 Email: info@savethemurray.com
PO Box 75 West Richmond, ADELAIDE SA 5033

Salinity Continued

Fig 1. Showing natural state of a river bank with deep rooted trees and ground water below the layer of historical salt

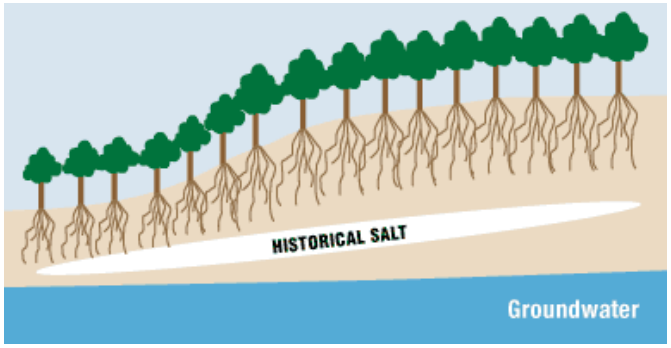


Fig 2. Showing shallow rooted crops or pastures, subsequent rise in water table, mobilising historical salt and causing groundwater movement towards river

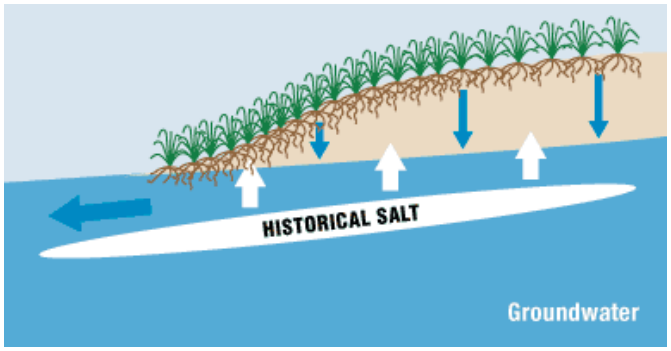
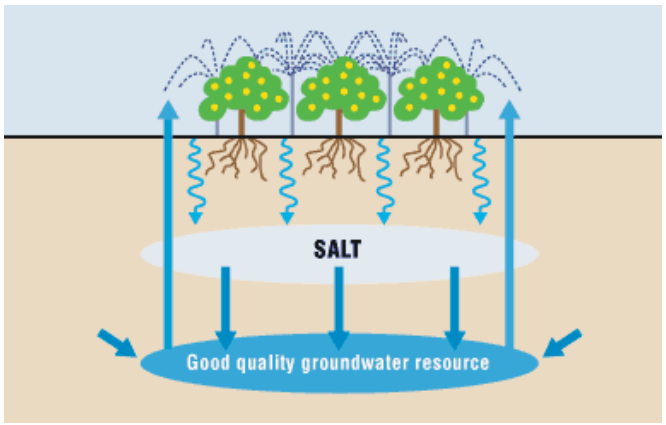


Fig 3. Showing the effect of irrigation, adding excess water to the surface, filtering through the salt layer and increasing the salinity of the groundwater



Why is salinity a problem?

Increasing salinity in the environment is a problem for a number of reasons. It can impact on crops, reducing yields and can cause the loss of orchard trees. Much of Australia's economy relies on the Murray-Darling Basin and the crops it produces. Irrigators will bear the greatest individual economic losses from increasing salinity in the River.

What are the predictions for increased salinity?

The consequences of rising salinity are serious. Without action we could see serious and long lasting impacts in the near future:

- Reduction in water resources
- Reduction in agricultural land
- Damage to urban infrastructure
- Constraints and losses to industry
- Reduction in biodiversity
- Reduction in aesthetics of the landscape

From the 1999 Murray-Darling Basin Ministerial Council Salinity Audit, it was predicted that without radical changes to land and water management in the Murray-Darling Basin:

- 3 to 5 million hectares of land will become salinised by 2100.
- Salinity in the lower Murray will increase by 50% by 2050 (exceed the 800 EC threshold for desirable drinking water quality in the next 50-100 years).
- Average salinity at Murray Bridge will be 980 EC by 2100, a rise of 390 EC.
- Agricultural productivity decline and infrastructure losses in the Basin will be costing $1 billion per year by 2100.

LAST UPDATED 29.06.2007

The Savethemurray Project Manager
Phone: +61 8 8226 4402 Email: info@savethemurray.com
PO Box 75 West Richmond, ADELAIDE SA 5033

Salinity Continued

- Increase in economic impacts - the cost of one EC unit increase in river salinity at Morgan lies in the range of $93,000 to $142, 000 per year.
- Increase in dryland salinity from the current 68,000 hectares to 116,000 hectares by 2050.
- Floodplain salinity will increase from 25,000 hectares to 40,000 hectares (mostly adjacent to highland irrigation areas).

What is the cost of salinity?

Economic
- Salinity costs $47 million per year to the users of River Murray water. Unchecked, salinity could have an annual cost of $1 billion within 100 years
- Agricultural losses

Environmental
- Changes to water quality in the river
- Continued decline of trees
- Reduction in biodiversity, both water and land based
- Habit changes
- Loss of wetlands and floodplains

Social
- Rural communities economically affected through reduced productivity
- Recreational activities threatened
- Archaeological resources threatened
- Loss of native flora and fauna

What is dryland salinity?

Dryland salinity is when soils become affected by rising salts in the groundwater. In some areas, dryland salinity renders soils useless for agriculture as the salts cause plants to wither and die. Dryland salinity is the result of clearing deep-rooted plants and replacing them with shallow-rooted annual crops and pastures. These shallow rooted crops are inefficient in their use of rainfall, allowing much of it to escape beyond the root zone to the groundwater system below. This is in contrast to deep-rooted native vegetation that only allows small amounts of annual rainfall past the root zone. This excess recharge of water below the root zone causes the saline ground water to rise, bringing it in contact with roots of crops.

What will be the effect on urban users?

As salinity increases, its taste becomes detectable and water becomes harder, increasing the amount of soap and detergent required for washing. Also, saline water increases the rate at which pipes and fittings corrode, thus increasing maintenance costs. As water resources and quality depletes, the future could see urban users paying more for their water as it may have to undergo more treatment.

What is being done?

There are numerous projects being conducted with the aims to combat salinity. The Murray-Darling Basin Commission has developed the Basin Salinity Management Strategy, which provides a framework for State salinity strategies and catchment management strategies. In 2000, The Federal Government launched the $1.4 billion National Action Plan on Salinity and Water Quality. The plan is based on a regional approach and is backed up by advances in mapping and land management.

New technologies in irrigation are being introduced to improve efficiency and reduce the impact of irrigation on water resources and the associated problems with salinity.

What can I do?

The easiest and most effective way to combat salinity is to assist your local Landcare or community group to plant more native trees, shrubs and grasses. Native trees have much deeper root systems than crops and pastures. They act by sucking up the groundwater before it reaches the salt. Revegetation is also important for our native animals as it provides important habitat. In urban areas, you can help by planting native plants in your garden, they require less water and give our native birds and bugs somewhere to live and something to eat.