OVERVIEW OF RIVER MURRAY SALINITY AND IRRIGATION

Salt is a natural part of the Murray-Darling Basin with more than 100 billion tonnes held within groundwater systems. The River Murray is the natural drainage point for these groundwater systems.

Some salinity in the River Murray is due to natural causes. However, the clearing of native vegetation and the development of agriculture across the Basin have increased saline groundwater discharge to the River Murray. River regulation and increased water extraction have also changed river flow patterns. This combination of factors have caused salinity levels to increase.

High salinity levels can reduce crop yields, corrode and damage infrastructure, reduce the suitability and palatability of water for human use and intensive livestock production, degrade floodplain and wetland systems and affect recreational, tourism and cultural heritage values.

As it is not feasible to completely revegetate the catchment and irrigated agriculture is vitally important to the State's economy, ongoing management is needed to keep salinity levels in the River Murray at acceptable levels.

How are River Murray salinity and irrigation related?

The flow of irrigation water into the groundwater system increases the discharge of salt into the river and floodplains (Figure 1).

Groundwater mounds grew significantly in the 1970s to early 1990's due to excessive drainage under irrigation areas.

Today advances in irrigation technology mean that significantly less water drains below irrigation areas. However, there is still an impact particularly as leaching is needed to remove salt from crop root zones.

In some areas the regional groundwater table can be far below the land surface, 100 metres in some cases, and the movement of salt to groundwater and then to the River may take decades to occur.

Without further intervention, salt loads from irrigation are predicted to increase from 560 tonnes per day in 2015 to 850 tonnes per day in 2050 and 1,000 tonnes per day in 2100.

How is salinity managed?

South Australia works with the other Basin jurisdictions to manage salinity under the Basin Salinity Management 2030 (BSM 2030) Strategy and the Murray-Darling Basin Agreement.

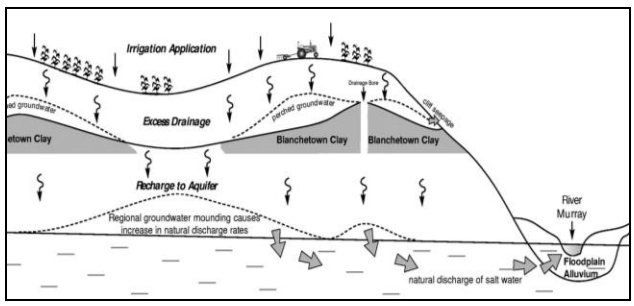

Figure 1: Effect of irrigation drainage on saline groundwater discharge

All Basin states are responsible to ensure that their overall impact on the river is neutral or positive. Actions which increase salt in the River Murray must be offset with actions that decrease salt.

The need to achieve this balance is reflected in South Australian Government policies and programs that support irrigated agriculture while also minimising and offsetting additional salt entering the River Murray.

Key elements of salinity management include:

- improvements to irrigation efficiency by South Australian irrigators;
- salt interception schemes which, across the Basin, divert on average, about 400,000 tonnes of salt per year away from the river;
- State policies and programs like the salinity zoning policy; and
- returning additional environmental water to the River under the Basin Plan.

How do we measure salinity impacts from irrigation?

Basin governments use groundwater models to estimate the long term salinity impacts of irrigation development and other actions which increase salinity into the River Murray.

Data and information about irrigated area, leaching estimates, groundwater volumes and salinity levels, water flow through groundwater systems and measurements of River Murray salinity levels (Figure 2) are all key inputs to the groundwater models and are also used to test model outputs against real-time observations.

Drainage under irrigated areas is represented in models by applying historical and current irrigation drainage rates onto mapped historical and current irrigation areas. A drainage rate of 100 mm/y has been adopted for most current irrigation areas in groundwater models, which is based on average water use efficiency of 85% across a range of crop types.

New information and data is regularly collected and groundwater models are updated to incorporate new information and best available scientific knowledge prior to undergoing independent expert review and accreditation by the Murray-Darling Basin Authority.

For example, extensive groundwater monitoring has been carried out since 1965 to better understand processes such as regional groundwater flow, drainage beneath irrigated areas and groundwater responses to salt interception schemes.

Figure 2: Conducting a Run-of-River salinity survey