

# Understanding the groundwaters of the Murray-Darling Basin

Water for a Healthy Country Flagship

Factsheet 6 of 7, 2010

National Research  
**FLAGSHIPS**  
Water for a Healthy Country



CSIRO is conducting groundwater research and analyses in the Murray-Darling Basin to support regional groundwater sharing and allocation plans and groundwater planning for the Basin.

The Murray-Darling Sustainable Yields project, delivered by CSIRO in 2008, was the largest study of its type and revealed the importance of groundwater systems for future water planning. In collaboration with consultants Sinclair Knight Merz (SKM), the project provided a Basin-wide perspective of groundwater use, potential and issues.

More recently, CSIRO has again partnered with SKM to support the Murray-Darling Basin Authority's (MDBA) planning process for integrated management of the Basin's water resources.

## An important resource

While groundwater forms 15 to 20 per cent of the current extraction in the Murray-Darling Basin, the relative use varies greatly around the Basin and is of much greater significance in the Darling Basin. During drier periods, its relative importance becomes greater and is important for regional economies during these times.

Most of this groundwater use is for irrigation of small areas on the alluvial plains of the Lower Murrumbidgee, Namoi, Condamine, Murray Basin and other river valleys.

Entitlements in six of the major groundwater systems in New South Wales have been reduced in recent years because of over-allocation.

Outside of the major groundwater use areas groundwater can often be more saline or difficult to access. For many of these areas, there is no groundwater plan or administration.

The total groundwater extraction in the Basin has increased since 1990



> Groundwater use across the Murray-Darling Basin becomes particularly important for regional economies during periods of drought.

for various reasons, including the additional security during the extended dry period, the Murray-Darling Basin Ministerial Council's 1995 Cap on surface water diversions, and increased confidence in using groundwater:

## Groundwater resources: difficult to assess and manage

Data, models and expertise exist for areas of greatest groundwater use, but data for other areas is often sparse. Changes in groundwater levels are much harder to measure than surface water. While water levels can be monitored, the amount of groundwater movement is dependent

on the material through which it flows. Because of this, sustainable groundwater extraction limits are difficult to assess.

Historically, groundwater limits were set using a 'safe yield' concept, where up to 100 per cent of the recharge may have been extracted. This has since been shown to be a flawed concept as extraction close to 100 per cent can have major impacts on ecology, streams and the groundwater resource itself.

In recent years, groundwater management has taken into account the need for socially acceptable impacts when managing groundwater extraction. But this requires better information and tools to assess the impacts of extraction, particularly numerical groundwater models.

## Basin groundwater analyses

Groundwater models exist for many of the data-rich areas in the Basin. Most of the groundwater models enable an analysis of the impacts of groundwater extraction on groundwater levels, stream flow or groundwater movement from saline areas to fresher areas.

Any groundwater extraction will lower water tables. However, levels should be able to stabilise in a reasonable time frame, such as 50 years. They should not impact on ecosystems and should account for any streamflow reduction.

The quality of the models vary depending on a range of issues, including the quality of groundwater monitoring and extraction data, the length of the calibration period, measurements independent of the calibration, the robustness in face of review and new data, and the degree to which the model captures key processes.

Outside of these areas, a 'groundwater balance' approach is used, especially focussing on either recharge or discharge measurements.

Analyses for these data-poor areas need to rely on setting extraction limits as a fraction of either the recharge or discharge. This fraction will vary, dependent on the risks and geological context.

## CSIRO research

CSIRO research has focussed on developing techniques for measuring groundwater levels and movement, such as:

- recharge
- discharge
- groundwater and surface water exchanges
- groundwater residence time; and
- characterisation of aquifers using geophysics and isotopic water tracers.

These have been applied to many areas of the Murray-Darling Basin.



> CSIRO researchers have developed techniques to measure the movement of water between the surface and underground.

## Supporting the Basin Plan

The MDBA is setting sustainable diversion limits for groundwater and surface water across the whole of the Murray-Darling Basin.

These limits use technical information provided by CSIRO and SKM and relate to three areas of work:

1. the setting of planning boundaries, given that much of the Basin previously had no formal administration units;
2. a recharge risk assessment method applicable to the whole of the Basin. (This assesses risks to groundwater-dependent ecological assets, baseflow, and the groundwater resource itself.); and
3. numerical groundwater modelling for priority areas to enable refined risk assessment.

### Want to know more?

Groundwater hydrology:  
<http://www.clw.csiro.au/research/groundwater-hydrology/index.html>

CSIRO Murray-Darling Basin Sustainable Yields project:  
<http://www.csiro.au/partnerships/MDBSY.html>

### For more information contact:

#### Glen Walker

Phone: 08 8303 8743

Email: [glen.walker@csiro.au](mailto:glen.walker@csiro.au)

Web: [www.csiro.au/science/MDBscience](http://www.csiro.au/science/MDBscience)

### Contact Us

Phone: 1300 363 400

+61 3 9545 2176

Email: [enquiries@csiro.au](mailto:enquiries@csiro.au)

Web: [www.csiro.au/flagships](http://www.csiro.au/flagships)

## CSIRO and the Flagships program

Australia is founding its future on science and innovation. Its national science agency, CSIRO is a powerhouse of ideas, technologies and skills. CSIRO initiated the National Research Flagships to address Australia's major research challenges and opportunities. They apply large scale, long term, multidisciplinary science and aim for widespread adoption of solutions.