Australian Government
Department of the Environment, Water, Heritage and the Arts

National Research FLAGSHIPS
Water for a Healthy Country

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Estimating the water yield of south-west Western Australia under a changing climate

Government of **Western Australia**
Department of **Water**

CSIRO is providing science input to help underpin the sustainable planning and management of Western Australia's water resources

South West Sustainable Yields

The South West Sustainable Yields (SWSY) project is the most comprehensive assessment of water yield in 2030 in Western Australia ever undertaken.

The study is funded by the Australian Government. CSIRO's *Water for a Healthy Country Flagship* will work in partnership with the West Australian Government's Department of Water to provide the science to help underpin the sustainable planning and management of the region's water resources.

The study will provide water managers and users with robust estimates of current and future water yield for the entire south-west of Western Australia.

Background

In 2007 and 2008, CSIRO produced a series of reports examining the likely water yield of surface and groundwater catchments in the Murray Darling Basin as a result of current and future climate scenarios and possible land management changes.

The Murray Darling Basin Sustainable Yields project was the first water resource assessment of its scale in the world and is currently informing stakeholders of the overall impact of climate change on the Basin's water.

In March 2008, the Council of Australian Governments' agreed to extend this assessment to three other regions – northern Australia, Tasmania and the south-west of Western Australia.

When these new assessments are complete, Australia will have a comprehensive scientific assessment of water yield in most of its major water systems. This will allow a consistent analytical framework for national water policy decisions.

The South West Sustainable Yields (SWSY) project will provide critical information on current and likely future water yield in a part of Australia that has experienced a drying climate since 1976.

This information will help governments, industry and communities consider the environmental, social and economic aspects of the sustainable use and management of the water assets of the south-west of Western Australia.

CSIRO will work closely with the Department of Water to ensure that the climate, surface and groundwater models that are used in the assessment are the best available and are accessible in the future so that the results are used in State Government regional and statutory water management plans of the foreseeable future.

The Study Area

South-west Western Australia is one of the most water-challenged parts of the country, experiencing Australia's highest rates of climate change amid rapid population growth and associated development. May to July rainfall has decreased by 15 per cent since 1975, runoff into metropolitan dams has decreased by more than 75 per cent and groundwater storages in the Gnangara Mound have been decreasing by over 45 GL each year.

The region has a unique drinking water supply, collection and distribution system managed by the relevant water authorities where extensive integrated water supply schemes distribute surface

water, groundwater and desalinated seawater from the coastal strip to metropolitan centres and inland to agricultural and mining areas.

The SWSY study area is very large (39,043 square kilometres of surface water catchments and 37,186 square kilometres of groundwater management areas) and extends from Geraldton (424 km north of Perth) to Albany on the south coast.

Almost all surface water diversion occurs in catchments east of the Darling Fault and on the Leeuwin-Naturalist Block where the topography enables storage dams to be constructed. Almost all groundwater diversions occur on the Swan and Scott Coastal Plains (Perth Basin), the Collie Basin and the eastern Bremer Basin near Albany.

> Hydrographic catchments (left)

1 Gingin Brook
2 Swan Coastal
3 Murray River
4 Harvey River
5 Collie River
6 Preston River
7 Busselton Coast
8 Lower Blackwood
9 Donnelly River
10 Warren River
11 Shannon River
12 Kent River
13 Denmark Coast

> Groundwater areas (right)

1 Casuarina
2 Arrowsmith
3 Jurien
4 Gingin
5 Gnangara
6 Yanchep
7 Wanneroo
8 Swan
9 Mirrabooka
10 Gwelup
11 Perth
12 Jandakot
13 Cockburn
14 Serpentine
15 Rockingham
16 Murray
17 South West Coastal
18 Bunbury
19 Harvey unproclaimed
20 Busselton-Capel
21 Blackwood
22 Collie
23 Nannup Unproclaimed
24 Albany

The Project

The project is looking at changes to current and future water yields, particularly in irrigated areas because of the importance of water to those areas and the potential significance of climate change.

There are a few areas where river and groundwater extraction interconnect (such as Gingin Brook and the Capel River) but most rivers crossing the coastal plains receive groundwater from immediately adjacent aquifers. "Run-of-the-river" pumping is uncommon in the region.

The overall approach of the project includes:

- Definition of different climate scenarios and the generation of time series of climate data to describe these scenarios,
- Spatial-temporal modelling of the implications of these climate scenarios for catchment runoff and aquifer recharge,
- Propagating the runoff/recharge implications through existing river systems and groundwater models including explicit consideration of the surface-groundwater exchanges, and
- Assessment and reporting of the implications for water yield and water use.

The project will assess water resources on an individual catchment and aquifer basis using four different scenarios:

A. Historical climate (1975 to 2007) and current development,

B. Recent climate of the last 11 years and current development (1997 to 2007),

C. Future climate (2030) and current development, and

D. Future climate (2030) and future development

The geographic separation of surface and groundwater resources in the south-west of Western Australia, along with the very different methodologies that are used in their analysis, makes it sensible to report each resource type separately which is different from the Murray Darling Basin where extractions from one resource affects the other.

The project will be overseen by a Steering Committee comprised of a representative from the Australian Government Department of the Environment, Water, Heritage and the Arts, the Western Australian Department of Water and CSIRO. A representative from the Bureau of Meteorology also participates on the Steering Committee.

The study is to be completed by the end of December 2009.

The Team

CSIRO is drawing on the scientific leadership and technical expertise of national and state government agencies, as well as leading Australian industry consultants.

Technical staff from CSIRO and the Department of Water are contributing to the project, supported by an internal and independent external review process to deliver robust assessments of water yield across the region.

A project team of approximately 11 full-time staff has been established which draws on the expertise of staff from four Divisions within CSIRO. The project team will be structured into seven groups: Project Management, Data Management, Climate, Surface Water, Groundwater, Environment and Demand Estimation, and Reporting/Communications.

Consultancies will be let to enable the project to be completed in the required time. This will include the development of a new groundwater model for the area between Mandurah and the Collie River, and area with important surface and groundwater irrigation industries. Recharge under a drier climate and major landuses will be estimated for the entire Swan Coastal Plain which will improve current and planned groundwater models.

For further information:

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MCK218 Nov 2008 • SWSY_factsheet.indd

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