



A call for tougher GROUNDWATER MANAGEMENT

Windmills pumping groundwater at
Penong, SA. Willem van Aken/CSIRO Land and Water

Sometimes called the forgotten resource, groundwater occupies the spaces created by geological fractures and soil pores underground. These are known as aquifers when they can hold a usable quantity of water, and the depth at which aquifers merge into a continuous layer is known as the water table.

Groundwater flows slowly to the surface, discharging in the form of springs, streams and wetlands (or in deserts, oases) in a continuous, integral cycle between the surface water and aquifers. According to Dr Rick Evans, Principal Hydrogeologist at Sinclair Knight Merz, the speed of the surface-to-ground cycle can vary widely, depending on aquifer structure, and whether groundwater is pumped up.

Dr Evans recently wrote a report, commissioned by Land & Water Australia, on groundwater's impact on streams. It points to the important role that groundwater plays in supplying

surface-level waterbodies and associated ecosystems. Groundwater extraction directly affects them.

'Between the start of pumping and the possible impact in the stream, the lag can be days, years or centuries,' Dr Evans says.

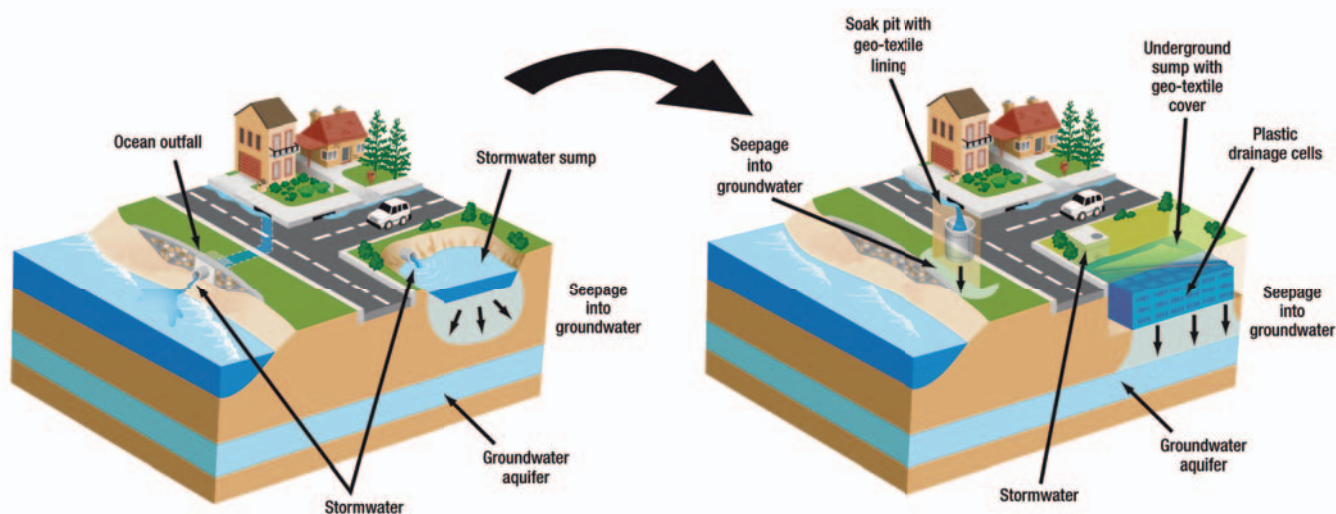
Experts agree that the lack of knowledge of underground water sources has produced poor and inconsistent management of groundwater across Australia.

Simply, we do not know how much groundwater is being extracted across the country by the multitude of users including farmers, industries, households, parks, golf courses and playing fields. Much bore water is extracted and consumed without metering or charge. Multiple licensing schemes are in place, but not even all licensed users are measuring their consumption.

However, a group of groundwater experts from the private and public

Amid one of Australia's worst droughts, the understanding and efficient management of groundwater supplies and their use has taken on a new urgency. Ageing metering infrastructure and weak guidelines on allocations and policing have led to profligate and illegal extraction. But new efforts to change this are underway. Strong policy action is now needed to see the tougher measures through. **Max Berry** reports.

The Cottesloe Peninsula Groundwater Restoration Project, Perth, WA, involves the replacement of open sumps with new underground sumps and soakage pits throughout Cottesloe to trap and filter stormwater, and then replenish the Cottesloe groundwater aquifer with the treated stormwater, enabling the closure of outfall pipes along the coast. A public education programme will aim to reduce private groundwater use, decrease the installation of new private bores and reduce stormwater pollutants. National Water Commission, Town of Cottesloe



sectors has recently studied groundwater management, identified the main problems and offered solutions. The group – Rick Evans, Ray Evans, Peter Jolly, Steve Barnett, Tom Hatton, Noel Merrick and Craig Simmons – published their findings in November 2006 as the *National Groundwater Reform* paper.

They estimate that groundwater comprises 20 per cent of the total water consumed in Australia, but say the resource is more important than that figure implies because it is available broadly across the country, even during droughts, and its quality is relatively secure. And groundwater is more important in certain places: Perth, for example, depends mainly on groundwater, the only capital city so reliant on the resource.

The group believes the above-average rainfall that eastern Australia enjoyed from the late 1950s to 1987 encouraged governments to become complacent about water and – apart from the increasing focus on land salinisation – the need to understand it better.

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It is clear that uncontrolled urban

and industrial discharges, and excessive agricultural usage, are causing widespread degradation of aquifers, falling water tables, reduction of flow to sustain wetlands, salinised or polluted groundwater, and land subsidence.

The *Reform* group recommends current groundwater be cut to sustainable levels

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and that groundwater users be licensed, apart from low-yield stock and domestic users. There should also be a requirement to measure consumption through meters on bores.

Proper allocation of groundwater for environmental purposes, such as sustaining wetlands, is another recommendation; the group noting that reduced environmental

flows mean ecosystems suffer when demand from other activities increases, especially during droughts.

At least some governments have recognised the deficiencies in groundwater control and have banned extraction in places until a better management system can be developed. But, the *Reform* group believes ‘illegal use is rampant’ and the ‘lack of a serious compliance program in many parts of Australia’ is resulting in weak management.

Clearly, effective monitoring, enforcement and prosecution of illegal extraction under any new groundwater management regime are needed. Conversely, scarce groundwater is effectively wasted when it is covered by licences that are not exploited. ‘A serious program to eliminate unused licences must be embarked on by all of the states,’ the *Reform* paper urges.

Aside from regulation, more innovative market-based solutions may be needed to manage groundwater. Just as carbon trading has been proposed as a response to climate change, trading in groundwater may help divert groundwater to areas where it is most needed. But the *Reform* group says the over-allocation of entitlements to groundwater should be rectified before further trading is encouraged.

Progress



Groundwater fills Lake Joondalup in the northern suburbs of Perth, WA. Willem van Aken/CSIRO Land and Water

Effective pricing of water is another pre-condition to a trading regime. Yet there is zero cost-recovery for groundwater management in some jurisdictions so it is little wonder that management is generally poor. The limited money from the sale of groundwater shows up in dated metering infrastructure, mostly installed between the 1960s and 1980s, which needs replacing.

Crucial to the better management of groundwater is the recognition of its direct relationship with surface water in a holistic approach. The curious failure to recognise the relationship has resulted in double counting and double allocation of water resources, a point emphasised by Dr Evans and the *Reform* group. Where allocations are becoming increasingly valuable, and politicised, it's obvious how important updated direction on this problem is.

Reports about massive consumption of water by mining companies are bringing groundwater management to the attention of the public and activists. The Australian Conservation Foundation is leading a campaign against BHP Billiton's plan to draw an extra 120 megalitres of artesian water a day, at no cost, as part of its expansion of the Olympic Dam copper and uranium mine at Roxby Downs, South Australia. That's on top of its existing draught of 35 megalitres a day. Many other large resource operations have the same subsidised use of groundwater.

It is not only the amount of water consumed that is causing concern. The ABC's *Catalyst* program recently reported on claims that uranium mining is contaminating groundwater at the Beverley

Mine, also in South Australia, turning an aquifer into a liquid nuclear waste dump. Beyond that, precious little is known about the make-up of subterranean ecosystems that may be vulnerable to changes in groundwater states.

Many of the changes suggested in the *Reform* paper have been identified in the Federal Government's National Water Initiative (NWI). However, as the initiative was signed by federal, state and territory governments in 2004 – more than two years before the *Reform* paper – it is clear that execution of agreed measures has been slow.

The NWI, for example, includes plans to license all users and ensure all usage is metered. Matt Kendall, Acting Chief Science Adviser at the National Water Commission, says a metering expert group has been set up. But universally licensed and metered groundwater usage is still an aspiration.

Mr Kendall says the NWI includes measures to deal with over-allocated water systems and assessing the environmentally sustainable yield, or level of extraction. He rates the top three research priorities for groundwater. The first is determining sustainable yield using a consistent approach in every state.

'The second priority is to understand and quantify the interaction between surface water and groundwater, which is essential to stopping the double counting and double allocation of groundwater,' Mr Kendall says, while noting that an integrated cap on groundwater and surface water is one of the goals of the Federal Government's Murray–Darling Basin Plan.

'The third goal is to understand the

volume of underground water storage. In some areas, the underground storage capacity is quite large, and understanding this better could lead to more use in drought years and less use in other years.'

Mr Kendall says another priority is to develop viable desalination technology because most groundwater is saline to some degree.

The NWI – and the Federal Government's \$10 billion Murray–Darling Basin Plan – can now be informed by a new baseline study of water resources, released in June. The study has been conducted by the WRON (Water Resource Observation Network) Alliance, which includes CSIRO. The WRON Alliance has measured levels of runoff and recharge of water systems for 51 geographic areas and prepared integrated water analyses covering groundwater and surface water.

Meanwhile, the Centre for Groundwater Studies (CGS), based at Flinders University with nine member institutions in several states, is conducting a raft of research projects that will contribute to better management of groundwater in future.

CGS Research Director Dr David Reynolds says the centre is examining how to use geophysics – mainly thought of as an investigative tool for mining industries – to assess water resources in a WA project, partnering with Curtin University.

'It's gaining acceptance as a tool for water resource investigation, and people are looking at how it can be used to measure volumes and salinity differentiation,' says Dr Reynolds.

CGS is looking at water optimisation strategies for alley-cropping by planting trees in rows in wheat paddocks to protect them from wind and erosion and to prevent raising the water table – a key cause of dryland salinity in the WA wheatbelt.

Indicative of the new urgency to understand groundwater, Dr Reynolds says CGS has massively expanded its facilitated research program over the past year and is in discussions with federal agencies on how it can contribute to the NWI.

More information:

Centre for Groundwater Studies:
www.groundwater.com.au

National Water Commission: www.water.gov.au

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