Huge scope to store water underground

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There is potential to store large volumes of Australia's precious fresh water underground, to offset climate change, avoid evaporation losses and meet national water needs into the future, leading water scientists say.

Following a major national scientific workshop in Canberra, researchers in the National Centre for Groundwater Research and Training (NCGRT) say that managed aquifer recharge – the injection or infiltration of excess surface water into underground aquifers – could help secure the nation's water supplies for an uncertain future.

With bigger droughts and floods forecast under climate change, along with rapidly rising demand from growing cities and industries, managing water wisely will be central to the nation's future prosperity and sustainability, says Professor Tony Jakeman of NCGRT and the Australian National University.

A workshop of leading groundwater experts convened by NCGRT last week identified twelve different sources of water in regional Australia that could be successfully 'parked' underground for use in time of need, he said.

These include supplementary irrigation water, surplus runoff into dams, and water brought to the surface by coal seam gas extraction and other mining activities.
"There are many benefits from storing water underground," Prof Jakeman says. "These include recharging depleted aquifers, enlarging

storages without building more dams, reducing evaporative losses, reconnecting surface and groundwaters, watering the Australian landscape from underground, and creating strategic reserves in critical foodgrowing or urban areas."

"Australia already stores the equivalent of 1800 Olympic-size swimming pools of water underground in the Burdekin region of Queensland every year – and bringing it up again for use in agriculture and horticulture," explains doctoral researcher Andrew Ross. "But in Orange County California they store around 300 gigalitres (GL) a year – enough for the household use of 2.3 million people."

The combined proven storage capacity of aquifers below Perth, Adelaide and Melbourne is 200GL – capable of meeting the needs of 2.5 million residents - and potentially as much as 430GL, he adds.

At present Australia loses around 4200 gigalitres a year in evaporation from surface storages across the Murray-Darling Basin, he adds – sufficient water to supply Sydney and Melbourne for four and a half years.

"On the face of it managed aquifer recharge looks tremendously promising, but we need a more detailed understanding of our aquifers, likely environmental impacts and, of course, we need effective rules and rights for injecting and recovering water on a large scale," Prof. Jakeman says.

The workshop has identified four potential projects in regional Australia where the concept of underground storage can be tested more thoroughly – on the Condamine in Queensland, the Namoi in NSW and two rivers in northern Victoria.

In sandy areas, water injection can be simple and low cost – as easy as an

artificial sump or soak that allows surplus floodwater to linger and percolate into the underlying aquifer. On clay soils or rock it may require the use of a solar pump or windmill to inject the water down a well. It may also be important to filter or cleanse water before injection.

“At any event, water injection looks to be a whole lot more affordable than desalinating sea water, which is often proposed as a solution to our urban water shortages,” Mr Ross adds.

The researchers add “The scale of large floods suggests that some of this water can be used to recharge aquifers without affecting the important ecological role of floods in our river systems.

Such events may be more frequent under climate change and it makes national sense to turn a problem into an opportunity."

“The recent ten year drought is equally a reminder how critically scarce Australia’s water can become in dry times and of the importance of investigating every opportunity to better manage the resources we have by ‘parking’ surplus water in wet years where it can be easily retrieved,” says Prof Jakeman.

Another important reason for storing more water below ground is to protect the Australian native landscape: thist can help keep Australian rivers and wetlands filled and ensure water is always accessible to the deep-rooted eucalypts and acacias that are key to our native landscapes.

One of the largest untapped sources of water in Australia is the northern wet, covering the top one third of the continent. The wish to preserve wild rivers combined with high evaporation rates make major dam building in the north unlikely – but scope may exist to store some of the runoff underground.

“Underground storage is likely to be socially more acceptable than building new dams in Australia – but it must nevertheless be carried out with care, and with a detailed understanding of the impact on other water bodies, both surface and subsurface, on natural ecosystems and communities,” says Prof. Jakeman.

Social research by Professor Allan Curtis’ NCGRT team at Charles Sturt University and others indicates that, “so far, Australians are generally positive about the idea of aquifer recharge,” adds Andrew Ross.

The scientists add that if Australia manages to solve its own water scarcity problems by understanding aquifer recharge, it will position itself as a world leader and major exporter of solutions in a world facing a growing water crisis.

Provided by NCGRT