

12 August 2022

NCGRT Submission on the Draft NSW Groundwater Strategy

The National Centre for Groundwater Research and Training (NCGRT) congratulates Department of Planning and Environment on their Draft NSW Groundwater Strategy. This document provides an excellent framework on which to base future groundwater management, investigations and policy developments. We are particularly pleased with plans to refresh the approach to sustainable groundwater management, support Aboriginal rights, values and uses of groundwater, improve understanding of groundwater dependent ecosystems (GDEs), improve monitoring networks and to better share groundwater data. We are also delighted to see the plans to improve the dialogue and strengthen partnerships with researchers. NCGRT is ideally placed to assist DPE in this regard, as we represent groundwater researchers at 15 universities around Australia. We are also well placed to help communicate the importance of protecting the groundwater resource and managing it to ensure its future sustainability. The NSW Department of Planning and Environment is also a partner in NCGRT.

While the Draft Groundwater Strategy contains many valuable initiatives, prioritisation of these initiatives will be important. One way to prioritise actions is by analysing the current impediments to sustainable groundwater management, and this is a topic that NCGRT has been examining over the last two years. We have also conducted a survey of groundwater professionals in government, industry and research to compare their perspectives on the current challenges. Amongst the biggest challenges identified in this survey were the difficulty in determining volumetric extraction limits, difficulty in defining resource condition limits (trigger levels), challenges in conjunctive management of surface water and groundwater, difficulties in defining ecosystem water requirements, and the need for improved groundwater communication and education.

We eagerly await the Implementation Plan for the Draft Groundwater Strategy. We believe that our team has much to offer DPE in the development of this implementation plan. Below, we highlight some of our expertise that links closely with the key actions proposed in the Draft Groundwater Strategy.

Action 1.2.1 (Manage surface and groundwater together)

Managing surface water and groundwater together, especially in fully allocated systems, remains a challenge worthy of strategic prioritization. Our work has included considering regulatory mechanisms across a broad range of jurisdictions that deal with this issue in systems under stress (for example, where baseflows support riverine endangered species, and where additional groundwater withdrawals are required to support basic landholder rights). Such mechanisms support approaches that are rare in Australia, for example managed aquifer recharge designed to provide controlled baseflow to ecologically important streams during the dry season, and the use of offset/mitigation mechanisms to counteract the effects of streamflow depletion caused by the exercise of basic landholder rights (also relevant to **Action 2.1 – review the regulation of basic landholder rights**). We are eager to explore these issues further in the NSW context.

Action 1.2.2 (Integrate groundwater considerations into land use planning decisions)

Australian jurisdictions face challenges integrating groundwater and land use planning frameworks. These challenges are multi-dimensional, for example, not only ensuring that planning decision-making considers the availability of groundwater required for development but also the effects of land development on recharge and groundwater quality. Our overseas collaborative work has shown that other jurisdictions, which have a heavy historical reliance on groundwater, have lessons to offer in relation to regulatory options in this regard.

Action 1.2.3. (Improve management of large developments impacting groundwater)

The management of cumulative impacts associated with major projects is an issue long identified as important and under-addressed—we applaud the attention given to the issue in this action. Unlicensed legacy groundwater take also contributes cumulative effects. Our expertise in frameworks for regulating cumulative impacts has developed over a multi-year Australian Research Council funded project (#DE180101154) specifically directed at cumulative impacts.

Action 1.4.1 (Review groundwater source extraction limits using new knowledge)

In Australia, groundwater management still mostly relies on regional scale extraction limits, even though this approach has been heavily criticized in the scientific literature. Its main benefit is that it is relatively easy to implement and manage, yet can fail to protect GDEs and other groundwater users. Regional scale limits are important as they can prevent large allocations being made that may subsequently have to be withdrawn when adverse impacts arise. Yet fine tuning of the absolute limit may be less important than resource condition limits and trigger levels. The role of extraction limits versus resource condition limits is an area that NCGRT is very keen to further explore.

Actions 1.3.1 (Review and update our approach to protecting groundwater dependent ecosystems) and 1.4.2 (Better manage impacts of extraction at a local scale)

In principle, extraction restriction triggers provide a more refined approach to preventing impacts on GDEs and other groundwater users than volumetric limits. However, the way that groundwater triggers have so far been applied in Australia does not achieve this goal. As well as identifying what the trigger levels should be, key factors include distances between trigger bore and areas to be protected, and delays between triggers being reached and pumping regimes being changed. Our research has been investigating how triggers need to be applied to get the best results.

Action 3.3.2 (Improve our groundwater models where required)

Groundwater models are one of our main tools for predicting the future state of groundwater systems. Yet groundwater data is always incomplete, and so uncertainty is an inherent characteristic of all models and integral to any groundwater management challenge. Despite this, uncertainty is not always represented in these models or in the planning documents that the models support. NCGRT has been researching and developing approaches for characterizing uncertainty in groundwater models and their associated water planning instruments, so that management risks can be properly understood and considered.

Action 3.4.1. (Improve our groundwater monitoring infrastructure)

It is great to see the emphasis on continued monitoring and the recognition that data is a prerequisite for scientifically informed management. Considerable work (and funding) is needed to maintain, update and redesign field monitoring systems for the future to better

capture the information needed for decision making, management and regulatory action. As monitoring is very costly, both in terms of capital investment and ongoing operations and maintenance, a comprehensive and cost-effective monitoring network should be based on analysis of the how the data will be used. Where groundwater models are available, they can be used to optimize the locations of monitoring infrastructure for different purposes. Both locations of extraction (e.g., early warning) and locations of potential impacts (e.g., GDEs and town water supplies) should be include in the monitoring network design.

The requirements for monitoring water levels and water quality are fundamentally different. Most existing regional monitoring bores were designed and installed with the aim to measure changes in water levels with monitoring of water quality changes being an afterthought. While a deep bore-screen may be adequate for generally representing the water level change in an aquifer, that same screen may be unfit for detecting recent changes in water quality near the groundwater water table or at GDE (due to significant lags). A more 'holistic' approach is needed in the design and location of future groundwater monitoring infrastructure to include monitoring of water quality changes, both at zones of extraction (e.g., mines, agricultural development) i.e., early warning and at sites of potential impact on ecosystems and communities. Collectively NCGRT have considerable expertise in physical and hydrochemical monitoring and we are eager to support NSW developing a world class groundwater monitoring network.

Again, congratulations on the excellent Draft NSW Groundwater Strategy. We look forward to continuing to work with DPE in investigating and managing the State's groundwater resources to ensure their future sustainability.

Your sincerely,

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