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Groundwater Regulation in a Drying South West

Executive Summary

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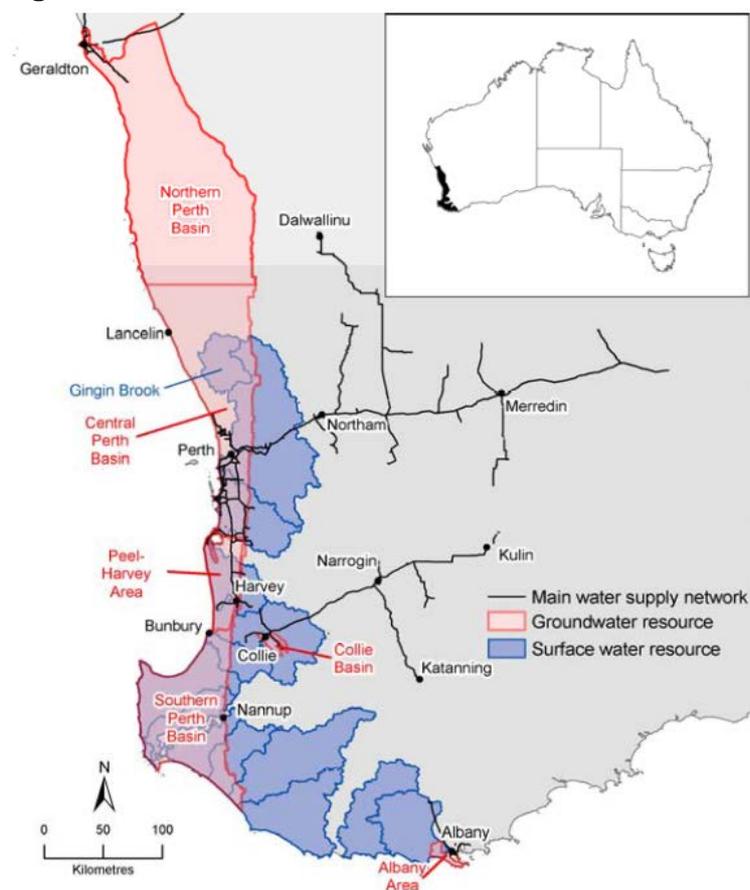
Executive summary

Groundwater in a drying South West

The community of South West Western Australia is facing an enormous water resources challenge from climate change, which is raising fundamental questions about the regulatory framework for managing groundwater. Do we need to extend groundwater regulation? Do we need a more rigorous approach to setting allocation limits? Can we continue with fixed, volumetric water rights in a drying climate? What should be the role for water markets in distributing water rights?

The South West of Western Australia is home to around 2 million people, some 90 per cent of Western Australia's population. This community is fortunate to have the benefit of substantial groundwater resources, which meet around three quarters of its water needs, along with the needs of the natural environment including internationally-significant wetlands and groundwater-dependent threatened species.

Figure 1: Water resources of the South West¹



The South West has experienced a significant drying trend over recent decades. This decline in winter rainfall (17 per cent since 1970) has been associated with a dramatic decline in streamflow to South West reservoirs (more than 50 per cent). There has also been a substantial impact on

¹ CSIRO, 'Water yields and demands in south-west Western Australia: A report to the Australian Government from the CSIRO South-West Western Australia Sustainable Yields Project' (CSIRO, 2009) 5.

groundwater resources – both directly, through reduced recharge to aquifers, and indirectly through increased demand for groundwater as a substitute for increasingly scarce surface water resources.

A number of peer-reviewed scientific papers, and a major research venture carried out by the CSIRO, Bureau of Meteorology and WA Government, have linked the decline in South West rainfall to climate change caused by greenhouse gas emissions. Whatever the cause of past drying, there is a high degree of agreement among climate models that the South West will experience a drying trend in future decades due to human-induced climate change. The impact on groundwater yields will be modest in some areas, but very substantial in others. Yield declines may be greater than one-third by 2030 in the Gnangara, Blackwood and Albany groundwater areas. Impacts on surface-water resources will also have an impact by increasing demand for alternative water sources such as groundwater.

The science suggests that effective action to stabilise greenhouse concentrations could quickly begin reverse this drying trend, but that it would take several centuries to fully reverse. While not detracting from the importance of reducing greenhouse gas emissions, this does underline the importance of considering how the South West can adapt to a dryer future. This report considers how the design of the regulatory framework for groundwater management can help meet this important challenge.

Research questions and directions for reform

In this report we seek to address the following fundamental questions for groundwater management and regulation:

- How can groundwater use be maintained within sustainable limits in a drying climate, and how can groundwater be used productively and efficiently within these limits?
- What role does the regulatory framework for groundwater management have in achieving these goals?

From an analysis of the existing regulatory framework, an assessment of how it has operated in practice and consideration of approaches in other jurisdictions we have identified four main directions for reform, which we outline below. The first three (broader regulatory coverage, better groundwater planning and flexible water access entitlements) relate to the goal of keeping groundwater use within sustainable limits in a drying climate. The fourth (greater use of water markets) relates to the productive and efficient use of groundwater. These reform directions are consistent with the Intergovernmental Agreement on a National Water Initiative which Western Australia signed in 2006.

1. Broader regulatory coverage

There is value, in a drying climate, in bringing existing, unlicensed uses within the regulatory framework as far as possible. Otherwise there is a risk that these unlicensed uses will expand, unconstrained by an allocation limit, to the detriment of groundwater-dependent ecosystems or

licenced water users. There are two unlicensed water uses of groundwater that are potentially problematic: domestic garden bores and commercial plantations.

Domestic garden bores are widely used in the South West. The Department of Water estimated in 2009 that there were 167,000 garden bores in the Perth Metropolitan Area, with total water use in the order of 73 gigalitres (GL) a year. Garden bores are currently exempt from usual licensing requirements (except in the unusual case in which water is not taken solely from the water table aquifer). This needs to be reconsidered in a drying climate – particularly in vulnerable areas, such as those that are already over-allocated or are close to wetlands.

Law Reform Recommendation: Domestic Garden Bores

Consideration should be given to two options:

- to license new and existing domestic garden bores in specified areas, or
- to prohibit the construction of new domestic garden bores in specified areas.

It is clear from studies of the Gngangara Mound that commercial plantations can have a significant impact on groundwater levels in a drying climate. While the Gngangara plantation is an unusual, if not unique, example in the South West of a large commercial plantation being located over a shallow, over-allocated aquifer, there is a strong case for the new water resource management to have the capacity to regulate plantations in specified areas.

South Australia is the first Australian jurisdiction to include commercial plantations within its water management regime. The South Australian reforms only came into effect in October 2013, so it is difficult to assess their usefulness in practice. Even so, the broad framework provided by these laws – the licensing of commercial plantations in designated areas, with the hydrological impact of those plantations being assessed in accordance with rules in the relevant statutory water allocation plan – appears to offer a workable approach.

Law Reform Recommendation: Commercial plantations

Western Australia's new water resource management legislation should recognise commercial plantations as a consumptive use of groundwater resources and have the capacity to licence water use by commercial plantations in specified areas identified by the statutory planning process.

2. Better groundwater planning

Good water allocation planning is central to maintaining groundwater use within sustainable limits in a drying climate. Important elements of such planning are the use of statutory water allocation plans to provide a consistent, legally secure basis to set and administer allocation limits; a transparent process to identify sustainable yields and set allocation limits; and monitoring and reporting on whether allocation limits and plan objectives have been met.

Law Reform Recommendation: Statutory water allocation plans

The legislation should:

- provide for statutory water allocation plans that bind decision-makers performing functions under the legislation and other government agencies exercising powers under other legislation
- require, as part of the process for preparing each statutory water allocation plan, the

publication of a scoping document that details how sustainable yields will be assessed

- require plans to identify the sustainable yield of each groundwater resource, explain how the sustainable yield was calculated and explain any discrepancy between the sustainable yield and the provisions of the plan
- provide that plans must be approved by the Cabinet (Governor in Council) and then tabled in Parliament and subject to disallowance
- specify the monitoring that is to be carried out to assess whether the objectives of plans are being achieved, and requirements for the reporting of that information.

While projections of reduced rainfall due to climate change were taken into account for water supply planning purposes from the late 1980s, they were only directly incorporated in assessments of groundwater allocation limits from 2009, some two decades later. Our analysis of groundwater allocation plans in the South West shows that there is still only one finalised plan that uses climate change projections. The Department of Water has recently done a significant amount of work in developing tools and guidelines to facilitate the use of climate projections in water allocation planning. To ensure that climate change is addressed in the making of water allocation plans we recommend that the new water resource management legislation require the Minister to consider climate change risks in plan preparation and to address those risks in the plan provisions.

Law Reform Recommendation: Duty to consider and address climate change in making statutory water allocation plans

The legislation should require the Minister to consider climate change risks in the preparation of statutory water allocation plans and to address those risks in the plan provisions.

Water allocation plans can have a role in deciding how groundwater, and groundwater scarcity, should be shared between consumptive uses in a drying climate. Non-statutory water allocation plans commonly reserve groundwater for the purpose of public (drinking) water supply, and the recent strategy to address groundwater shortages in Perth's North West Corridor has also effectively reserved groundwater for the efficient watering of public open space. The power to make reservations of this kind should be retained in the new water resource management legislation to provide the capacity to make sure water is available, on an equitable basis, for water uses that provide a public benefit.

Law reform recommendation: Reservation of groundwater

The new water resource management legislation should provide that statutory water allocation plans may reserve water for specified purposes.

3. Flexible water access entitlements

Groundwater resources are likely to diminish in a drying climate because of reduced groundwater recharge. This raises the question, in areas that are already fully allocated, of whether the regulatory system is capable of adjusting the volume of water that can be taken under water access entitlements in order to keep total groundwater extraction within sustainable limits, over the medium to longer term and in extreme drought.

Under current law and practice, groundwater entitlements are volumetric – that is, licensees are entitled to extract a specified volume of water each year. During temporary severe water shortages

these entitlements may be reduced by ministerial direction, and no compensation is payable. These powers have not been exercised in the past twenty years, even though it is arguable that there have been seasonal circumstances that could have warranted their application. Further, volumetric groundwater entitlements may be reduced permanently on various grounds and no compensation is payable if the reduction is 'fair and reasonable' amongst licensees. In practice, this power has rarely been exercised in over-allocated groundwater areas in the South West. This may be because licensees have an expectation of a fixed annual entitlement and because it would be administratively onerous to amend a large number of licences individually and deal with resulting merits appeals to the State Administrative Tribunal.

The introduction of a more flexible entitlements system, consistent with Western Australia's commitments under the National Water Initiative, would make it easier to manage allocations within sustainable limits in a drying climate. Under this system, water users would hold perpetual share entitlements in a consumptive pool and available water can be accessed in proportion to the share. This consumptive pool could be varied in response to seasonal circumstances, in accordance with rules in the relevant statutory water plan, in order to keep allocations to entitlements within sustainable limits. Variation of the consumptive pool would affect all water users equally, so that the allocation is proportional to the share and no compensation would be payable.

Law Reform Recommendation: A more flexible entitlements system

The legislation should provide greater flexibility to adjust levels of groundwater extraction in response to seasonal circumstances through non-compensable adjustments made by:

- a new system of water entitlements that provide access to a share of a consumptive pool determined periodically, rather than to a fixed annual volume of water
- pending the introduction of those entitlements, powers to vary more easily the volume of water that may be taken under existing licences.

The legislation should also provide that, where necessary, permanent reductions to groundwater entitlements can be made to adapt to a drying climate. If there is no currently applicable statutory plan, this adaptation is best undertaken by making a statutory plan. If there is an existing statutory plan, then a permanent reduction of entitlements can be made by plan amendment, usually at a time prescribed for regular plan review. Such regular review might take place, for example, every ten years, but there should also be ministerial authority to change a plan during the ten year term. If an existing plan provides for consumptive pool determination, then the entitlement reduction can be undertaken by amending the relevant plan rules for determining the consumptive pool. This form of plan amendment may or may not affect all water users equally.

Law Reform Recommendation: A regular plan review of entitlements

The legislation should provide a capacity for longer term adjustments to climate change impacts by providing for:

- regular plan review, possibly every ten years
- a fair process by which the minister may amend plan provisions to re-set the regime of rules for determination of the consumptive pool and share entitlements.

The legislation should also provide for how the risk of loss from entitlement reductions made by plan amendments is assigned between water users and government. In all Australian jurisdictions that have implemented the National Water Initiative a periodic adjustment to a consumptive pool, made in accordance with a statutory water plan, will apply equally to all entitlement-holders² and is not compensable. However, permanent adjustments to the reliability of water access entitlements through plan amendments, either during the term of a plan or at the end of the plan term, raise more difficult questions of compensation. Water users who invest on the basis of a plan-defined entitlement may legitimately anticipate some security of entitlement during the term of the plan.

One approach put forward in the National Water Initiative, which has been adopted in some Australian jurisdictions, is to provide that reductions in water access associated with plan amendments or new plans may be compensable, depending on the reason for the new approach. If the reduction is needed because of climatic changes no compensation is payable, but compensation may need to be paid if the consumptive pool is reduced because of changes in government policy or improvements in knowledge. This approach is difficult to apply in practice because it is hard to apportion reductions in water entitlements between these different factors.

An alternative approach is to recognise that certainty is needed during the term of a plan, but a regular plan review at the end of the plan term is the opportunity for the community and the government to re-assess the long term sustainability of plan provisions of water for consumptive use and for environmental and other public benefit outcomes. The community and the government may then legitimately anticipate the capacity to re-set the plan regime without the burden of compensation unless the burden of entitlement reductions were to fall disproportionately on particular water users, so that water rights are effectively acquired for a public purpose identified in the new plan.

Law Reform Recommendation: Risk assignment and compensation

No compensation should be payable for adjustments to consumptive pools, or the rules governing the determination of consumptive pools, by regular end of term plan review and amendment. Permanent regulatory adjustments to consumptive pools and entitlements during the term of the plan would be compensable. Commonwealth structural adjustment assistance, funded by major emitters of greenhouse gases, could be provided to water users affected by climate change.

A flexible water entitlements system will help to keep groundwater allocations within sustainable limits in a drying climate, but this will be to no effect if groundwater use exceeds those limits. We therefore support proposals in the Department of Water's Position Paper, Reforming Water Resource Management ('2013 Position Paper') for increased metering, and suggest some additional reforms to increase compliance with metering requirements and disclosure of data obtained from metering. We also recommend that the legislation should have the capacity to introduce 'net' water accounting that takes into account return flow of water to an aquifer as well as extraction.

Law Reform Recommendation: Improved water accounting

The legislation should provide for:

² Assuming the entitlement holders have the same level of security.

- the implementation of increased metering as proposed by the 2013 Position Paper
- a strengthening of enforcement provisions for non-compliance with licence conditions requiring metering and reporting
- reform of the provisions for the water register to mandate on-line publication of licence conditions for metering and of the metering data unless the licensee can show a good reason for non-disclosure
- the capacity to introduce 'net' accounting for groundwater entitlements.

4. Greater use of water markets

Water markets promote the productive and efficient use of water. They facilitate the movement of water to its most economically productive use, and by putting a price on water encourage physically efficient water use. Both of these things become increasingly important in a drying climate.

At present market-based mechanisms such as auctions are not used in the initial allocation of groundwater entitlements in the South West. Groundwater is normally allocated for free under a 'first-in, first-served' approach, in which the applicant who is first in time has priority over other applicants. There have also been experiments with 'merit selection', under which expressions of interest for water use are assessed against multiple, often subjective, criteria. The failure to use market-based mechanisms may in part be due to the fact that the current legislation does not provide a clear legal basis to do so. The new legislation should correct this shortcoming. In order to promote productive and efficient use of groundwater, market-based mechanisms should be considered the default approach for heavily allocated groundwater resources, including where water has been reserved for specified uses.

Law reform recommendation: Initial allocation of groundwater through market-based mechanisms

The legislation should provide a clear legal basis for the release of unallocated water through a range of mechanisms, including market-based mechanisms such as auctions. Market-based mechanisms should be considered the default approach for heavily allocated groundwater resources.

This raises the question of how the resulting revenue should be used. The State Government's Water Reform Implementation Committee recommended in 2006 that the revenue be directed to water resource management. This would have the advantage of providing much-needed funding for water resource management and building support for the use of market-based mechanisms.

Law reform recommendation: Use of revenue from groundwater allocation

The revenue from the release of groundwater through auctions and other market-based mechanisms should be directed to water resource management.

Water trading has been possible since 2001 amendments to the *Rights in Water and Irrigation Act 1914* (WA) ('RIWI Act'), and a number of water trades have been carried out in South West groundwater areas. However, there are a number of barriers to trade. The State Government proposes to address some of these barriers to trade. One barrier that it does not propose to address is the requirement that the person purchasing the water entitlement must be the owner or

occupier of land from which the water is taken, or have an agreement with that person. This makes it more difficult for some prospective water purchasers, such as businesses that wish to acquire a portfolio of water entitlements for leasing or investors acquiring a water entitlement before acquiring land title, to purchase water entitlements.

Law Reform Recommendations: Water trading

The legislation should be designed to facilitate trade in groundwater entitlements, including through implementation of the reforms outlined in the 2013 Position Paper. The legislation should include the capacity to remove the requirement that a *purchaser* of an entitlement must be an owner or occupier of the land from which the water will be taken.

Applying these reforms in the South West

When should the National Water Initiative model be used for groundwater resources?

The National Water Initiative model, built around the concept of water users holding tradeable shares to a sustainable consumptive pool, is sometimes criticised as an Eastern States invention that works for surface water but isn't suitable for groundwater resources. To some extent this ignores the fact that there are substantial groundwater resources in the Eastern States, and that many of these resources are already subject to the National Water Initiative model. However, it is true that there are issues that need to be addressed in applying this model to groundwater resources, and that the model may not be appropriate for all groundwater resources in the South West.

One issue is that the volume of water that is allocated to water entitlements will tend to be unreliable in poorly understood systems. This is because the volume of water that can be taken under an entitlement will change with changes in the consumptive pool. A second issue is that premature introduction of share entitlements and auctions of those entitlements may discourage exploration for new groundwater resources. For these reasons, it may be appropriate for poorly understood systems, and systems in which there is scope for substantial new resources to be identified by exploration, to continue to use the traditional licensing model – albeit with some refinements such as greater flexibility to vary the volume of water taken under those licences.

In other areas, the introduction of the full National Water Initiative model is to be recommended for the reasons discussed above. Experience from other Australian jurisdictions is that the model provides the capacity to find the right balance between flexibility to sustainably manage a groundwater resource and reliability of water access for entitlement holders.

Managing the transition to the new system

In areas where it is appropriate to introduce the full National Water Initiative reforms, including share based entitlements, there will be issues that have to be addressed in the transition to the new system. There will be particular challenges in areas that are over-allocated, as an entitlement to a share of a sustainable consumptive pool may be less than the volume of water available under the old licence. Legislation in other Australian jurisdictions does not provide for compensation for this transition. It could be argued that Western Australia should provide for a different approach because its legislation currently provides for compensation for licence amendments in certain

circumstances. However, even if current compensation rights were applied to the conversion of licences to share entitlements, no compensation would be payable where reductions are fair and reasonable between relevant licensees.

Law reform recommendation: Compensation on transition to share entitlements

The new legislation should not provide a right to compensation for losses suffered in the conversion of existing licences to share entitlements, at least where the Minister is satisfied that the conversion is fair and reasonable between relevant licensees.

The new legislation should have the capacity to ease the transition from licenses to share entitlements in over-allocated areas through the use of techniques such as the issuing of temporary supplementary entitlements that phase out over time.

Law reform recommendation: Supplementary entitlements

The new legislation should provide the capacity to issue supplementary entitlements, which phase out over time, to ease the transition to more sustainable allocation limits in currently over-allocated water resources.

Use of groundwater as a ‘drought reserve’

One important issue for the South West, along with other areas of the world facing a drying climate, is how groundwater resources should be managed to anticipate future extreme drought. Some groundwater resources – especially deeper, more confined aquifers – may have the capacity to be temporarily overdrawn to meet water needs in periods of drought and replenished through limiting extraction in wetter periods. The experience of groundwater extraction for public water supply in Perth has been one of sustained high groundwater abstraction in a drying climate, rather than strategic use of confined aquifers as a ‘drought reserve’. This may in part be due to inadequacies in the current regulatory framework. We suggest a number of options to provide a better regulatory basis for use of groundwater as a ‘drought reserve’ in a drying climate. The key to each of those options are firm legal safeguards to ensure that a realistic allocation limit is set for a drying climate, and that groundwater extraction is below that limit in relatively wet years to provide room to increase extraction in drought.

Law reform recommendation: Sustainable use of groundwater as a ‘drought reserve’

The new legislation should provide the basis for sustainable use of groundwater resources as a ‘drought reserve’, where appropriate. Regulatory options include:

- The use of ‘carryover’ or ‘borrowing’ rules in statutory water allocation plans, leaving it to the entitlement holder to elect when to ‘bank’ an allocation for later use
- Compulsory ‘banking’ of a proportion of each entitlement holder’s periodic allocation so as to build an individual reserve that is accessible to the entitlement holder in a severe drought as declared by the Minister
- Formal designation of volumes of water in suitable deeper aquifers as a ‘drought reserve’, accessible through short term licences that are auctioned in severe droughts
- Establishing an independent statutory authority to hold share entitlements as a drought reserve, to be auctioned in extreme droughts.

Concluding points

The broad conclusion of this report is that new water resource management legislation is needed to meet the challenges of groundwater management in a drying South West. This conclusion is consistent with the reforms outlined in the State Government's 2013 Position Paper, as are many of our recommendations. There are, however, some differences around important issues such as risk assignment and some areas in which our recommendations raise new issues that are not considered in the 2013 Position Paper. A comparison between our proposals and those of the State Government is attached at **Appendix A**.

Some important general principles emerge from the experience of the South West.

1. One obvious principle is that, in setting limits, governments should not assume past rainfall is a good guide to the future. Climate change projections must be taken into account.
2. However, given that climate science and hydrogeology do not provide a crystal ball, the entitlements system must be flexible enough to allow collective extraction to be adjusted under changing conditions. This flexibility should include reductions in consumptive pools to keep extraction within sustainable limits in a drying climate. The flexibility may also include temporary increases in extraction from deeper, more confined aquifers that are managed as 'drought reserves.'
3. Thirdly, there is a need to ensure that the regulatory framework encourages the productive and efficient use of groundwater: this can be achieved through use of market-based mechanisms, but with the ability for governments to reserve water for specified uses where it is in the public interest to do so.

Finally, we note that managed aquifer recharge ('MAR') using waste water or stormwater is becoming increasingly important in the drying climate of the South West, and in other parts of the world seeking to make better use of water resources in a drying climate. While we recognise that MAR raises important issues of regulatory reform, some of which are considered in the 2013 Position Paper, we have not dealt with those issues in this report. These issues are being separately considered, in work led by Alex Gardner, as part of a project being conducted for the CRC for Water Sensitive Cities.