Water Extraction from the Alstonville Plateau

D.O.Huett, MSc.Agr; Ph.D., formerly, Senior Research Scientist, NSW Agriculture, Alstonville

This article reviews the information presented in the NSW Govt. Water Management Fact Sheet and then critically assesses the availability of water in the Alstonville area of the Plateau.

The fact sheet estimates that less than 2% of the water entering the Northern Rivers region is utilised and that groundwater reserves are not under stress. It fails to acknowledge that the geography of the region is highly heterogeneous consisting of mountain ranges (the Great Dividing and McPherson ranges), coastal lowlands and the Alstonville Plateau. Ground water availability also varies greatly with a case study showing that the Alstonville Plateau aquifer is designated a high stress system (Brodie et al 2003). The Fact Sheet clearly has little relevance to the Plateau.

Alstonville Plateau Rainfall

The eastern extremity of the plateau at Alstonville has a mean annual rainfall of 1805mm and drops to 1343 mm at Lismore (Bureau of Meteorology). The rainfall is variable where annual totals at Alstonville have been less than 1300mm on 6 occasions from 1956-2010. Spring to early Summer is typically dry and mean annual evaporation at Alstonville is 1537mm. Using a conservative and widely adopted Crop Factor of 0.7, crop and pasture evapotranspiration is 1076mm. Runoff is another source of water loss and this was estimated at 130mm for 2018 when annual rainfall at Alstonville was 1537mm. Runoff will be higher when rainfall is greater and intensity increases.

Case Study of Groundwater-Dependent Ecosystems on the Alstonville Plateau by Brodie et al. (2003)

They reported that the Alstonville Plateau basalt aquifer was designated a high stress system due to the multiplicity of users and the reporting of interference problems between bores and the projections for increased water demand. There is a high degree of connectivity between groundwater and surface water which indicates that the mining of water in deeper aquifers will exacerbate the availability of water in shallower aquifers. This will be further exacerbated if consecutive years of low rainfall, as have been recorded since 1956, occur.

Brodie et al. focussed on the Groundwater Dependent Ecosystems (GDEs) which proliferate throughout the Plateau. They factored in the environmental provisions in the sustainable yield estimates for the available groundwater resources. Annual average recharge to the aquifer was calculated at 44,420ML/yr. of which 80% was allocated to the environment, as a result the sustainable yield calculation for the allowable annual groundwater extraction is 8,900ML/yr.

High yielding bores (>20ML/yr) accessing the same aquifer as GDEs will not be allowed. Existing licence holders within buffer zones cannot increase their allocation through trading unless they can demonstrate zero impact on the GDEs. The current DA (2018/597) is within close proximity to the buffer zone for Youngmans Creek.

The deeper aquifers in the Plateau have an important effect on the ecosystem of the Northern Rivers because they discharge as springs and seepages at the base of the Plateau valleys or escarpment. Adjoining wetlands and the Richmond river are dependent on these discharges. The

health of the Richmond river has been rated as poor for several decades and the extraction of water from the Plateau, particularly at depth, has impacted on its health.

Water extraction around Ellis Rd, Alstonville

Brodie et al in Fig.3 show the Groundwater Dependent Ecosystems near Alstonville and along Ellis Rd. It also shows that 61 bores > 10m occur in the study area of 2722 ha. The area around Ellis Rd has the highest density of bores. Local knowledge confirms that the number of bores and deep wells exceed this and are a source of large volumes of water used for irrigation. Total extraction of water on the Plateau and particularly along Ellis Rd is an unknown quantity.

The total area of the Plateau is 39,000 ha which means that the total recharge to the sustainable yield calculation for allowable groundwater extraction (environmental allocation 80% of recharge) to the Alstonville area is 621ML/yr or 10ML/ licenced bore. This area, which is an intensive horticultural/grazing/rural living area is more stressed that the broader Plateau.

Future Water demand and the impact of Global Warming

Ballina Shire Council in 2004 critically reviewed the demand for water in the Shire and the discharge into local estuaries. The study identified a shortfall in water supply as population increased towards 2030. Groundwater is a current source of domestic supply and monitoring from 1987 and 2004 showed that deep aquifers have dropped by 7 to 19m. The drought of 2002/03 contributed to this decline. By 2004, groundwater levels in deep aquifers had not stabilised and it was unclear by 2004 whether recovery will be permanent.

The Ballina Shire Council report (2004) reviewed the health of the Richmond River catchment and reported that not a single site could be classified as good for aquatic ecosystems. Most of the estuarine sites received a Poor to Very Poor ranking.

Rous Water (2014) have investigated potential future water supply options for domestic supply up until 2060 which include the Alstonville Plateau bores. They acknowledge uncertain water quality and supply yield.

Air temperatures in Australia have increased by 1deg.C since 1910 and have been associated with increases in the frequency and intensity of heat waves (BOM 2018). These trends are expected to continue. The value of macadamias in the Northern Rivers of NSW is $110 million and are predominantly grown on the Alstonville Plateau (AMS 2016). Current management strategies and an increase in temperatures are leading to the industry adopting permanent irrigation to optimise production (James personal communication). Canopy physiology studies (Huett 2004) confirm the benefits of irrigation. Similar trends can be expected to occur with other horticulture industries on the Plateau. This trend will increase the demand for water from the Alstonville aquifers and because of the major effect on the local economy, are a higher priority than the mining and export of water for bottling.

Conclusions

- The 2% available water utilisation estimates provided in the NSW Govt Fact sheet for the Northern Rivers has no credibility when applied to the Alstonville Plateau, and particularly to the Alstonville area.

- Published estimates from Brodie et al confirm that the Alstonville aquifer is a high stress system and the groundwater available for recharge is fully committed to licenced extraction sources. Unlicensed extraction is compounding this problem.
- Short term droughts have caused shallow bores and creeks to run dry, and caused water levels in deep bores to drop. Temperature increases will further exacerbate this problem.
- Studies conducted by Ballina Shire Council and Rous Water have documented an increasing demand for water in the Shire for domestic purposes and a likely future shortfall in meeting this demand. The Alstonville aquifers have been and are designated as possible future sources of domestic water.
- Horticulture industries on the Plateau are expected to adopt irrigation as temperatures and weather extremes increase.
- The "Save Alstonville Aquifer Group" represent the Alstonville and Wollongbar communities who are overwhelmingly opposed to the industrial extraction of water from the aquifer. The uncertainty of future domestic and agricultural water supplies and the consequent impact on the local economy will reinforce the communities' opposition to industrial extraction.