

Socio-economic research into community wellbeing
& resilience in Balonne Shire in response to reduced
water availability due to the Proposed Basin Plan and
other causes



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This report has been prepared for

Balonne Shire Council

by

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1 House of Representatives, Standing Committee on Regional Australia - *Inquiry into the Impact of the Murray-Darling Basin Plan in Regional Australia*

1.1 Introduction

The Balonne Shire Council is located in southern Queensland and includes portions of three Surface Water Sustainable Diversion Limit (SDL) areas including the Condamine-Balonne, Moonie and Nebine.¹

The *Guide* to the Basin Plan, and associated documentation, supports a view that Balonne Shire, with a substantial part of the economy based on irrigation, will be very vulnerable to a permanent reduction in irrigation water, particularly in light of its lower levels of adaptive capacity and higher levels of social and economic disadvantage.

We believe the impact of the introduction of a 3,500 GL SDL at the Basin level on Balonne Shire will be the loss of between 242 and 362 jobs (between 9% and 13% of employment) and with population loss of between 460 and 690 people (between 9% and 13% of population), with these estimates based on using 2000-01 as a reference year. The predicted job and population loss will result in a residualised population with higher levels of disadvantage and decreased indicators of resilience, with this of particular concern in the light of existing low levels of adaptive capacity and high levels of social and economic disadvantage. Aboriginal people will feel a good deal of this impact as their employment opportunities decrease.

We have prepared the following submission to the House of Representatives Standing Committee on Regional Australia inquiry into the Impact of the Murray-Darling Basin Plan in Regional Australia. As per the Terms of Reference, we understand that this inquiry will consider the socio-economic impact of the proposed Murray-Darling Basin Authority's *Guide* to the Proposed Basin Plan on regional communities, with particular reference to:

¹ Murray-Darling Basin Authority (2010) *Guide to the Proposed Basin Plan: Volume 1*, Canberra, Pg 105.

1. The direct and indirect impact of the Proposed Basin Plan on regional communities, including agricultural industries, local business activity and community wellbeing;
2. Options for water-saving measures or water return on a region-by-region basis with consideration given to an analysis of actual usage versus licence entitlement over the preceding fifteen years;
3. The role of governments, the agricultural industry and the research sector in developing and delivering infrastructure and technologies aimed at supporting water efficiency within the Murray-Darling Basin;
4. Measures to increase water efficiency and reduce consumption and their relative cost effectiveness;
5. Opportunities for economic growth and diversification within regional communities; and
6. Previous relevant reform and structural adjustment programs and the impact on communities and regions.

1.2 Response to Terms of Reference

We have prepared our submission in response to the relevant Terms of Reference and have drawn on documentation associated with the *Guide* to the proposed Basin Plan and other sources. We are particularly concerned with, and draw your attention to, our response regarding the likely direct and indirect social and economic impacts of the proposed Sustainable Diversion Limits (SDLs) on the Balonne Shire. The submission also critiques the approaches used by various researchers commissioned by the MDBA to model and quantify the socio-economic impacts of proposed SDLs, and can be found at Appendix A.

1.2.1 The direct and indirect impact of the Proposed Basin Plan on regional communities, including agricultural industries, local business activity and community wellbeing

The social and economic impacts of the proposed SDLs on Balonne Shire are likely to be severe, and opportunities for effective mitigations extremely limited. The *Guide* to the proposed Basin Plan, and its supporting documentation, recognise that the Balonne Shire is likely to be very vulnerable to a permanent reduction in irrigation water, with existing low levels of adaptive capacity and high levels of social and economic disadvantage. The *Guide* and its supporting documentation make the following points about the current status of the Balonne region that demonstrate this vulnerability.

- Severe and prolonged drought across the Basin (from 2000 to 2009) has resulted in a sustained period of substantially reduced water available for economic purposes. This has adversely affected the cash flows and capital and increased the debt levels of farms, households and businesses in the agriculture, forestry and fishing industry and related sectors.²
- Cotton-based regions and communities that are further inland tend to be more sensitive to potential reductions. The Condamine-Balonne is identified as a highly sensitive region³ in this regard due to its reliance on agricultural employment.⁴
- Smaller towns with heavy dependence on irrigated agriculture could experience greater social and economic implications due to their dependence and the lack of alternate industries.⁵ St George and Dirranbandi have been identified as towns highly reliant on expenditure from irrigation farms.⁶
- Communities in the Condamine-Balonne have been identified as having some of the lowest levels of adaptive capacity in the Basin. This means that due to general social and economic disadvantage, and not necessarily a dependence on irrigated agriculture, they are likely to have fewer resources and a lower ability to respond to changes in their circumstances.⁷
- “The Lower Balonne regional economy is probably more reliant on agriculture than any other regional economy in Queensland, with approximately 36% of employment directly in agriculture”.⁸
- “SEIFA data shows the proportion of the population in the most disadvantaged quintile is almost twice the Queensland average”.⁹

² Murray-Darling Basin Authority (2010) Ibid, Pg xxi.

³ “These areas have a combination of a higher dependence on water for agriculture at the farm level and a higher proportion of people in the community who are employed in agriculture and downstream agri-industries, such as food processing plants, abattoirs, canneries, etc compared with other areas. These areas have a very direct connection with irrigated agriculture.” ABARE-BRS (2010b) *Indicators of community vulnerability and adaptive capacity across the Murray-Darling Basin – a focus on irrigation in agriculture*, report for the Murray Darling Basin Authority, Canberra, Pg 25-26.

⁴ Murray-Darling Basin Authority (2010) Op cit, Pg 84.

⁵ Murray-Darling Basin Authority (2010) Ibid, Pg xxi.

⁶ ABARE-BRS (2010a) *Environmentally sustainable diversion limits in the Murray–Darling Basin: socioeconomic analysis*, report for the Murray–Darling Basin Authority, Canberra. Pg 92.

⁷ ABARE-BRS (2010b) Op cit, Pg 26.

⁸ Marsden Jacob Associates, RMCG, EBC Consultants, DBM Consultants, The Australian National University, McLeod, G & Cummins, T (2010b) *Condamine-Balonne community profile: Sustainable yield regions*, report for the Murray–Darling Basin Authority, Canberra, Pg 5.

- While unemployment in the Lower Balonne is low, anecdotally underemployment is high.¹⁰
- “Debt levels are relatively high due to agricultural expansion prior to the drought and during the drought they increased significantly. Banks reluctant to provide further debt funding due to uncertainty of future water availability and higher degree of commercial risk”.¹¹

The Balonne Shire has a predominately agricultural economy, with cotton, wool, beef, grain and horticultural production being the most common industries. The *Guide* to the Proposed Basin Plan, and its supporting documentation, identifies the following impacts to agricultural industries in the Balonne Shire:

- Regional Economic Impacts, with regard to the 3,500 GL basin-wide scenario, for the Condamine-Balonne are predicted to be a \$64-70 million reduction in Gross Value of Irrigated Agricultural Production (GVIAP), a \$61-67 million reduction in Gross Value of Agricultural Production (GVAP) and a –0.1% decrease in employment. For the Moonie region, the impact is calculated to be a \$13-15 million reduction in GVIAP, a \$13-14 million reduction in GVAP and a –0.1% decrease in employment.¹²
- Industries with high water usage but lower or more volatile value products such as broadacre cereals, rice and cotton will be more severely impacted than other industries with higher value products such as grapes, nuts and fruit.¹³
- Reductions in watercourse diversions may lead to further investments in water-use efficiency, some sale of entitlements (where allowed), possible fall in cotton production, shifts to dryland farming, some farmers exiting the industry, property consolidation, possible closure of some cotton gins all resulting in reduced employment opportunities and possible increased migration of people from the region¹⁴

⁹ Marsden Jacob Associates et al (2010b) Ibid, Pg 21.

¹⁰ Marsden Jacob Associates et al (2010b) Ibid, Pg 21.

¹¹ Marsden Jacob Associates et al (2010b) Ibid, Pg 10.

¹² ABARE-BRS (2010c) *Assessing the regional impact of the Murray-Darling Basin Plan and the Australian Government’s Water for the Future Program in the Murray-Darling Basin*.

¹³ Murray-Darling Basin Authority (2010) Ibid, Pg xx.

¹⁴ Murray-Darling Basin Authority (2010) Ibid, Pg 91.

- The most likely response to any permanent and material reduction in SDLs would be a wholesale shift into lower value dryland broadacre crops, with irrigation only being practiced on the rare occasions when water is very plentiful. A wholesale shift out of cotton would be a major concern to the region as irrigated cotton produces over eight times as much employment per hectare as dryland crop alternatives.¹⁵
- Possible benefits to floodplain grazing industry from the reduction of current diversion limits and some reinstatement of natural flooding regimes in the Lower Balonne are likely to be of limited benefit. “These benefits could modestly offset some of the costs associated with reductions in the value of irrigated agriculture, such as cotton production.”¹⁶
- “Potential for extremely low or negative equity in enterprises if SDLs significant – would make accessing capital for adjustment or exiting the industry difficult”.¹⁷
- Increased pressure on irrigators as water services charges for remaining customers [of the St George Irrigation Scheme] as fixed costs of supply are spread across a smaller customer base.¹⁸

The productive capacity of the Balonne Shire is significant. A large proportion of that capacity relies on access to water for irrigation and other uses. Significant reductions in diversion limits in this region will reduce this capacity as there are limited options for alternative higher-value and more efficient uses of water within the infrastructure system as it currently stands.

The *Guide to the Basin Plan*, and its associated documentation, supports a view that Balonne Shire, and indeed any community with a substantial part of the economy based on irrigation, is likely to be very vulnerable to a permanent reduction in irrigation water, particularly in the light of its lower levels of adaptive capacity and higher levels of social and economic disadvantage, and as a result experience significant **social and economic impacts**. As the *Guide* states,

- “Implementing SDLs may have significant social and economic implications for individual entitlement holders and communities across the Basin”.¹⁹

¹⁵ Marsden Jacob Associates, RMCG, EBC Consultants, DBM Consultants, The Australian National University, McLeod, G & Cummins, T (2010) Economic and social profiles and impact assessments for the Murray–Darling Basin Plan: synthesis report, report for the Murray–Darling Basin Authority, Canberra, Pg. 150-151.

¹⁶ Murray-Darling Basin Authority (2010c) *Guide to the Proposed Basin Plan: Volume 2 – Technical Background*, Pg. 233-234.

¹⁷ Marsden Jacob Associates et al (2010b) Ibid, Pg. 11.

¹⁸ Marsden Jacob Associates et al (2010b) Ibid, Pg. 21.

- Any reduction in water availability will affect communities.²⁰ The larger the reduction, the more significant the impact.²¹

With regard to local community impacts the *Guide* and its referenced documents state,

- The small, cotton-dependent communities in the Condamine Balonne are highlighted as particularly at risk of significant social issues due to potential out-migration of cotton-related workers, a subsequent loss of demand for community services and resultant increased welfare-dependency.²²
- Those regions with a relatively high dependence on irrigated agriculture would be expected to experience a larger reduction in economic activity compared to regions with more diverse economic activities. The Condamine–Balonne is identified as a region that is expected to experience the greatest reduction in economic activity.²³
- Decline in the rateable base for local government authorities and reduced demand for community services may result in reduced service provision, reduced access to services, reduced funds for maintenance and investment in community infrastructure, increased pressure on social and community networks.²⁴
- “Demographics likely to change and welfare dependency likely to increase sharply, particular where less mobile workforce (eg Indigenous workers in Dirranbandi)”.²⁵

We have undertaken modelling and a review of ABS data relating to employment and land use over time with regard to the Balonne Shire.

- Based on 2005-06 employment data from the census, we find that the primary impact is a loss of employment of between 5% and 8% across the range of proposed SDLs, or in absolute numbers, between 109 and 172 lost jobs. Correspondingly, population loss of between 7% and 10% is expected, or between 306 and 481 people.

¹⁹ Murray-Darling Basin Authority (2010b) *Summary of Condamine-Balonne from the Guide to the Proposed Basin Plan* and *Summary of Moonie from the Guide to the Proposed Basin Plan*.

²⁰ Murray-Darling Basin Authority (2010) *Op cit*, Pg xx.

²¹ Murray-Darling Basin Authority (2010) *Ibid*, Pg 108.

²² Murray-Darling Basin Authority (2010) *Ibid*, Pg 85.

²³ Murray-Darling Basin Authority (2010) *Ibid*, Pg xx.

²⁴ Murray-Darling Basin Authority (2010) *Ibid*, Pg 98.

²⁵ Marsden Jacob Associates et al (2010b) *Ibid*, Pg. 26.

- Referring to 2000-01 data, and assuming this would be an average year, job losses against this benchmark are likely to be between 242 and 362 jobs (between 9% and 13%) and with population loss of between 460 and 690 people (between 9% and 13%).
- Comparing between 2000-01 and 2005-06, the area of cotton (the major irrigation crop) in Balonne Shire halved as a result of the drought. Over the same period, 17% of jobs and 15% of population were lost, but these losses also reflect jobs in dryland, as well as irrigated agriculture.
- The predicted job and population loss will result in a residualised population with higher levels of disadvantage and decreased indicators of resilience. The impacts are likely to be most felt by Indigenous communities in Balonne Shire.

The Balonne Shire has much greater proportion of Indigenous residents at 14.9% than the Basin or Australia at 4% and 2.3% respectively.²⁶ While many Aboriginal people of the Balonne Shire are likely to welcome proposals (such as the proposed SDLs) that will improve the health and environmental condition of waterways in the area²⁷, it is also likely that Aboriginal residents of the Balonne Shire would have similar concerns to those raised by the Northern Basin Aboriginal Nations and the NSW Aboriginal Land Council regarding the failure of the *Guide* to adequately explore or create a provision for ‘culture flows’²⁸ nor acknowledge the complexity of the relationship between the wellbeing of the agricultural sector and Aboriginal residents in an area (like the Balonne Shire) with little opportunity for significant industry diversification and replacement.

For the Balonne Shire, there is a clear reliance on irrigated agriculture with limited opportunities for diversification and new alternative industries. To a large extent, this employment landscape is similar for Aboriginal and non-Aboriginal residents where a large proportion of both groups of employed residents (20% and 40% respectively) are employed in Agriculture.²⁹ We recognise that there remains a tremendous difference in unemployment rates between the general population

²⁶ ABS (2006) Census of Population and Housing, Quick Stats. ABS (2008) Water and the Murray Darling Basin – A Statistical Profile Australia 2000–01 to 2005-06, Chapter 2 — People in the Murray-Darling Basin

²⁷ MDBA (2010) Ibid, Pg. 98.

²⁸ While there are variations in definition of ‘cultural flows’ the definition accepted by the Murray Lower Darling Rivers Indigenous Nations (MLDRIN) is, “water entitlements that are legally and beneficially owned by the Indigenous Nations of a sufficient and adequate quantity and quality to improve the spiritual, cultural, environmental, social and economic conditions of those Indigenous Nations” as stated by Jackson, S., Moggridge, B., & Robinson C. (2010) Effects of changes in water availability on Indigenous people of the Murray Darling Basin, June. Pg 70.

²⁹ ABS (2006) Census of Population and Housing, Census Tables, Industry of Employment by Indigenous Status for Balonne LGA.

and our Indigenous residents. At the time of the 2006 Census, the unemployment rate across the LGA was 3.3% while for Aboriginal residents the rate was 10.8%.³⁰ However, the jobs held by Aboriginal residents in Balonne Shire in industries outside of Agriculture, such as Retail, Education and Training, and Health Care and Social Assistance are in many ways related and reliant upon the wellbeing of the economic base of the community, which is strongly agricultural, to maintain population and demand for such services. Many of these jobs are likely to be threatened in the face of further population declines and resultant decline in demand for services and retail due to out-migration as a result of a declining agricultural sector.

We share the concerns expressed by the NSW Aboriginal Lands Council that, “the Aboriginal population of the Basin Area would seem to be disproportionately vulnerable to the socio-economic impacts of the proposed Basin Plan reforms”.³¹ We would add that these concerns are particularly relevant for communities in the Northern Basin (of which Balonne is a prime example) which are remote, highly reliant on irrigated agriculture, already include a large proportion of Indigenous residents and have small populations.

1.2.2 Options for water-saving measures or water return on a region-by-region basis with consideration given to an analysis of actual usage versus licence entitlement over the preceding fifteen years

No comment.

1.2.3 The role of governments, the agricultural industry and the research sector in developing and delivering infrastructure and technologies aimed at supporting water efficiency within the Murray-Darling Basin

We believe the Water Act 2007 should be amended to properly take into account the social and economic impacts of SDLs by accounting for the opportunity cost of water. In this regard, we support the recommendations of the Productivity Commission. The Productivity Commission had a number of broad criticisms related to the Water Act and the setting of SDLs. In particular, it strongly recommended that the opportunity cost of water be considered when allocating water to the environment.

³⁰ ABS (2006) Census of Population and Housing, Basic Community Profile and Indigenous Profile for Balonne LGA.

³¹ NSW Aboriginal Lands Council (2010) Comments for the Murray-Darling Basin Authority on the *Guide to the Proposed (Murray-Darling) Basin Plan*, November.

- “SDLs must be based on scientific assessments of the amount of water that is required to avoid compromising key environmental assets and processes. Good science is a necessary but not sufficient basis for optimising the use of the Basin’s water resources. The value people place on environmental outcomes, the opportunity cost of foregone irrigation, and the role of other inputs, such as land management, must also be considered. If the Water Act 2007 (Cwlth) precludes this approach, it should be amended”.³²

The commission was also critical of subsidising infrastructure as a measure to return water to the environment.

- “The same cost effectiveness tests should be applied to all water recovery options. Purchasing water from willing sellers (at appropriate prices) is a cost-effective way of meeting the Government’s liability for policy-induced changes in water availability. Subsidising infrastructure is rarely cost effective in obtaining water for the environment, nor is it likely to be the best way of sustaining irrigation communities”.³³

The *Guide* and its referenced documents propose a number of mitigations in response to the likely social and economic impacts of the proposed SDLs for the regions of the Balonne Shire, particularly developing and delivering infrastructure and technologies to improve water efficiency (including trade and technological advancements – particularly engineering solutions). These proposed mitigations and their limitations, as stated by the *Guide* and referenced documents, are detailed here and include a critique of these stated mitigations as applicable to the Balonne Shire where relevant.

Permanent and Temporary Trade³⁴

- “Permanent water trading between irrigators as a market-driven structural adjustment mechanism is not possible in the Lower Balonne”.³⁵
- “The sale of permanent water to the Commonwealth is now possible in the Lower Balonne”.³⁶

³² Productivity Commission (2010) *Market mechanisms for recovering water in the Murray–Darling Basin*, Productivity Commission research report, Canberra, page xxii.

³³ *Ibid*, page xxii.

³⁴ These comments probably apply to the inability to trade water prior to ROP being finalised this year, however we note that notwithstanding there being ability to trade water, very little has happened.

³⁵ Marsden Jacob Associates, RMCG, EBC Consultants, DBM Consultants, The Australian National University, McLeod, G & Cummins, T (2010) *Economic and social profiles and impact assessments for the Murray–Darling Basin Plan: synthesis report*, report for the Murray–Darling Basin Authority, Canberra, Pg. 150-151.

³⁶ Marsden Jacob Associates et al (2010) *Ibid*, Pg. 150-151.

- The Australian Government conducted its first tender in the Lower Balonne in early 2010, and recently (19 November) advertised a \$100 million water entitlement buy back tender. While the amount purchased from the first tender is not publicly available at this time, the average price offered pursued is stated to be \$1,433.30.³⁷
- Due to the delay in commencing the water buy back program in Queensland, ‘the gap’ between the proposed SDLs and the any entitlements already obtained is large³⁸
- “Temporary water trade is not possible in the Lower Balonne Water Management Area which reduces options for water availability risk management”.³⁹
- “Temporary trade is possible in SunWater’s St George Irrigation Scheme, largely to finish off crops (typically less than 20,000 ML/annum)”.⁴⁰

Given the wide range in the productive use of irrigation water across the Basin, permanent and temporary trade has the opportunity to mitigate impacts at the Basin and national level. However at the local level, some communities are likely to be net exporters of water, with a commensurate loss of business and services and facilities in that community, and the ability to benefit from trade will also depend on connectivity. In the case of Balonne Shire, it could be anticipated that trade will reduce impact on horticultural uses, but will not mitigate any impacts on cotton production. There is limited opportunity to expand horticultural uses of irrigation water in Balonne Shire and they provide a small contribution to the economy.

With regard to the permanent buy back of entitlements by the government, the concept of a “willing buyer and willing seller” is ill defined. It is important that the market rate is paid for water, and that the price recognises the inherent infrastructure cost that has been invested to utilise that water. It is also important to recognise that water markets in the lower Balonne are thinly traded and not mature, the buy back could well be a market maker and as almost sole purchaser will set the price. The most recent value of water sold as part of water and land can be inferred as approximately \$2,200 per ML. A very limited amount of water has been purchased

³⁷ Australian Government (2010) Water for the Future website, accessed online at www.environment.gov.au/water/policy-programs/entitlement-purchasing/average-prices.html, 24 November 2010.

³⁸ Held environmental water to off-set reductions at 30 June 2010: Condamine-Balonne = 1 GL/yr (range of gap 204-274 GL/yr), Moonie = 1 GL/y (range of gap 11-14 GL/yr) as detailed in MDBA (2010) Ibid, Table 11.1 Environmental water available for off-set. Pg. 153.

³⁹ Marsden Jacob Associates et al (2010) Ibid, Pg. 150-151.

⁴⁰ Marsden Jacob Associates et al (2010) Ibid, Pg. 150-151.

under the buy back, with this coming from financially distressed sellers. This water has traded at approximately \$1,400 ML. The concept of a “willing seller - willing buyer” appears to be a farce.

Improvements in Water Use Efficiency

- “Enhancements to scheme efficiencies by SunWater (e.g., lining channels) are limited as they generally are not commercially viable within current pricing arrangements”.⁴¹
- “As most irrigators are now utilising soil moisture testing and efficient application timing, the most likely viable water use efficiency option is to deepen on-farm storages”.⁴²
- “Options for further efficiencies in cotton extremely limited by absence of co-investment”.⁴³

Rizza⁴⁴ states that banks are unlikely to provide funding for the implementation of water efficiency schemes. Such schemes are likely to require considerable investment by government. There are also concerns about the cost effectiveness of such schemes by the Productivity Commission.⁴⁵

In our view, engineering projects that will produce increasing returns into the future need to be favoured over those with reducing returns. If you make a storage deeper the resultant evaporation savings only increase in value over time, however if you invest in lateral move irrigation to replace flood irrigation the machinery will wear out and need replacing.

Engineering projects for water savings should be prioritised and commenced as soon as possible. In addition, these projects and their projected savings should be taken into account when determining the SDL’s. It appears hypocritical to commence a buy back of water on the basis that “it is self evident where water needs to be purchased” but not to urgently address the self evident engineering solutions, such as what could be required at Menindee Lakes.

The cost per ML should not necessarily be the driving factor when deciding which engineering solutions to fund. Projects that save water that is critical to maintaining the viability of Basin Communities must receive priority. The value of reduced social upheaval and a strong Regional

⁴¹ Marsden Jacob Associates et al (2010) Ibid, Pg. 150-151.

⁴² Marsden Jacob Associates et al (2010b) Ibid, Pg. 5.

⁴³ Marsden Jacob Associates et al (2010b) Ibid, Pg. 12.

⁴⁴ Rizza, A, (2010), *The potential effects of changes to water allocation policy on financing the agricultural sector and businesses in the Murray Darling Basin*, page 7.

⁴⁵ Productivity Commission (2010), *Market Mechanisms for recovering water in the Murray-Darling Basin*.

Australia need to be considered along with the cost per ML saved, that is the full cost to the Australian community needs to be assessed.

1.2.4 Measures to increase water efficiency and reduce consumption and their relative cost effectiveness

See comments above

1.2.5 Opportunities for economic growth and diversification within regional communities

The *Guide* and its referenced documents propose a number of mitigations in response to the likely social and economic impacts of the proposed SDLs for the regions of the Balonne Shire, particularly **opportunities for agricultural diversification and the development of alternative industries.**

It is noted that many of these mitigations are based on theoretical considerations, however ‘real world’ considerations are more complex. Rizza (2010)⁴⁶ is informative in this regard, as many of these mitigations rely on access to capital, and that report states the position of banks with regard to the provision of funding for the implementation of mitigation proposals. The banks also have a good knowledge of the practical position of local enterprises likely to be affected by the introduction of SDLs.

These proposed mitigations and their limitations, as stated by the *Guide* and referenced documents, are detailed here and include a critique of these stated mitigations as applicable to the Balonne Shire where relevant.

Crop & Agriculture Diversification

- “Opportunities for diversification into higher value crops (margins per ML) are agronomically possible but options are commercially limited by a lack of competitive advantage in the Lower Balonne and access to capital; markets tend to be very small and wholesale crop changes would likely result in significant reductions in prices received (due to oversupply into key markets)”⁴⁷

⁴⁶ Rizza, A, (2010), *The potential effects of changes to water allocation policy on financing the agricultural sector and businesses in the Murray Darling Basin.*

⁴⁷ Marsden Jacob Associates et al (2010) Ibid, Pg. 150-151.

- “Significant moves into irrigated grapes are unlikely to be commercially viable due to constrained demand”.⁴⁸
- “Growth in other sectors (particularly beef) to offset losses in irrigated agriculture is likely in the long term, but could also be constrained by other factors (eg. vegetation management regulations)”.⁴⁹
- “Opportunities for market-led transformation into other forms of agriculture are limited in the absence of structural adjustment”.⁵⁰
- Diversification strategies by agribusinesses are likely to focus outside their community of origin and so are unlikely to flow to local communities.⁵¹

Alternative Industries

- “From a structural adjustment perspective, the Lower Balonne provides a difficult challenge as there are few, if any, viable alternative economic activity opportunities in the region.”⁵²
- “Modest but expanding tourism industry, centred on region’s natural and historic heritage and recreational activities. Many ‘grey nomads’ injecting relatively minor expenditure in local economy.”⁵³

The only alternative industry to irrigated agriculture in Balonne Shire is dryland grazing and/or opportunistic dryland cropping, with much lower returns compared to irrigated cropping. The area lacks other attributes such as extractive industry or tourism to act as a suitable replacement for the irrigated agricultural sector.

⁴⁸ Marsden Jacob Associates et al (2010b) Ibid, Pg. 15.

⁴⁹ Marsden Jacob Associates et al (2010b) Ibid, Pg. 21.

⁵⁰ Marsden Jacob Associates et al (2010b) Ibid, Pg. 23.

⁵¹ Rizza (2010) at page 12.

⁵² Marsden Jacob Associates et al (2010) Ibid, Pg. 152.

⁵³ Marsden Jacob Associates et al (2010b) Ibid, Pg. 19.

Free movement of displaced labour

Compensation for funds received from a water buyback scheme is likely to transfer directly to banks. Little of these funds will stay in the local community. The sale of permanent water attached to farm land is likely to lead to a reduction in the capacity of that land, even where temporary water is available. Consequently, once the permanent water has been sold, the remaining land will be treated as dry land and the value, and ability to borrow to restructure, will reduce markedly. Without water, much infrastructure will be valueless. For 80% of small businesses in the basin with loans, their security is the family home. As the value of those homes falls, small business owners are unlikely to retain sufficient equity after retiring debt to start again. These businesses employ 90% of workers in many regions in the basin. Other larger scale businesses will also be effected as throughput decreases. Businesses dependent on the irrigation sector are unlikely to be provided with compensation with the introduction of SDLs.⁵⁴ The net effect of these considerations will be that many people will have limited or no economic resources with which to relocate or start again. It might be that for many of them, the best outcome is to stay in a home they own and receive welfare payments, rather than relocate to an uncertain future living in rental accommodation, particularly for older people.

1.2.6 Previous relevant reform and structural adjustment programs and the impact on communities and regions

No comment.

⁵⁴ Rizza (2010) pages 6, 7, 11, 12, 17, 22, 23, 28, 29, 30, 32, 36, 39 and 40.

2 Senate Standing Committee on Rural Affairs and Transport - *Inquiry: The Management of the Murray Darling Basin*

2.1 Introduction

The Balonne Shire Council is located in southern Queensland and includes portions of three Surface Water Sustainable Diversion Limit (SDL) areas including the Condamine-Balonne, Moonie and Nebine.⁵⁵

The *Guide to the Basin Plan*, and associated documentation, supports a view that Balonne Shire, with a substantial part of the economy based on irrigation, will be very vulnerable to a permanent reduction in irrigation water, particularly in light of its lower levels of adaptive capacity and higher levels of social and economic disadvantage.

We believe the impact of the introduction of a 3,500 GL SDL at the Basin level on Balonne Shire will be the loss of between 242 and 362 jobs (between 9% and 13% of employment) and with population loss of between 460 and 690 people (between 9% and 13% of population), with these estimates based on using 2000-01 as a reference year. The predicted job and population loss will result in a residualised population with higher levels of disadvantage and decreased indicators of resilience, with this of particular concern in the light of existing low levels of adaptive capacity and high levels of social and economic disadvantage. A good deal of this impact will be felt by Aboriginal people as their employment opportunities decrease.

We have prepared the following submission to the Senate Standing Committee on Rural Affairs and Transport inquiry, *The Management of the Murray-Darling Basin*. As per the Terms of Reference, we understand that this inquiry will consider the management of the Murray-Darling Basin, and the development and implementation of the Basin Plan, with particular reference to:

- (a) the implications for agriculture and food production and the environment;
- (b) the social and economic impacts of changes proposed in the Basin;

⁵⁵ Murray-Darling Basin Authority (2010) *Guide to the Proposed Basin Plan: Volume 1*, Canberra, Pg 105.

- (c) the impact on sustainable productivity and on the viability of the Basin;
- (d) the opportunities for a national reconfiguration of rural and regional Australia and its agricultural resources against the background of the Basin Plan and the science of the future;
- (e) the extent to which options for more efficient water use can be found and the implications of more efficient water use, mining and gas extraction on the aquifer and its contribution to run off and water flow;
- (f) the opportunities for producing more food by using less water with smarter farming and plant technology;
- (g) the national implications of foreign ownership, including:
 - (i) corporate and sovereign takeover of agriculture land and water, and
 - (ii) water speculators;
- (h) means to achieve sustainable diversion limits in a way that recognises production efficiency;
- (i) options for all water savings including use of alternative basins; and
- (j) any other related matters.

2.2 Response to Terms of Reference

We have prepared our submission in response to the relevant Terms of Reference and have drawn on documentation associated with the *Guide to the proposed Basin Plan* and other sources. We are particularly concerned with, and draw your attention to, our response regarding the likely socio-economic impacts of the proposed Sustainable Diversion Limits (SDLs) on the Balonne Shire. The submission also critiques the approaches used by various researchers commissioned by the MDBA to model and quantify the socio-economic impacts of proposed SDLs, and can be found at Appendix A.

2.2.1 (a) the implications for agriculture and food production and the environment

The Balonne Shire has a predominately agricultural economy, with cotton, wool, beef, grain and horticultural production being the most common industries.

The *Guide to the Proposed Basin Plan*, and its supporting documentation, identifies the following **implications for agriculture** in the Balonne Shire:

- Regional Economic Impacts, with regard to the 3,500 GL basin-wide scenario, for the Condamine-Balonne are predicted to be a \$64-70 million reduction in Gross Value of

Irrigated Agricultural Production (GVIAP), a \$61-67 million reduction in Gross Value of Agricultural Production (GVAP) and a -0.1% decrease in employment. For the Moonie region, the impact is calculated to be a \$13-15 million reduction in GVIAP, a \$13-14 million reduction in GVAP and a -0.1% decrease in employment.⁵⁶

- Industries with high water usage but lower or more volatile value products such as broadacre cereals, rice and cotton will be more severely impacted than other industries with higher value products such as grapes, nuts and fruit.⁵⁷
- Reductions in watercourse diversions may lead to further investments in water-use efficiency, some sale of entitlements (where allowed), possible fall in cotton production, shifts to dryland farming, some farmers exiting the industry, property consolidation, possible closure of some cotton gins all resulting in reduced employment opportunities and possible increased migration of people from the region.⁵⁸
- The most likely response to any permanent and material reduction in SDLs would be a wholesale shift into lower value dryland broadacre crops, with irrigation only being practiced on the rare occasions when water is very plentiful. A wholesale shift out of cotton would be a major concern to the region as irrigated cotton produces over eight times as much employment per hectare as dryland crop alternatives.⁵⁹
- Possible benefits to floodplain grazing industry from the reduction of current diversion limits and some reinstatement of natural flooding regimes in the Lower Balonne are likely to be of limited benefit. “These benefits could modestly offset some of the costs associated with reductions in the value of irrigated agriculture, such as cotton production.”⁶⁰
- “Potential for extremely low or negative equity in enterprises if SDLs significant – would make accessing capital for adjustment or exiting the industry difficult”.⁶¹
- Increased pressure on irrigators as water services charges for remaining customers [of the St George Irrigation Scheme] as fixed costs of supply are spread across a smaller customer base.⁶²

The productive capacity of the Balonne Shire is significant. A large proportion of that capacity relies on access to water for irrigation and other uses. Significant reductions in diversion limits in this region will reduce this capacity as there are limited options for alternative higher-value and

⁵⁶ ABARE-BRS (2010c) *Assessing the regional impact of the Murray-Darling Basin Plan and the Australian Government's Water for the Future Program in the Murray-Darling Basin*.

⁵⁷ Murray-Darling Basin Authority (2010) *Ibid*, Pg xx.

⁵⁸ Murray-Darling Basin Authority (2010) *Ibid*, Pg 91.

⁵⁹ Marsden Jacob Associates, RMCG, EBC Consultants, DBM Consultants, The Australian National University, McLeod, G & Cummins, T (2010) *Economic and social profiles and impact assessments for the Murray-Darling Basin Plan: synthesis report, report for the Murray-Darling Basin Authority, Canberra, Pg. 150-151.*

⁶⁰ Murray-Darling Basin Authority (2010c) *Guide to the Proposed Basin Plan: Volume 2 – Technical Background*, Pg. 233-234.

⁶¹ Marsden Jacob Associates et al (2010b) *Ibid*, Pg. 11.

⁶² Marsden Jacob Associates et al (2010b) *Ibid*, Pg. 21.

more efficient uses of water within the infrastructure system as it currently stands. The proposed SDLs will result in a reduced productive capacity in both the dry and wet years.

With regard to the environment, there are a number of engineering projects that have been developed on-farm and on private land to regulate flow to wetlands and other areas. Without on-farm stewards of the environment to maintain this infrastructure, these interventions and investment in management will be lost.

2.2.2 (b) the social and economic impacts of changes proposed in the Basin

The **social and economic impacts** of the proposed SDLs on Balonne Shire are likely to be severe, and opportunities for effective mitigations extremely limited. The *Guide to the proposed Basin Plan*, and its supporting documentation, recognise that the Balonne Shire is likely to be very vulnerable to a permanent reduction in irrigation water, with existing low levels of adaptive capacity and high levels of social and economic disadvantage. The Guide and its supporting documentation make the following points about the current status of the Balonne region that demonstrate this vulnerability.

- Severe and prolonged drought across the Basin (from 2000 to 2009) has resulted in a sustained period of substantially reduced water available for economic purposes. This has adversely affected the cash flows and capital and increased the debt levels of farms, households and businesses in the agriculture, forestry and fishing industry and related sectors.⁶³
- Cotton-based regions and communities that are further inland tend to be more sensitive to potential reductions. The Condamine-Balonne is identified as a highly sensitive region⁶⁴ in this regard due to its reliance on agricultural employment.⁶⁵
- Smaller towns with heavy dependence on irrigated agriculture could experience greater social and economic implications due to their dependence and the lack of alternate industries.⁶⁶ St George and Dirranbandi have been identified as towns highly reliant on expenditure from irrigation farms.⁶⁷

⁶³ Murray-Darling Basin Authority (2010) Ibid, Pg xxi.

⁶⁴ “These areas have a combination of a higher dependence on water for agriculture at the farm level and a higher proportion of people in the community who are employed in agriculture and downstream agri-industries, such as food processing plants, abattoirs, canneries, etc compared with other areas. These areas have a very direct connection with irrigated agriculture.” ABARE-BRS (2010b) *Indicators of community vulnerability and adaptive capacity across the Murray-Darling Basin – a focus on irrigation in agriculture*, report for the Murray Darling Basin Authority, Canberra, Pg 25-26.

⁶⁵ Murray-Darling Basin Authority (2010) Ibid, Pg 84.

⁶⁶ Murray-Darling Basin Authority (2010) Ibid, Pg xxi.

⁶⁷ ABARE-BRS (2010a) *Environmentally sustainable diversion limits in the Murray–Darling Basin: socioeconomic analysis*, report for the Murray–Darling Basin Authority, Canberra. Pg 92.

- Communities in the Condamine-Balonne have been identified as having some of the lowest levels of adaptive capacity in the Basin. This means that due to general social and economic disadvantage, and not necessarily a dependence on irrigated agriculture, they are likely to have fewer resources and a lower ability to respond to changes in their circumstances.⁶⁸
- “The Lower Balonne regional economy is probably more reliant on agriculture than any other regional economy in Queensland, with approximately 36% of employment directly in agriculture”.⁶⁹
- “SEIFA data shows the proportion of the population in the most disadvantaged quintile is almost twice the Queensland average”.⁷⁰
- While unemployment in the Lower Balonne is low, anecdotally underemployment is high.⁷¹
- “Debt levels are relatively high due to agricultural expansion prior to the drought and during the drought they increased significantly. Banks reluctant to provide further debt funding due to uncertainty of future water availability and higher degree of commercial risk”.⁷²

The *Guide to the Basin Plan*, and its associated documentation, supports a view that Balonne Shire, and indeed any community with a substantial part of the economy based on irrigation, is likely to be very vulnerable to a permanent reduction in irrigation water, particularly in the light of its lower levels of adaptive capacity and higher levels of social and economic disadvantage, and as a result experience significant **social and economic impacts**. As the Guide states,

- “Implementing SDLs may have significant social and economic implications for individual entitlement holders and communities across the Basin”.⁷³
- Any reduction in water availability will affect communities.⁷⁴ The larger the reduction, the more significant the impact.⁷⁵

With regard to local community impacts the Guide and its referenced documents state,

⁶⁸ ABARE-BRS (2010b) Ibid, Pg 26.

⁶⁹ Marsden Jacob Associates, RMCg, EBC Consultants, DBM Consultants, The Australian National University, McLeod, G & Cummins, T (2010b) *Condamine-Balonne community profile: Sustainable yield regions*, report for the Murray–Darling Basin Authority, Canberra, Pg 5.

⁷⁰ Marsden Jacob Associates et al (2010b) Ibid, Pg 21.

⁷¹ Marsden Jacob Associates et al (2010b) Ibid, Pg 21.

⁷² Marsden Jacob Associates et al (2010b) Ibid, Pg 10.

⁷³ Murray-Darling Basin Authority (2010b) *Summary of Condamine-Balonne from the Guide to the Proposed Basin Plan and Summary of Moonie from the Guide to the Proposed Basin Plan*.

⁷⁴ Murray-Darling Basin Authority (2010) Ibid, Pg xx.

⁷⁵ Murray-Darling Basin Authority (2010) Ibid, Pg 108.

- The small, cotton-dependent communities in the Condamine Balonne are highlighted as particularly at risk of significant social issues due to potential out-migration of cotton-related workers, a subsequent loss of demand for community services and resultant increased welfare-dependency.⁷⁶
- Those regions with a relatively high dependence on irrigated agriculture would be expected to experience a larger reduction in economic activity compared to regions with more diverse economic activities. The Condamine–Balonne is identified as a region that is expected to experience the greatest reduction in economic activity.⁷⁷
- Decline in the rateable base for local government authorities and reduced demand for community services may result in reduced service provision, reduced access to services, reduced funds for maintenance and investment in community infrastructure, increased pressure on social and community networks.⁷⁸
- “Demographics likely to change and welfare dependency likely to increase sharply, particular where less mobile workforce (eg Indigenous workers in Dirranbandi)”.⁷⁹

We have undertaken modelling and a review of ABS data relating to employment and land use over time with regard to the Balonne Shire.

- Based on the 2005-06 data, we find that the primary impact is a loss of employment of between 5% and 8% across the range of proposed SDLs, or in absolute numbers, between 109 and 172 lost jobs. Correspondingly, population loss of between 7% and 10% is expected, or between 306 and 481 people.
- Referring to 2000-01 data, and assuming this would be an average year, job losses against this benchmark are likely to be between 242 and 362 jobs (between 9% and 13%) and with population loss of between 460 and 690 people (between 9% and 13%).
- Comparing between 2000-01 and 2005-06, the area of cotton (the major irrigation crop) in Balonne Shire halved. Over the same period, 17% of jobs and 15% of population were lost, but these losses also reflect jobs in dryland, as well as irrigated agriculture.
- The predicted job and population loss will result in a residualised population with higher levels of disadvantage and decreased indicators of resilience. The impacts are likely to be most felt by Indigenous communities in Balonne Shire.

⁷⁶ Murray-Darling Basin Authority (2010) Ibid, Pg 85.

⁷⁷ Murray-Darling Basin Authority (2010) Ibid, Pg xx.

⁷⁸ Murray-Darling Basin Authority (2010) Ibid, Pg 98.

⁷⁹ Marsden Jacob Associates et al (2010b) Ibid, Pg. 26.

Our residents have expressed serious concerns about the potential ‘domino effect’ of population and employment loss as a result of the proposed reductions. As one resident said,

“We are a town with a delicate or fragile community fabric, with only just enough people for certain things to happen. If we lose people a whole lot of things will start disappearing. One teacher might go, and then all of the supports for that one teacher will go. Maybe next it is the dentist or the tennis coach. A whole lot of little things build up and cause more people to go. This is what has not been thought through yet.”

The Balonne Shire has much greater proportion of Indigenous residents at 14.9% than the Basin or Australia at 4% and 2.3% respectively.⁸⁰ While many Aboriginal people of the Balonne Shire are likely to welcome proposals (such as the proposed SDLs) that will improve the health and environmental condition of waterways in the area⁸¹, it is also likely that Aboriginal residents of the Balonne Shire would have similar concerns to those raised by the Northern Basin Aboriginal Nations and the NSW Aboriginal Land Council regarding the failure of the Guide to adequately explore or create a provision for ‘culture flows’⁸² nor acknowledge the complexity of the relationship between the wellbeing of the agricultural sector and Aboriginal residents in an area (like the Balonne Shire) with little opportunity for significant industry diversification and replacement.

For the Balonne Shire, there is a clear reliance on irrigated agriculture with limited opportunities for diversification and new alternative industries. To a large extent, this employment landscape is similar for Aboriginal and non-Aboriginal residents where a large proportion of both groups of employed residents (20% and 40% respectively) are employed in Agriculture.⁸³ We recognise that there remains a tremendous difference in unemployment rates between the general population and our Indigenous residents. At the time of the 2006 Census, the unemployment rate across the LGA was 3.3% while for Aboriginal residents the rate was 10.8%.⁸⁴ However, the jobs held by Aboriginal residents in Balonne Shire in industries outside of Agriculture, such as Retail,

⁸⁰ ABS (2006) Census of Population and Housing, Quick Stats. ABS (2008) Water and the Murray Darling Basin – A Statistical Profile Australia 2000–01 to 2005-06, Chapter 2 — People in the Murray-Darling Basin

⁸¹ MDBA (2010) Ibid, Pg. 98.

⁸² While there are variations in definition of ‘cultural flows’ the definition accepted by the Murray Lower Darling Rivers Indigenous Nations (MLDRIN) is, “water entitlements that are legally and beneficially owned by the Indigenous Nations of a sufficient and adequate quantity and quality to improve the spiritual, cultural, environmental, social and economic conditions of those Indigenous Nations” as stated by Jackson, S., Moggridge, B., & Robinson C. (2010) Effects of changes in water availability on Indigenous people of the Murray Darling Basin, June. Pg 70.

⁸³ ABS (2006) Census of Population and Housing, Census Tables, Industry of Employment by Indigenous Status for Balonne LGA.

⁸⁴ ABS (2006) Census of Population and Housing, Basic Community Profile and Indigenous Profile for Balonne LGA.

Education and Training, and Health Care and Social Assistance are in many ways related and reliant upon the wellbeing of the economic base of the community, which is strongly agricultural, to maintain population and demand for such services. Many of these jobs would likely be threatened in the face of further population declines and resultant decline in demand for services and retail due to out-migration as a result of a declining agricultural sector.

We share the concerns expressed by the NSW Aboriginal Lands Council that, “the Aboriginal population of the Basin Area would seem to be disproportionately vulnerable to the socio-economic impacts of the proposed Basin Plan reforms”.⁸⁵ We would add that these concerns are particularly relevant for communities in the Northern Basin (of which Balonne is a prime example) which are remote, highly reliant on irrigated agriculture, already include a large proportion of Indigenous residents and have small populations.

2.2.3 (c) the impact on sustainable productivity and on the viability of the Basin

No comment

2.2.4 (d) the opportunities for a national reconfiguration of rural and regional Australia and its agricultural resources against the background of the Basin Plan and the science of the future

The *Guide* and its referenced documents propose a number of mitigations in response to the likely social and economic impacts of the proposed SDLs for the regions of the Balonne Shire, particularly **opportunities for reconfiguration of agricultural resources** (through crop and agriculture diversification) and the development of alternative industries.

It is noted that many of these mitigations are based on theoretical considerations, however ‘real world’ considerations are more complex. Rizza (2010)⁸⁶ is informative in this regard, as many of these mitigations rely on access to capital, and that report states the position of banks with regard to the provision of funding for the implementation of mitigation proposals. The banks also have a good knowledge of the practical position of local enterprises likely to be affected by the introduction of SDLs.

⁸⁵ NSW Aboriginal Lands Council (2010) Comments for the Murray-Darling Basin Authority on the Guide to the Proposed (Murray-Darling) Basin Plan, November.

⁸⁶ Rizza, A, (2010), *The potential effects of changes to water allocation policy on financing the agricultural sector and businesses in the Murray Darling Basin*.

These proposed mitigations and their limitations, as stated by the *Guide* and referenced documents, are detailed here and include a critique of these stated mitigations as applicable to the Balonne Shire where relevant.

Crop & Agriculture Diversification

- “Opportunities for diversification into higher value crops (margins per ML) are agronomically possible but options are commercially limited by a lack of competitive advantage in the Lower Balonne and access to capital; markets tend to be very small and wholesale crop changes would likely result in significant reductions in prices received (due to oversupply into key markets)”.⁸⁷
- “Significant moves into irrigated grapes are unlikely to be commercially viable due to constrained demand”.⁸⁸
- “Growth in other sectors (particularly beef) to offset losses in irrigated agriculture is likely in the long term, but could also be constrained by other factors (eg. vegetation management regulations)”.⁸⁹
- “Opportunities for market-led transformation into other forms of agriculture are limited in the absence of structural adjustment”.⁹⁰

Diversification strategies by agribusinesses are likely to focus outside their community of origin and so are unlikely to flow to local communities.⁹¹ The desire to diversify is not sufficient to ensure a successful transition, as these types of innovations and adjustments are largely market driven. Farmers are researching these types of opportunities regularly, and are often doing what best suits their capabilities and market realities.

Alternative Industries

- “From a structural adjustment perspective, the Lower Balonne provides a difficult challenge as there are few, if any, viable alternative economic activity opportunities in the region.”⁹²
- “Modest but expanding tourism industry, centred on region’s natural and historic heritage and recreational activities. Many ‘grey nomads’ injecting relatively minor expenditure in local economy.”⁹³

⁸⁷ Marsden Jacob Associates et al (2010) Ibid, Pg. 150-151.

⁸⁸ Marsden Jacob Associates et al (2010b) Ibid, Pg. 15.

⁸⁹ Marsden Jacob Associates et al (2010b) Ibid, Pg. 21.

⁹⁰ Marsden Jacob Associates et al (2010b) Ibid, Pg. 23.

⁹¹ Rizza (2010) at page 12.

⁹² Marsden Jacob Associates et al (2010) Ibid, Pg. 152.

The only alternative industry to irrigated agriculture in Balonne Shire is dryland grazing and/or opportunistic dryland cropping, with much lower returns compared to irrigated cropping. The area lacks other attributes such as extractive industry or tourism to act as a suitable replacement for the irrigated agricultural sector.

While tourism and providing ‘alternative lifestyle’ for migrants has the potential to add some opportunity to an area like Balonne Shire, there are plenty of other rural and regional areas competing for the same limited resource. It will never be anywhere near a replacement for the core business of our community, which is agriculture.

2.2.5 (e) the extent to which options for more efficient water use can be found and the implications of more efficient water use, mining and gas extraction on the aquifer and its contribution to run off and water flow

The *Guide* and its referenced documents propose a number of mitigations in response to the likely social and economic impacts of the proposed SDLs for the regions of the Balonne Shire, particularly **options for more efficient water use** (including trade and technological advancements – particularly engineering solutions). These proposed mitigations and their limitations, as stated by the *Guide* and referenced documents, are detailed here and include a critique of these stated mitigations as applicable to the Balonne Shire where relevant.

Permanent and Temporary Trade⁹⁴

- “Permanent water trading between irrigators as a market-driven structural adjustment mechanism is not possible in the Lower Balonne”.⁹⁵
- “The sale of permanent water to the Commonwealth is now possible in the Lower Balonne”.⁹⁶
 - The Australian Government conducted its first tender in the Lower Balonne in early 2010, and recently (19 November) advertised a \$100 million water entitlement buy back tender. While the amount purchased from the first tender is

⁹³ Marsden Jacob Associates et al (2010b) Ibid, Pg. 19.

⁹⁴ These comments probably apply to the inability to trade water prior to ROP being finalised this year, however we note that notwithstanding there being ability to trade water, very little has happened.

⁹⁵ Marsden Jacob Associates, RMCG, EBC Consultants, DBM Consultants, The Australian National University, McLeod, G & Cummins, T (2010) Economic and social profiles and impact assessments for the Murray–Darling Basin Plan: synthesis report, report for the Murray–Darling Basin Authority, Canberra, Pg. 150-151.

⁹⁶ Marsden Jacob Associates et al (2010) Ibid, Pg. 150-151.

not publicly available at this time, the average price of offer pursued is stated to be \$1,433.30.⁹⁷

- Due to the delay in commencing the water buy back program in Queensland, ‘the gap’ between the proposed SDLs and the any entitlements already obtained is large.⁹⁸
- “Temporary water trade is not possible in the Lower Balonne Water Management Area which reduces options for water availability risk management”.⁹⁹
- “Temporary trade is possible in SunWater’s St George Irrigation Scheme, largely to finish off crops (typically less than 20,000 ML/annum)”.¹⁰⁰

Given the wide range in the productive use of irrigation water across the Basin, permanent and temporary trade has the opportunity to mitigate impacts at the Basin and national level. However at the local level, some communities are likely to be net exporters of water, with a commensurate loss of business and services and facilities in that community, and the ability to benefit from trade will also depend on connectivity. In the case of Balonne Shire, it could be anticipated that trade will reduce impact on horticultural uses, but will not mitigate any impacts on cotton production. There is limited opportunity to expand horticultural uses of irrigation water in Balonne Shire and they provide a small contribution to the economy.

With regard to the permanent buy back of entitlements by the government, the concept of a “willing buyer and willing seller” is ill defined. It is important that the market rate is paid for water, and that the price recognises the inherent infrastructure cost that has been invested to utilise that water. It is also important to recognise that water markets in the lower Balonne are thinly traded and not mature, the buy back could well be a market maker and as almost sole purchaser will set the price. The most recent value of water sold as part of water and land can be inferred as approximately \$2,200 per ML. A very limited amount of water has been purchased under the buy back, with this coming from financially distressed sellers. This water has traded at approximately \$1,400 ML. The concept of a “willing seller - willing buyer” appears to be a farce.

Improvements in Water Use Efficiency

- “Enhancements to scheme efficiencies by SunWater (e.g., lining channels) are limited as they generally are not commercially viable within current pricing arrangements”.¹⁰¹

⁹⁷ Australian Government (2010) Water for the Future website, accessed online at www.environment.gov.au/water/policy-programs/entitlement-purchasing/average-prices.html, 24 November 2010.

⁹⁸ Held environmental water to off-set reductions at 30 June 2010: Condamine-Balonne = 1 GL/yr (range of gap 204-274 GL/yr), Moonie = 1 GL/y (range of gap 11-14 GL/yr) as detailed in MDBA (2010) Ibid, Table 11.1 Environmental water available for off-set. Pg. 153.

⁹⁹ Marsden Jacob Associates et al (2010) Ibid, Pg. 150-151.

¹⁰⁰ Marsden Jacob Associates et al (2010) Ibid, Pg. 150-151.

¹⁰¹ Marsden Jacob Associates et al (2010) Ibid, Pg. 150-151.

- “As most irrigators are now utilising soil moisture testing and efficient application timing, the most likely viable water use efficiency option is to deepen on-farm storages”.¹⁰²
- “Options for further efficiencies in cotton extremely limited by absence of co-investment”.¹⁰³

Rizza¹⁰⁴ states that banks are unlikely to provide funding for the implementation of water efficiency schemes. Such schemes are likely to require considerable investment by government. There are also concerns about the cost effectiveness of such schemes by the Productivity Commission.¹⁰⁵

In our view, engineering projects that will produce increasing returns into the future need to be favoured over those with reducing returns. If you make a storage deeper the resultant evaporation savings only increase in value over time, however if you invest in lateral move irrigation to replace flood irrigation the machinery will wear out and need replacing.

Engineering projects for water savings should be prioritised and commenced as soon as possible. In addition, these projects and their projected savings should be taken into account when determining the SDL’s. It appears hypocritical to commence a buy back of water on the basis that “it is self evident where water needs to be purchased” but not to urgently address the self evident engineering solutions, such as what could be required at Menindee Lakes.

The cost per ML should not necessarily be the driving factor when deciding which engineering solutions to fund. Projects that save water that is critical to maintaining the viability of Basin Communities must receive priority. The value of reduced social upheaval and a strong Regional Australia need to be considered along with the cost per ML saved, that is the full cost to the Australian community needs to be assessed.

2.2.6 (f) the opportunities for producing more food by using less water with smarter farming and plant technology

No comment

¹⁰² Marsden Jacob Associates et al (2010b) Ibid, Pg. 5.

¹⁰³ Marsden Jacob Associates et al (2010b) Ibid, Pg. 12.

¹⁰⁴ Rizza (2010) at page 7.

¹⁰⁵ ¹⁰⁵ Productivity Commission (2010), *Market Mechanisms for recovering water in the Murray-Darling Basin*.

2.2.7 (g) the national implications of foreign ownership, including:

(i) corporate and sovereign takeover of agriculture land and water,
and

(ii) water speculators

No comment

2.2.8 (h) means to achieve sustainable diversion limits in a way that recognises production efficiency

No comment

2.2.9 (i) options for all water savings including use of alternative basins

No comment

2.2.10 (j) any other related matters

We believe the Water Act 2007 should be amended to properly take into account the social and economic impacts of SDLs by accounting for the opportunity cost of water. In this regard, we support the recommendations of the Productivity Commission. The Productivity Commission had a number of broad criticisms related to the Water Act and the setting of SDLs. In particular, it strongly recommended that the opportunity cost of water be considered when allocating water to the environment.

- “SDLs must be based on scientific assessments of the amount of water that is required to avoid compromising key environmental assets and processes. Good science is a necessary but not sufficient basis for optimising the use of the Basin’s water resources. The value people place on environmental outcomes, the opportunity cost of foregone irrigation, and the role of other inputs, such as land management, must also be considered. If the Water Act 2007 (Cwlth) precludes this approach, it should be amended”.¹⁰⁶

We are particularly concerned with many aspects of the economic modelling carried out in support of the Basin Plan. More detailed comments are attached at Appendix A.

¹⁰⁶ Productivity Commission (2010) *Market mechanisms for recovering water in the Murray–Darling Basin*, Productivity Commission research report, Canberra, page xxii.

Appendix A: Critique of Basin Plan Economic Modelling

While the documentation referenced in the *Guide to the proposed Basin Plan* is generally quite clear with regard to the overwhelmingly adverse nature of the qualitative impacts of the introduction of SDLs, economic modelling carried out for the Guide has a number of areas of concern.

These include:

- Lack of transparency
- Incorrect or limiting assumptions
- Inappropriate methodology
- A failure to consider opportunity cost
- A lack of alignment with empirical data
- High degree of sensitivity to small variations in assumptions
- A failure to compare alternate futures
- Different methodologies applied to benefits and to costs

The effect of these various concerns appears to be to systematically understate the negative socio-economic impacts of the introduction of SDLs.

Lack of transparency

In our view, a transparent analysis would consider the impacts of policy initiatives separately, with clearly defined system boundaries around time and geography, and would vary one thing at a time.

The ABARE-BRS (2010a & c)¹⁰⁷ approach, and the results presented in the *Guide to the Proposed Basin Plan*, reflect the long run predictions, and at the national, basin and regional scale. The model has two partes, the Water Trade model and the AusRegion model. The Water Trade model allows water to trade between various uses so that it is allocated to the most profitable use.

¹⁰⁷ ABARE–BRS (Australian Bureau of Agricultural and Resource Economics – Bureau of Rural Sciences) (2010a) *Environmentally sustainable diversion limits in the Murray–Darling Basin: socioeconomic analysis*, report for the Murray–Darling Basin Authority, Canberra; ABARE–BRS (2010c) *Assessing the regional impact of the Murray–Darling Basin Plan and the Australian Government’s Water for the Future program in the Murray–Darling Basin*, report for the Department of Sustainability, Environment, Water, Population and Communities, Canberra.

The effect on GVIAP is then calculated, and the AusRegion model then models the impacts of reduction in the GVIAP on the regional economy.

The results as presented have essentially two transparent inputs, reduced irrigation water with and without buyback, and three outputs, the long term impact on Gross Regional Product with and without the introduction of water purchases and the long term impact on unemployment. In fact there are three inputs tested. These are the introduction of SDLs, the removal of restrictions to trade within the MDB and the impact of buybacks. These inputs then generate two outputs, the impact on GVIAP with and without buybacks. This data is then further processed with two outputs generated, the long term impact on employment and GRP with and without the buyback. While the impact on GRP may be correct, the impact on unemployment is probably because of a reduction in immigration allowing an opportunity for displaced labour to be taken up by other industries, as there is a marked discrepancy between predicted change in employment and change in GRP. Other modelling commissioned by the authority takes a similar approach.

A transparent presentation would show the effect on GVIAP without trade, then show the mitigating effect attributed to trade. The immediate impact on employment would then be shown, at different levels and in absolute numbers as well as percentage. The quantum of those supposed to be employed by other industries would then be explicitly stated. If the conclusion is that, for example, a large number of people will be unemployed but that that number is proportionally small at the scale of the Australian economy, then that should be explicitly stated. Such an approach would separate out the effects of the three (not two) policy initiatives modelled, and would present those effects across a range of temporal and geographical scales, showing the short run and long run impacts and the differential geographic impact. Importantly, it would show the effects of the removal of trade restrictions in mitigating socio-economic impacts rather than conflating their removal with the introduction of SDLs.

[Incorrect or limiting assumptions](#)

The ABARE-BRS (2010a & c) model assumes that the supply of land suitable for irrigation is fixed, that is that it cannot expand in response to trade. There is empirical evidence to suggest this assumption is incorrect, with irrigated area in the Victorian Mallee reported to have increased by 30,130 hectares or 75% between 1997 and 2009 with most of this increase by private diverters and most growth in permanent plantings.¹⁰⁸ A comparison of the calculated baseline scenario has significant discrepancies with empirical data, showing misalignments with CPI adjusted MDB GVIAP data, both in quantum, and more importantly, in proportion. In particular, and of concern in the interlinked Southern Basin, the model overestimates the proportion of lower value crops which are likely to lose water such as hay and rice (by 19-24%),

¹⁰⁸ Mallee Catchment Authority, (2010), *Mallee Irrigated Horticulture 1997 to 2009*, Mildura, page 8.

and underestimates the proportion of higher value crops such as horticulture and vegetables (by 5-15%) which are sectors likely to purchase water. The net effect is likely to be that there is more water in lower value uses by comparison with reality, so that the economic impact of the introduction of SDLs will be ameliorated.

The model assumes that structural unemployment is at best transient, that is that displaced labour can move freely into other industries, but there is evidence, from structural change in other parts of Australia, of sustained resulting structural unemployment over a period of thirty years.

Inappropriate methodology

The MDBA appears to have chosen to use a Socio-Economic impact Assessment (SEIA).¹⁰⁹ However a combination of two approaches, Cost Benefit Analysis (CBA) and SEIA would appear appropriate. The MDBA is in the position of selecting between different policy alternatives, with those alternatives being the scale and geographical distribution of SDLs. Accordingly, Cost Benefit Analysis is the appropriate methodology. Importantly, SEIA is appropriate when a policy or action has been selected for implementation, and the broader economic impacts need to be understood. Government guidelines predominantly favour the use of CBA and it would appear to be best practice.

Failure to consider opportunity cost

The principle of opportunity cost is central to CBA. In the case of water for SDLs, the opportunity cost will be the economic value if that water was used for the best use. For example, if the government controlled 3,500 GL of water, they may have two options. They can use the water for environmental flows or they can use it for agriculture. In the case of using the water for agriculture, the opportunity cost is not what the water is used for now, but what it could be used for. For example it may be possible for the government to allocate the water to horticultural uses in the lower Murray. Such uses typically employ 15-20 people per GL and around 30-40 people per GL with a local multiplier.¹¹⁰ If that was the case, then the opportunity cost would be 105,000 to 140,000 jobs. If the water was used for rice or cotton, the opportunity cost would be around 8,000 jobs. These figures are much higher than the 800 lost jobs predicted by the MDBA. More importantly, failure to consider opportunity cost masks the true cost to the Australian Community of the introduction of SDLs.

¹⁰⁹ Sinclair Knight Mertz (2010) *Demonstrating Use of Best Available Scientific Knowledge and Socio-Economic Analysis – Part 2: Best Available Socio-Economic Assessment*.

¹¹⁰ Stubbs, J *et al* (2010) *Report 4: Exploring the Relationship between Community Resilience and Irrigated Agriculture in the MDB: Social and Economic Impacts of Reduced Irrigation Water*.

A lack of alignment with empirical data

As discussed above, the output of the model does not align with empirical data. A similar problem is found with other modelling commissioned by the MDBA. Modelling by University of Queensland¹¹¹ predicts increasing area under irrigation with decreasing availability of water for irrigation, and with that prediction utterly at odds with empirical data showing a decrease in area under irrigation with decreasing availability of water for irrigation. Modelling by Wittwer¹¹² grossly underestimates employment impact in Condamine Balonne. However independent modelling by Stubbs *et al*¹¹³ appears to show a reasonable alignment with published data on changes in GVIAP and water availability in the MDB over time.

It is a fundamental principle of the scientific method that, when a hypothesis is tested and the results do not align with the predictions of the hypothesis, the hypothesis should be modified or rejected. The hypothesis of the three modelling approaches commissioned by the MDBA is that they reflect reality, but this is demonstrably not the case, hence the models should be rejected or modified so as to obtain an alignment. We note the requirement of the Water Act to use the best available science, and note that the use of the ABARE-BRS economic modelling is clearly at odds with the requirement of the act.

If the authority wishes to rely on such models, the models should at least predict the past if they are to be given any weight. As a minimum, the authority should require modellers to predict the 2000-01 or 2005-06 year, or should require them to use the 2000-01 year to calibrate the model and then predict the 2005-06 year. If the models cannot accomplish this simple task, they should be given little or no weight.

High degree of sensitivity to variation in assumptions

The ABARE-BRS model appears to be one of a family of models which aim to model changes in the real world by modelling the theoretical response of farmers to changes in water availability. However such models appear to give a wide range of outcomes. The sensitivity of the modelling to assumptions is evident in the output of Quiggin *et al*,¹¹⁴ with their table 9 showing (for 2040), reductions in irrigated water use of 28% (similar to that modelled by ABARE-BRS (2010C))

¹¹¹ Mallawaarachchi, T, Adamson, D, Chambers, S & Schrobback, P (2010) *Economic analysis of diversion options for the Murray–Darling Basin Plan: returns to irrigation under reduced water availability*, unpublished paper for the Murray–Darling Basin Authority, Risk and Sustainable Management Group, University of Queensland.

¹¹² Wittwer, G (2010) *The regional economic impacts of sustainable diversion limits*, unpublished report, Centre of Policy Studies, Monash University, Melbourne.

¹¹³ Stubbs, J *et al* (2010), *op cit*.

¹¹⁴ Quiggin, J., D. Adamson, P. Schrobback and S. Chambers. (2008). *Garnaut Climate Change Review: The Implications for Irrigation in the Murray-Darling Basin*. University of Queensland.

resulting in a 65% reduction in output, 13 times the impact predicted by ABARE-BRS (2010C) for similar reductions in irrigated water use.

More importantly, extensive sensitivity modelling is not carried out by the various groups commissioned by the MDBA. Such modelling would require varying each assumption of the model across a reasonable range, and seeing how much the predictions vary. Such an analysis will allow a judgement to be formed around the weight to be given to the model predictions, with a more robust model given more weight compared to a less robust model.

A failure to compare alternative futures

There are in fact a number of alternative futures, but only one future is being modelled. That future appears to be one in which SDLs are introduced along with removal of constraints to trade, structural unemployment is minimised and immigration is cut back to absorb excess labour.

Without modelling each alternative future, it is not possible to understand the socio-economic impacts of the introduction of SDLs under the Basin Plan. Those alternate futures are:

- No SDLs and removal of restrictions to trade
- SDLs and removal of restrictions to trade
- SDLs, removal of restrictions to trade and free mobility of labour

Each future should be modelled, and the results presented separately.

Different methodologies applied to benefits and costs

In the calculation of environmental benefits,¹¹⁵ the authority takes an opportunity cost approach and reports the results as net present value. By contrast, when calculating the socio-economic costs, a socio-economic impact assessment approach is taken, and costs are presented in annual value. If the cost methodology was applied to environmental benefits, they would be valued at zero. Conversely if the benefit methodology was applied to costs, they would be valued at around \$254 billion. In the authority's documentation, the benefits are reported as \$7.6 billion, and the costs are reported as \$0.9 billion per year, but the comparisons are not equivalent.

¹¹⁵ Morrison, M & Hatton MacDonald, D (2010) *Economic valuation of environmental benefits in the Murray–Darling Basin*, report for the Murray–Darling Basin Authority, Canberra.

Appendix B: Review of selected documents

A number of reports and studies have been critically reviewed in preparation of this submission with particular regard to the characteristics of the Balonne Shire, its communities and projected social and economic impacts of reduced availability of water for irrigation. A summary and targeted critique where relevant, particularly regarding Balonne Shire, has been undertaken and is provided here as supporting documentation for this submission. Documents reviewed include:

Murray-Darling Basin Authority (2010) *Guide to the Proposed Basin Plan: Volume 1, Overview and Volume 2, Technical Background*, Canberra.

ABARE–BRS (Australian Bureau of Agricultural and Resource Economics – Bureau of Rural Sciences) (2010a) *Environmentally sustainable diversion limits in the Murray–Darling Basin: socioeconomic analysis*, report for the Murray–Darling Basin Authority, Canberra.

ABARE–BRS (2010b) *Indicators of community vulnerability and adaptive capacity across the Murray–Darling Basin—a focus on irrigation in agriculture*, report for the Murray–Darling Basin Authority, Canberra.

ABARE–BRS (2010c) *Assessing the regional impact of the Murray–Darling Basin Plan and the Australian Government’s Water for the Future program in the Murray–Darling Basin*, report for the Department of Sustainability, Environment, Water, Population and Communities, Canberra.

ABS, ABARE & BRS (2009a) *Socio-economic context for the Murray–Darling Basin: a descriptive report*, report for the Murray–Darling Basin Authority, Canberra.

ABS, ABARE & BRS (2009b) *Condamine-Balonne sustainable yield region community profile*, report for the Murray-Darling Basin Authority, Canberra.

ABS, ABARE & BRS (2009c) *Moonie sustainable yield region community profile*, report for the Murray-Darling Basin Authority, Canberra.

Frontier Economics (2010) *Structural adjustment pressures in the irrigated agriculture sector in the Murray–Darling Basin*, report for the Murray–Darling Basin Authority, Canberra.

Institute for Rural Futures & Tim Cummins and Associates (2010) *Sensitivity of Goondiwindi Regional Council and parts of the BROOC Region to a reduction in water availability*, report to Goondiwindi Regional Council, January.

Mallawaarachchi, T, Adamson, D, Chambers, S & Schrobback, P (2010) *Economic analysis of diversion options for the Murray–Darling Basin Plan: returns to irrigation under reduced water availability*, unpublished paper for the Murray–Darling Basin Authority, Risk and Sustainable Management Group, University of Queensland.

Marsden Jacob Associates, RMCG, EBC Consultants, DBM Consultants, The Australian National University, McLeod, G & Cummins, T (2010) *Economic and social profiles and impact assessments for the Murray–Darling Basin Plan: synthesis report*, report for the Murray–Darling Basin Authority, Canberra.

Marsden Jacob Associates, RMCG, EBC Consultants, DBM Consultants, The Australian National University, McLeod, G & Cummins, T (2010) *Condamine-Balonne community profile: Sustainable yield regions*, report for the Murray–Darling Basin Authority, Canberra.

Marsden Jacob Associates, RMCG, EBC Consultants, DBM Consultants and expert advisors (2010) *Lower Balonne community profile: irrigation region*, report for the Murray–Darling Basin Authority, Canberra.

Marsden Jacob Associates, RMCG, EBC Consultants, DBM Consultants, The Australian National University, McLeod, G & Cummins, T (2010) *Moonie community profile: Sustainable yield regions*, report for the Murray–Darling Basin Authority, Canberra.

Marsden Jacob Associates (2010a) *Delivering the Basin Plan: Economic and social profiles of Murray Darling Basin Communities, Appendix 3a: Community survey technical report*, report for the Murray–Darling Basin Authority, Canberra.

Marsden Jacob Associates (2010b) *Delivering the Basin Plan: Economic and social profiles of Murray Darling Basin Communities, Appendix 3b: Irrigator survey technical report*, report for the Murray–Darling Basin Authority, Canberra.

Productivity Commission (2010) *Market mechanisms for recovering water in the Murray–Darling Basin*, Productivity Commission research report, Canberra.

Rizza, A (2010) *Future financial investment in the Murray–Darling Basin: the potential effects of changes to water allocation policy on financing the agricultural sector, small business and individuals in the Murray–Darling Basin*, report to the Murray–Darling Basin Authority, Canberra.

Stubbs, J, Storer, J, Lux, C & Storer, T (2010) *Report 4: exploring the relationship between community resilience & irrigated agriculture in the MDB: social and economic impacts of reduced irrigation water*, report for Cotton Catchment Communities CRC, Narrabri.

ABS (2010) *Experimental Estimates of the Gross Value of Irrigated Agricultural Production 2000–01 to 2007–08*, Canberra.

Alston, M, Whittenbury, K & Haynes, A (2010) *The social impacts of declining water availability and ongoing drought in the Murray–Darling Basin: short report*, Monash University.

Ashton, D & Oliver, M 2009, *An economic survey of irrigation farms in the Murray–Darling Basin: industry overview and region profiles, 2007–08*, Australian Bureau of Agricultural and Resource Economics research report 09.21, Canberra.

Jackson, S, Moggridge, B & Robinson, CJ (2010) *Effects of changes in water availability on Indigenous people of the Murray–Darling Basin: a scoping study*, report for the Murray–Darling Basin Authority, Canberra.

The Nous Group (2010) *Integration of socioeconomic assessments of the Murray–Darling Basin Plan*, report to the Murray–Darling Basin Authority.

Morrison, M & Hatton MacDonald, D (2010) *Economic valuation of environmental benefits in the Murray–Darling Basin*, report for the Murray–Darling Basin Authority, Canberra.

Sinclair Knight Mertz (SKM) (2010) *Demonstrating Use of Best Available Scientific Knowledge and Socio-Economic Analysis - Part 2: Best Available Socio-Economic Assessment*, report to the Murray–Darling Basin Authority. (Referred to in other critiques, but not reviewed)

Wittwer, G (2010) *The regional economic impacts of sustainable diversion limits*, unpublished report, Centre of Policy Studies, Monash University, Melbourne.

Murray-Darling Basin Authority (2010) Guide to the Proposed Basin Plan: Volume 1, Overview and Volume 2, Technical Background

The Balonne Shire Council area includes portions of three Surface Water Sustainable Diversion Limit (SDL) areas including the Condamine Balonne, Moonie and Nebine.

The Guide refers to the history, development of irrigation, relevant state water policy and socio-economic characteristics of the Balonne region. The Guide recognises the mix of public and private investment that has contributed to the development of irrigated agriculture in the Balonne Shire.¹¹⁶ In addition, the lower Balonne is emblematic of the pattern of irrigation development in the northern Basin of large scale private on-farm storages that capture highly variable monsoonal floodwaters to irrigate a variety of crops, with cotton being dominant due to its high adaptability in response to water availability and ongoing improvements in yields, quality and productivity.¹¹⁷ The Guide states that, “Although individual capacities of on-farm storages are generally low, the impact on inflows of their continued growth is a significant risk to Basin water resources.”¹¹⁸

In terms of surface water resources planning in the region, the current Water Resource Plans for both the Condamine-Balonne and the Moonie will cease to have effect 1 September 2014.¹¹⁹ Water resource planning has not been undertaken for any Basin groundwater resource in Queensland. The state has indicated their intention to amend the Condamine–Balonne Water Resource Plan to include the groundwater resources of the Central Condamine Alluvium.¹²⁰

Proposed Sustainable Diversion Limits

¹¹⁶ Murray-Darling Basin Authority (2010b) Guide to the proposed Basin Plan: Volume 2, Technical Background, Pg 19-20.

¹¹⁷ Murray-Darling Basin Authority (2010) Guide to the proposed Basin Plan: Volume 1, Overview, Pg 84.

¹¹⁸ MDBA (2010b) Ibid, Pg 36.

¹¹⁹ MDBA (2010b) Ibid, Pg 62.

¹²⁰ MDBA (2010b) Ibid, Pg 57.

The proposed Sustainable Diversion Limits (SDLs) for the catchments that comprise the Balonne Shire are displayed in the table below. These figures are provided for the three scenarios that have been proposed to achieve 3,000, 3,500 and 4,000 GL for the Basin.

Table 1: Proposed Sustainable Diversion Limits (Scenarios 1-3)

		Condamine-Balonne	Nebine	Moonie	Total MDB
Current Surface Water Diversion Limit GL/yr	Interception	265	25	51	2,735
	Watercourse Diversions	706	6	32	10,942
	Total	971	31.3	83	13,677
Scenario 1: 3,000 GL/yr	Interception	265	25	51	2,732
	Watercourse Diversions	503	3.6	20	7,945
	Total	768	28.9	71	10,677
Total CDL Reduction GL/yr (%)		203 (21%)	2.4 (8%)	12 (14%)	3,000 (22%)
Proposed reduction in watercourse diversion if only applied to watercourse div component (%)					
		29%	40%	37%	27%
Scenario 2: 3,500 GL/yr	Interception	265	25	51	2,731
	Watercourse Diversions	468	3.6	19	7,445
	Total	734	28.9	70	10,177
Total CDL Reduction GL/yr (%)		238 (24%)	2.4 (8%)	12.8 (15%)	3,500 (26%)
Proposed reduction in watercourse diversion if only applied to watercourse div component (%)					
		34%	40%	40%	32%
Scenario 3: 4,000 GL/yr	Interception	265	25	51	2,731
	Watercourse Diversions	434	3.3	18	6,946
	Total	699	28.6	69	9,677
Total CDL Reduction GL/yr (%)		272 (28%)	2.7 (9%)	14 (17%)	4,000 (29%)
Proposed reduction in watercourse diversion if only applied to watercourse div component (%)					
		39%	45%	45%	37%

Source: Murray-Darling Basin Authority (2010) Guide to the Proposed Basin Plan, Tables 8.3, 8.4 and 8.5.

Predicted Social and Economic Impacts

The Guide and other MDBA documents report a number of likely social and economic impacts of the proposed reductions in water availability on communities in the Basin, including communities within the Condamine-Balonne and Moonie regions specifically. According to the Authority,

- “Depending on the actual size of the reduction in current diversion limits, this could have serious effects on some communities. Any reduction in water availability will affect communities”.¹²¹
- “The larger the reduction, the more significant the impact”.¹²²
- According to the MDBA fact sheets for the Condamine-Balonne and Moonie regions, “Implementing SDLs may have significant social and economic implications for individual entitlement holders and communities across the Basin.”¹²³
- “Industries with high water usage but lower or more volatile value products such as broadacre cereals, rice and cotton will be more severely impacted than other industries with higher value products such as grapes, nuts and fruit”.¹²⁴
- “Those regions with a relatively high dependence on irrigated agriculture would be expected to experience a larger reduction in economic activity compared to regions with more diverse economic activities. The regions expected to experience the greatest reduction in economic activity are Murrumbidgee, Moonie, Goulburn–Broken and, to a lesser extent, Condamine–Balonne, Murray (in all three states), Macquarie, Campaspe and Loddon”.¹²⁵
- “Smaller towns with heavy dependence on irrigated agriculture could experience greater social and economic implications due to their dependence and the lack of alternate industries”.¹²⁶
- “Severe and prolonged drought across the Basin (from 2000 to 2009) has resulted in a sustained period of substantially reduced water available for economic purposes. This has adversely affected the cash flows and capital and increased the debt levels of farms, households and businesses in the agriculture, forestry and fishing industry and related sectors”.¹²⁷
- “A significant proportion of Basin communities appear to have sufficient diversity of economic activity and social capital that they will be relatively resilient to the proposed reductions in diversions. However, several regions appear to be at a relatively higher risk of substantial social impacts, including in the north-east of the Basin, the Border Rivers, Gwydir, Namoi and Macquarie–Castlereagh regions and, in the southern Basin, the Lachlan, Loddon, Murrumbidgee and Murray regions”.¹²⁸

¹²¹ MDBA (2010) Ibid, Pg xx.

¹²² MDBA (2010) Ibid, Pg 108.

¹²³ MDBA (2010) Summary of Condamine-Balonne from the Guide to the Proposed Basin Plan, MDBA (2010) Summary of Moonie from the Guide to the Proposed Basin Plan.

¹²⁴ MDBA (2010) Ibid, Pg xx.

¹²⁵ MDBA (2010) Ibid, Pg xx.

¹²⁶ MDBA (2010) Ibid, Pg xx.

¹²⁷ MDBA (2010) Ibid, Pg xx.

¹²⁸ MDBA (2010) Ibid, Pg xx.

- “In terms of sensitivity to reductions in current diversion limits, the cotton-based regions and communities that are further inland tend to be more sensitive to potential reductions. For example, the agriculture sector in Condamine–Balonne in Queensland directly employs approximately 36% of workers in the region — a greater percentage than any other region in the state.¹²⁹ The small cotton-dependent communities of this region often face significant social issues: they have highly mobile workforces that follow job opportunities and if these workers leave because cotton-related activities have declined, the towns may lose critical mass for community services and face increased risk of welfare-dependency”.¹³⁰
- “Across the cotton regions of northern New South Wales and the Queensland Lower Balonne, reductions in watercourse diversions in the 3,000–4,000 GL/y range may lead to further investments in water-use efficiency and some sale of entitlements, where allowed. If reductions beyond 4,000 GL/y were imposed, cotton production could fall, and farmers may shift to alternative dryland farming (often of lower value) or may choose to exit. Some properties might consolidate and some cotton gins may close (as has occurred through the period of extended drought), with a consequent decline in employment opportunities and possible increased migration of people from the region”.¹³¹
- “Towns with approximately \$2,000 or more per resident in terms of irrigation expenditure per resident in the Basin are considered to be highly reliant on irrigator expenditure. There are highly reliant towns in the northern Basin, particularly in the Condamine–Balonne and Namoi regions”.¹³²
- “A decline in business activity across these at-risk regional and rural towns and communities may have long-term consequences. In particular, a decline in the rateable base for local government authorities and reduced levels of demand for major community services such as health and education may mean that the level of service provision is likely to decline over time. As a consequence, there is a greater likelihood that: access to health services and education will become more difficult; there will be fewer funds available to local government authorities to invest in and maintain community infrastructure; social and community networks will come under increasing pressure”.¹³³
- Condamine–Balonne: Likely to experience moderate losses in processing activity mainly associated with reduced output from cotton and other broadacre irrigated agriculture.¹³⁴

¹²⁹ MDBA (2010) Ibid, Pg 84.

¹³⁰ MDBA (2010) Ibid, Pg 85.

¹³¹ MDBA (2010) Ibid, Section 7.4 Implications for Regions – Northern Basin, Pg 91.

¹³² MDBA (2010) Ibid, Section 7.7 Likely implications for small and medium enterprises and towns, Pg 96.

¹³³ MDBA (2010) Ibid, Section 7.8 Long term consequences for communities at risk, Pg 98.

¹³⁴ MDBA (2010) Ibid, Section 8.14 Implications for the broader economy and communities, Table 8.2 Key points raised by stakeholders in relation to potential effects of reduced water availability, Pg 123.

- Moonie: Likely to experience significant reduction in processing activity mainly associated with reduced output from cotton and other broadacre irrigated agriculture.¹³⁵
- Held environmental water to off-set reductions at 30 June 2010: Condamine-Balonne = 1 GL/yr (range of gap 204-274 GL/yr), Moonie = 1 GL/y (range of gap 11-14 GL/yr)¹³⁶
 - It is noted that the Australian Government conducted its first tender in the Lower Balonne in early 2010, and recently (19 November) advertised a \$100 million water entitlement buy back tender. While the amount purchased from the first tender is not publicly available at this time, the average price of offered pursued is stated to be \$1,433.30.¹³⁷
 - It is understood there irrigators in the St George area have expressed concern about the Government’s willingness to pay a ‘fair price’ for entitlements to achieve the buy back targets set for the region.¹³⁸
- The estimated reductions to the Gross Value of Irrigated Agriculture Production for the Condamine-Balonne and Moonie regions for Scenarios 1-3 range from -14% to -17% and -34% to -42% respectively.¹³⁹
- In terms of predicted reductions in GVIAP the MDBA state, “Overall, the largest percentage changes are estimated in the northern Basin — in the Moonie (34–42%) and Gwydir (22–29%) regions — biggest absolute reductions in the northern Basin are likely to be in the Gwydir, Condamine–Balonne, Namoi and Macquarie–Castlereagh regions. The estimated reductions in gross value of irrigated agricultural production in the Moonie, Gwydir and Barwon–Darling regions are high in relation to the reductions in water use; this is due to a relatively undiversified landuse pattern and little opportunity for water trade, with cotton tending to represent more than 80% of total irrigated land use in these regions”.¹⁴⁰
- Table 4.19 provides a summary of indirect (flow-on) responses to changes in diversion limits for the regions of the northern Murray–Darling Basin. For the Condamine-Balonne a 20% reduction is predicted to lead to “some positive impacts from implementation of water-use efficiency as temporary investment and employment to establish new infrastructure occurs. Lower ongoing levels of employment in gins and other upstream and downstream sectors (e.g. farm inputs and transport)”. A 40% reduction is predicted to lead to, “One gin in the broader

¹³⁵ MDBA (2010) Ibid, Section 8.14 Implications for the broader economy and communities, Table 8.2 Key points raised by stakeholders in relation to potential effects of reduced water availability, Pg 123.

¹³⁶ MDBA (2010) Ibid, Table 11.1 Environmental water available for off-set, Pg. 153.

¹³⁷ Australian Government (2010) Water for the Future website, accessed online at www.environment.gov.au/water/policy-programs/entitlement-purchasing/average-prices.html, 24 November 2010.

¹³⁸ Correspondence with individual irrigators in the St George area, 24-25 November 2010.

¹³⁹ MDBA (2010b) Ibid, Pg. 147.

¹⁴⁰ MDBA (2010b) Ibid, Pg. 201.

Lower Balonne could close. Permanent migration out of the region, changing demographics (fewer people of working age) and affecting the viability of many businesses and the potential viability of some government services”.¹⁴¹

- “The construction of dams and structures upstream of the floodplains, and the subsequent lower frequency and volume of floods, are viewed as contributing factors to the diminished health of Basin floodplains and wetlands (Lewis 2006). In the Lower Balonne region, for instance, irrigation development and diversion has led to reduced flows, resulting in reduced fodder production in downstream grazing areas (Snowy Mountains Engineering Corporation 2006)...it is very likely that the floodplain grazing industry would benefit greatly from the reduction of current diversion limits and some reinstatement of natural flooding regimes. These benefits could be expected to modestly offset some of the costs associated with reductions in the value of irrigated agriculture, such as cotton production”.¹⁴²

With Regard to Aboriginal People¹⁴³

The Balonne Shire has much greater proportion of Indigenous residents at 14.9% than the Basin or Australia at 4% and 2.3% respectively.¹⁴⁴ With regard to Aboriginal people, the Authority states,

- “The relationship maintained by Aboriginal nations with their countries is a key motivation behind their interests in water. Many of these peoples have expressed the desire for restoration of environmental systems; improvement in the environmental condition of the Basin is therefore likely to be viewed positively”.¹⁴⁵
- “Reduced watercourse diversions could limit Aboriginal development options, most directly for those who hold formal entitlements to water and/or are employed in irrigated agricultural industries”.¹⁴⁶
- “There is some evidence to suggest that in the northern Basin, Aboriginal residents rely heavily on the cotton industry for employment. More broadly, many Aboriginal people are active in natural resource management. Within this context, the Authority understands that there may be some potential for structural change to open up new opportunities for Aboriginal people in emerging natural resource-based industries. Such peoples have expressed a strong

¹⁴¹ MDBA (2010b) Ibid, Pg. 205.

¹⁴² MDBA (2010b) Ibid, Pg. 233-234.

¹⁴³ MDBA (2010) Ibid, Section 7.9 Possible implications for the Basin’s Aboriginal communities, Pg 98.

¹⁴⁴ ABS (2006) Census of Population and Housing, Quick Stats. ABS (2008) Water and the Murray Darling Basin – A Statistical Profile Australia 2000–01 to 2005-06, Chapter 2 — People in the Murray-Darling Basin

¹⁴⁵ MDBA (2010) Ibid, Pg. 98.

¹⁴⁶ MDBA (2010) Ibid, Pg. 98.

desire to exercise authority, responsibility and control in the determination of allocations to meet their water requirements”.¹⁴⁷

The notes from the MDBA consultation with the Northern Basin Aboriginal Nations on 20 October 2010 in Tamworth following the release of the *Guide to the Proposed Basin Plan* indicate that participants remain deeply concerned about the lack of inclusion of ‘cultural flows’ as part of the plan. For example, “Research into cultural flows is fundamental so we can make sure cultural flows are incorporated into the Basin Plan. From our perspective, most of what we say and what we want comes down to cultural flows”.¹⁴⁸

While there are variations in definition of ‘cultural flows’ the definition accepted by the Murray Lower Darling Rivers Indigenous Nations (MLDRIN) is, “water entitlements that are legally and beneficially owned by the Indigenous Nations of a sufficient and adequate quantity and quality to improve the spiritual, cultural, environmental, social and economic conditions of those Indigenous Nations”.¹⁴⁹

With Regard to Mitigations

The Authority has stated that,

- “The Australian Government has committed to recovering sufficient water access entitlements to fully offset the impact of SDLs across the Basin, including the Condamine-Balonne region, through a combination of purchasing entitlements in the market and investments in more efficient irrigation infrastructure. Consequently, should these targets be met, there are likely to be no reductions in individual water entitlement holder allocations”.¹⁵⁰

¹⁴⁷ MDBA (2010) Ibid, Pg. 98.

¹⁴⁸ MDBA (2010) Feedback from Northern Basin Aboriginal Nations Meeting, Tamworth NSW, 20 October 2010, accessed online at www.mdba.gov.au/communities/latest-news/feedback-from-tamworth-meeting

¹⁴⁹ Jackson, S, Moggridge, B & Robinson, CJ (2010) Effects of changes in water availability on Indigenous People of the Murray-Darling Basin: a scoping study, report for the Murray Darling Basin Authority, Pg. 71. Citing Atkinson (2009) Murray Darling Basin. National Indigenous Studies Conference ANU, Canberra, AIATSIS.

¹⁵⁰ MDBA (2010) Summary of Condamine-Balonne from the Guide to the Proposed Basin Plan, MDBA (2010) Summary of Moonie from the Guide to the Proposed Basin Plan.

ABARE-BRS (2010a) Environmentally sustainable diversion limits in the Murray–Darling Basin: socioeconomic analysis

This report provides an economic analysis of the effects of the proposed sustainable diversion limits (SDLs) as proposed by the MDBA as per the Guide to the Proposed Basin Plan. The impacts of these proposals are identified for the wider Australian community and economy; as well as people, communities, regional economies and industry sectors within and outside the Basin that depend on Basin water resources.

With regard to the Condamine-Balonne, ABARE-BRS state that:

- GVIAP will fall most in the northern Basin areas of the Gwydir, Condamine and Namoi regions. “A number of towns in these regions are located in close proximity to irrigated cropping (principally cotton) areas. Compared with the southern Basin, there tends to be less diversity in irrigated activities in these regions so effects are expected to be spread more evenly across irrigation areas and associated towns”.¹⁵¹
- The authors refer to the findings by Marsden Jacob Associates (2010) with regard to the effect of the Basin Plan scenario with interregional water trade on cotton GVIAP in key cotton growing areas, which show that the Condamine-Balonne is predicted to experience a 24.1% decline.¹⁵²
- The authors review the findings of Adamson et al (2005), who used the Risk and Sustainable Management Group model (a Basin-wide optimisation model with similar regions to those used in the WTM) to model the effects of a 20 percent across the board reduction in inflows in the MDB, resulting in a 15 per cent reduction in total water use. The analysis assumed that water could be traded between regions, including regions in the northern Basin. The modelling for Maranoa-Balonne showed a -20% change in water use would equate to a -18.2% change in GVIAP.¹⁵³
- The authors refer to additional ABS and ABARE-BRS work that identified towns that are highly reliant on expenditure from irrigation farms. Nine towns where

¹⁵¹ ABARE-BRS (2010a) Environmentally sustainable diversion limits in the Murray-Darling Basin: socioeconomic analysis, report for the Murray Darling Basin Authority, Canberra, Pg 46.

¹⁵² ABARE-BRS (2010a) Ibid, Pg 49.

¹⁵³ ABARE-BRS (2010a) Ibid, Pg 89.

identified in the Condamine Region, including St George and Dirranbandi which are within the Balonne Shire.¹⁵⁴

With regard to the economic modelling approach taken

Aspects of the economic modelling approach are discussed elsewhere in this submission. Some key points raised in ABARE-BRS (2010a) with critiques where applicable are set out below.

The report states that “ideally, the Basin plan would be subject to a cost–benefit analysis, with the net benefits being expressed in dollar values. However, in practice valuing non-market environmental benefits remains a difficult task. This report focuses on estimating the costs of restricting access to irrigation water, and makes no attempt to value the benefits from providing additional water for environmental assets”.¹⁵⁵

We note the clear reference to a cost-benefit analysis (CBA). A review of documentation suggests that what has been carried out is in fact a Socio-Economic Impact Assessment (SEIA).¹⁵⁶ Such an approach is quite different in general principle to a CBA and does not represent best practice.¹⁵⁷ Importantly, “the costs included in a CBA represent the opportunity cost, which is the cost of what has to be given up to gain the good or service”.¹⁵⁸ Essentially the opportunity cost of something is the best alternate use. An SEIA does not assess opportunity cost, and opportunity cost is not assessed by ABARE-BRS (2010a), with this being a notable shortcoming of the analysis. The analysis needs to be carried out in accordance with best practice and properly assessing all costs, including opportunity cost, associated with the proposed SDLs.

We believe the best way to conceptualise the opportunity cost of an SDL of 3,500 GL is to consider that water as being in the hands of government. It can allocate the water to irrigation, and if the water was, for example, auctioned off, it would presumably go to the most efficient use in each region or interlinked region, and those efficient uses would not necessarily be the current uses of the water, as these are constrained by a variety of restrictions to trade. Those efficient uses could be used to calculate the opportunity cost

¹⁵⁴ ABARE-BRS (2010a) Ibid, Pg 92.

¹⁵⁵ ABARE-BRS (2010a) *Environmentally sustainable diversion limits in the Murray-Darling Basin; socioeconomic analysis*, page 2.

¹⁵⁶ SKM (2010) *Demonstrating Use of Best Available Scientific Knowledge and Socio-Economic Analysis- Part 2: Best available Socio-Economic Assessment*, report to the Murray-Darling Basin Authority, page 12.

¹⁵⁷ *Ibid*, page 9.

¹⁵⁸ *Ibid*, page 23.

of the water, as represented as additional employment or production. ABARE-BRS (2010a) does not calculate, or attempt to calculate, this opportunity cost.

The alternative for government is to give the water to environmental flows. While this second option (the value of environmental flows) may be difficult to quantify, techniques exist such as revealed or stated preference. In the extreme, Australians have an avenue, parliament, for expressing community values. If our elected representatives are prepared to pay the properly calculated and expressed price, calculated as the opportunity cost in lost productivity or employment from an efficient allocation of the water, giving due consideration to mitigations such as economic growth and deregulation of trade, then they will have valued the environmental outcomes as greater in value than the economic costs. Effectively, their actions will reveal their preference.

Finally, we are also of the view that in the area of public policy, and in accordance with best practice, the cost to the whole of community must be considered. Hence the cost of all externalities needs to be included in the cost. In the case of introducing SDLs, externalities could include losses associated with ancillary businesses and in households through loss of jobs or depreciation of assets such as houses. For these reasons, the cost of SDLs is much more than the market price of the water. Again, such costs have not been considered.

Some other important points include:

- “The effects of the SDLs may vary over different time scales. In this report, modelling results (from both the WTM and AusRegion) represent long-run estimates unless stated otherwise. The short run is often taken to refer to the period of time over which certain key factors of production remain fixed. By definition, the effect of a given shock is expected to be higher in the short run than in the long run, given the reduced flexibility of individuals, firms and regions”.¹⁵⁹

Presentation of long run results lacks transparency and is misleading. By definition, any and all systems will adapt in the long run, including environmental systems. Unfortunately, they may incur considerable pain (for example species extinction) along the way. We believe that the long run adjustment is best conceptualised as a mitigation against the loss of productivity associated with the introduction of SDLs.

- “At an aggregate level, it is estimated that the 3500 GL Basin plan scenario (comprising a 29.1 per cent reduction in total water use) will reduce average

¹⁵⁹ ABARE-BRS (2010a) *op cit*, page 3.

annual GVIAP in the Basin by around 15 per cent (approximately \$940 million) relative to the baseline scenario, with interregional water trade. Average annual irrigation profits are estimated to fall by 7.8 percent under this scenario”.¹⁶⁰

This is the estimated direct cost of the introduction of SDLs. However, there are some important riders. The calculation does not reflect the total cost as it gives no regard to multipliers arising from agricultural production, it does not include the cost of externalities such as depreciation of assets and it is not transparent, as it conflates SDLs with interregional water trade when in reality they are two separate policy initiatives and could be introduced independently of each other. For these reasons, the estimate grossly underestimates the real cost to the community.

- Opportunities for mitigation through alternative uses of agricultural land are limited, as “the gross value of non-irrigated agriculture per unit of land is substantially lower than that of irrigated agriculture, particularly within the MDB, given the relatively modest rainfall in many of the Basin regions”.¹⁶¹

The importance of this is that, for communities such as Balonne Shire, where the only opportunities for industry diversification are other forms of agriculture, moving from irrigated agriculture to dryland agriculture will result in a significant decrease in the size of the local economy, with a commensurate diminished ability to provide employment or maintain current levels of employment.

- “For the MDB as a whole, the 3500 GL Basin plan scenario was estimated to lead to a 1.3 percent reduction in gross regional product (GRP). At a national level, the SDL scenario is estimated to lead to a 0.1 percent reduction in gross domestic product (GDP), compared with the baseline scenario. These small percentage changes are to be expected given the baseline size of the MDB (\$59 billion) and Australian (\$760 billion) economies relative to the change in GVAP (around \$870 million)”.¹⁶²

This figure is almost certainly an underestimate, as it is not calculated using an opportunity cost approach, but rather based on the conflation of two policies, SDLs and deregulation of trade. The first, SDLs, is the policy initiative, while the second, deregulation of trade, is better understood as a mitigation strategy to offset the impacts of the introduction of SDLs. Transparency would require the two to be considered and reported separately.

- “Relatively smaller percentage reductions in employment are estimated by AusRegion, with a 0.10 per cent reduction in employment across the MDB as a

¹⁶⁰ *Ibid*, page 3.

¹⁶¹ *Ibid*, page 4.

¹⁶² *Ibid*, page 4.

result of the Basin plan, relative to the baseline. This small change in employment largely reflects the long-run nature of the AusRegion model, in which labour markets are able to adjust and displaced agricultural labour is able to gain employment in other regions and/or industries”.¹⁶³

There are two concerns with this approach. The first is that the approach is unlikely to consider opportunity cost, as deregulation of trade is coupled with introduction of SDLs. A correct approach would be to identify the impact on employment if trade was deregulated, with and without the introduction of SDLs. This would show the true opportunity cost. The focus on the “long-run” means that the model is not transparent, as the long run adjustment will be achieved at the cost of significant dislocation at a local level. Properly stated, the AusRegion model is predicting that because of economic growth generally, there will probably be opportunities for displaced labour to be employed elsewhere in the economy. However, the community as a whole is worse off than it would be otherwise with the allocation of a resource, irrigation water, to a non-productive use.

- “Any decline in irrigated output as a result of the Basin Plan may have implications for the amount of downstream processing undertaken in some regions. The WTM results suggest that annual activities such as irrigated rice, cotton and dairy will experience more significant declines in GVIAP than perennial activities. Significant downstream processing of rice occurs in southern NSW, cotton processing occurs in a number of northern Basin regions, while dairy processing is concentrated mostly in northern Victoria. Predicting the likely effects on processing facilities is difficult given the uncertainties involved”.¹⁶⁴

We are concerned that this modelling does not include the effects on downstream processing. Data on employment in downstream industries is readily available from the ABS, and statistical techniques exist for determining the interrelationship between employment in agricultural sectors and in processing and in general service sectors.¹⁶⁵ The failure to include such effects will understate the impacts of the introduction of SDLs, noting particularly that sectors such as vegetables, grape growing and fruit growing are likely to have significant employment in downstream processing. For cotton in 2005-06, there were 1,852 people employed in the category of cotton growing and 399 employed in cotton ginning across the MDB and the cotton growing areas in Queensland outside of the MDB. For grapes, 5,608 people were employed in grape production across the MDB, and 5,114 were employed in wine and other alcoholic beverage manufacturing.¹⁶⁶ Failure to consider downstream processing, even though data is

¹⁶³ *Ibid*, page 4.

¹⁶⁴ *Ibid*, page 5.

¹⁶⁵ See for example Stubbs *et al*, *op cit*, where ABS employment data sets are analysed to determine processing employment associated with agricultural industries, and linear regression analysis is used to understand the relationship between agricultural employment and employment in other sectors at a local level.

¹⁶⁶ ABS, 2006, employment by place of usual residence.

readily available, underestimates the impacts on cotton growing areas by at least 21.5%, and in grape growing areas by at least 91%. From another perspective, the modelling would seem to assume that wineries, packing sheds, cotton gins and rice mills will continue to operate without product to process.

ABARE-BRS (2010b) Indicators of community vulnerability and adaptive capacity across the Murray Darling Basin – a focus on irrigation in agriculture

This project developed a metric to compare the vulnerability of communities across the Basin. The researchers developed a set of measures of community ‘vulnerability’, ‘sensitivity’ and ‘adaptive capacity’ to changes in water availability.¹⁶⁷ The authors describe: ‘vulnerability’ as the potential for susceptibility to harm, pressures and disturbances such as climate change or socio-economic processes; ‘sensitivity’ as the level of dependency of a community on a resource that is changing; and ‘adaptive capacity’ as the ability or potential of a community to modify or change to better cope with stresses or changes. These indices were examined spatially at a fine geographic grain (Census Collection District) to better understand differences across regions and communities.¹⁶⁸

- Results from the research show that ‘Sensitivity’ is predicted to be highest for communities in the northeast of the Basin including the Condamine-Balonne, Moonie, Border Rivers, and Gwydir and in the southern Basin communities within the Basin Plan regions of Lachlan, Murrumbidgee, Murray, Wimmera-Avoca and Loddon-Campaspe. Meaning that these areas have a combination of a higher dependence on water for agriculture at the farm level and a higher proportion of people in the community who are employed in agriculture and downstream agri-industries, such as food processing plants, abattoirs, canneries, etc compared with other areas. These areas have a very direct connection with irrigated agriculture.¹⁶⁹
- Results from the research show that ‘Adaptive capacity’ is predicted to be lowest for communities in the northeast of the Basin within the Basin Plan regions of Border-Rivers and Condamine-Balonne, central west of the Basin within the

¹⁶⁷ ABARE-BRS (2010b) Indicators of community vulnerability and adaptive capacity across the Murray-Darling Basin – a focus on irrigation in agriculture, report for the Murray Darling Basin Authority, Canberra, Pg vi.

¹⁶⁸ ABARE-BRS (2010b) Ibid, Pg 1.

¹⁶⁹ ABARE-BRS (2010b) Ibid, Pg 25-26.

Basin Plan regions of Barwon-Darling and the western and south western areas of the Basin within the Basin Plan regions of Paroo, Lower Darling, Murray and Eastern Mt Lofty Ranges.

- ABARE-BRS state, “These communities have lower adaptive capacity, meaning that they are likely to have fewer resources and a lower ability to respond to changes in their circumstances. On its own, adaptive capacity is not directly connected with a dependence on irrigation water or agriculture. Therefore, areas which come up with low adaptive capacity are those that show signs of general social and economic disadvantage”.¹⁷⁰

The study used a range of census variables combined with principle component analysis to develop an index for community vulnerability. Other work has found that the significant predictors of proxy measures of vulnerability and resilience are age, remoteness, Aboriginal population and population size.¹⁷¹ The ABARE-BRS study gives no regard to these geographic and historical variables, which may result in deficiencies in their ranking of communities with regard to vulnerability.

ABARE-BRS (2010c) – Assessing the regional impact of the Murray-Darling Basin Plan and the Australian Government’s Water for the Future Program in the Murray-Darling Basin.

The report uses a two stage model to quantify the impacts of reductions in irrigation water as a result of introduction of SDLs. In the first stage, the Water Trade Model is used to calculate the impacts of reduced irrigation water on the Gross Value of Irrigated Agricultural Production (GVIAP). In the second stage, The AusRegion model is used to calculate the impact of changes in GVIAP on Gross Regional Product (GRP) and on employment. Two scenarios are modelled. These are introduction of SDLs only and the introduction of SDLs coupled with water purchases by government. The models are long run, that is they allow for the regional economy to redistribute factors of production such as water trade and movement of employment between industries. The models use a regional and Murray Darling Basin scale.

There are a number of caveats in the report around scaling with regard to time and geography. These include:

¹⁷⁰ ABARE-BRS (2010b) Ibid, Pg 26.

¹⁷¹ Stubbs, *et al*, *op cit*.

- ...in the longer term labour can move from agriculture to other sectors¹⁷²
- ...small towns that are more dependent on irrigation could be significantly affected. For example, some small towns highly reliant on irrigated agriculture could be quite susceptible, especially if they are surrounded by irrigated annual cropping activities such as rice and cotton.¹⁷³
- The AusRegion employment estimates represent long run predictions, in which displaced individuals and firms have time to adjust to the change in agricultural output. In the short run, it may be that employment effects are more pronounced.¹⁷⁴
- While the introduction of new SDLs in the MDB have the potential to significantly affect some towns in the Basin...¹⁷⁵
- ...AusRegion allows for movement of labour between industries and regions. ...While production and employment in the agricultural industries declines, other industries absorb a significant proportion of the labour released...¹⁷⁶
- The broader regional effects estimated by AusRegion depend on a range of assumptions, including those over the extent to which displaced agricultural labour in a given region will find employment in other industries within the region or migrate to other regions inside or outside the MDB.¹⁷⁷
- ...The impacts... are likely to be more substantial in smaller regional towns than in larger regional centres.¹⁷⁸
- Some towns that are highly reliant on irrigated agriculture could be quite susceptible to changes in water availability, especially if they are surrounded by irrigated activities such as rice and cotton.¹⁷⁹

The summation of these various caveats seems to be that adverse impacts will be differentially experienced and experienced most markedly at the local level, with communities such as Balonne Shire likely to be highly susceptible to adverse impacts. It is likely that the response to the introduction of SDLs will be significant disruption at the local level in some communities, as people relocate to other towns and areas.

¹⁷² ABARE-BRS (2010c) *Assessing the regional impact of the Murray-Darling Basin Plan and the Australian Government's Water for the Future program in the Murray-Darling Basin*, report for the Department of Sustainability, Environment, Water, Population and Communities, Canberra. Pg. 3.

¹⁷³ ABARE-BRS (2010c) *op cit*, page 4.

¹⁷⁴ ABARE-BRS (2010c) *op cit*, page 4.

¹⁷⁵ ABARE-BRS (2010c) *op cit*, page 31.

¹⁷⁶ ABARE-BRS (2010c) *op cit*, page 33.

¹⁷⁷ ABARE-BRS (2010c) *op cit*, page 34.

¹⁷⁸ ABARE-BRS (2010c) *op cit*, page 35.

¹⁷⁹ ABARE-BRS (2010c) *op cit*, page 36.

Summary of predicted impacts on Balonne

The impacts predicted on the Condamine and Moonie regions are summarised in the table below.

Table 2: Summary of predicted impacts in the Condamine and Moonie regions

Measure	Reference	Condamine region	Moonie region
Impact on GVIAP relative to baseline scenario 1	Table 9	-\$70 million/year (-15.3% change)	-\$15 million/year (-37.1% change)
Impact on GVIAP relative to baseline scenario 2	Table 9	-\$64 million/year (-13.9% change)	-\$13 million/year (-32.7% change)
Impact on GVAP relative to baseline scenario 1	Table 11	-\$67 million/year (-4.6% change)	-\$14 million/year (-9.4% change)
Impact on GVAP relative to baseline scenario 2	Table 11	-\$61 million/year (-4.2% change)	-\$13 million/year (-8.3% change)
Estimated change in Employment, 2018-19	Table 17	-0.1%	-0.1%

Table 17 of the report shows the estimated change in Employment for 2018-2019 for Queensland MDB as -0.1% for both scenario 1 and 2.

Given the various caveats above, it is likely that these values will markedly underestimate the impacts in the Balonne Shire or on a community such as St George, with its dependence on irrigated agriculture.

Assessment of the modelling approach

What is the best science?

ABARE-BRS (2010c) presents the results from an economic analysis of the effect on agriculture and regional economies from the implementation of Government policies

related to SDLs and Water for the Future.¹⁸⁰ The MDBA has commissioned a separate report titled *Demonstrating Use of Best Available Scientific Knowledge and Socio-Economic Analysis*.¹⁸¹ This report appears to set out guidelines to provide confidence to the MDBA that Socio-Economic Assessments are ‘developed with and to an appropriate quality’.¹⁸² By reference to that report, the modelling approach appears to be a Socio-Economic Impact Assessment (SEIA) even though “most of the official national and state government guidelines for socio-economic assessments focus, and predominantly favour the use of Cost Benefit Analysis”.¹⁸³ With respect to analysis, the base case is very important, being listed at the top of Table 6 and Table 13 with the tables setting out the Level 1 framework: High level checklist for two assessment methods. Importantly Table 6 states ‘The base case option does not always mean a continuation of current policies and expenditure’. Under section 3.5.1.2 the report states, ‘although the baseline mainly refers to the current profile, it is also important to forecast changes to that profile under the do nothing scenario (i.e. without the policy or project going ahead)’. This is an important point, and suggests that policy initiatives should be evaluated one at a time, rather than being bundled together or conflated.

Sensitivity analysis is also important. Table 6 states ‘... it is essential that all CBAs include a sensitivity and risk assessment’. At page 24 the report states ‘All variables used in a CBA, whether for estimating the base case, or quantifying and monetising the impacts are subject to risk and uncertainty. ...The impact of these risks and uncertainties should be captured in the analysis and their impact on the final decision assessed.’

We believe that ABARE-BRS (2010C) does not meet these threshold tests relating to base case for the reasons discussed below.

What does the model do?

The Water Trade model allows water to trade between various uses so that it is allocated to the most profitable use. This mitigates the impacts of reductions to irrigation water through SDLs. The effect on GVIAP is then calculated.

¹⁸⁰ ABARE-BRS (2010c) *op cit*, page 1.

¹⁸¹ Sinclair Knight Mertz (SKM) (2010) *Demonstrating Use of Best Available Scientific Knowledge and Socio-Economic Analysis - Part 2: Best Available Socio-Economic Assessment*, report to the Murray-Darling Basin Authority.

¹⁸² *Ibid*, page 1.

¹⁸³ *Ibid*, page 9.

‘The cushioning effect of interregional trade on the value of irrigated activities is effectively achieved by water trading away from rice, irrigated cereals, other broadacre and sheep to other activities’.¹⁸⁴

The AusRegion model then models the impacts of reduction in the GVIAP on the regional economy. It does this by ‘allowing for movement of labour between industries and regions’.

What are some of the key assumptions and are they supportable?

The Water Trade model contains two key assumptions with regard to the current analysis. The first is the calculation of the baseline scenario. The second is the assumption that the supply of land suitable for particular irrigation uses is fixed, that is any particular sector cannot expand in response to trade.¹⁸⁵ Variation or error in either of these key assumptions is likely to dramatically effect the outputs of the model but the sensitivity of the model to variations in these key assumptions has not been modelled. A third assumption is that water used for rice for example, can be used for horticulture. This point is not discussed here, except to note that there are differences in water security across jurisdictions and irrigation uses. Permanent plantings require water every year, whereas annual crops can be planted in response to changing availability of water. Hence such an assumption is necessarily optimistic.

The baseline for the Water Trade Model is set out at table 6. A baseline year of 2000-01 was selected, although data was not available for that year. For these reasons a baseline was constructed ‘from a variety of sources’. ABS has published data on GVIAP for the Murray Darling Basin for 2000-01, 2005-06, 2006-07 and 2007-08.¹⁸⁶ As discussed elsewhere, that data has not been adjusted for inflation. The table below shows that data (CPI adjusted to 2010) for 2000-01 (the model year), 2005-06 and for the ABARE-BRS (2010C) base case.

While GVIAP can vary with commodity price as well as with area under cultivation, using this data has the advantage of being inductive (based on observation) rather than

¹⁸⁴ ABARE-BRS (2010C), *Assessing the regional impact of the Murray-Darling Basin Plan and the Australian Government’s Water for the Future Program in the Murray-Darling Basin*, page 27.

¹⁸⁵ Hafi, A, Thorpe, S. and Foster, A, *The impact of climate change on the irrigated agricultural industries in the Murray-Darling Basin*, Australian Agricultural and Resource Economics Society, ABARE Conference Paper, 2009, equation 5 on page 7.

¹⁸⁶ ABS, *Murray-Darling Basin – Gross Value of Irrigated Agricultural Production, 2000-01 to 2007-08*, (2010).

deductive and provides an empirical basis to evaluate the validity of the ABARE-BRS (2010C) baseline scenario.

Table 3: Gross Value of Irrigated Agricultural Production (GVIAP), Murray-Darling Basin

	2000-01	2000-01 CPI (1) adjusted (\$AUD2010)	2005-06	2005-06 CPI (1) adjusted (\$AUD2010)	ABARE-BRS (2010C) base case
Commodity groups	(\$m)	(\$m)	(\$m)	(\$m)	(\$m)
Cereals for grain and seed	148.7	191.3	180.3	201.0	185.0
Total hay production	79.9	102.8	160.5	179.1	171.0
Cereals for hay	6.1	7.8			
Pastures for hay	73.9	95.0			
Pastures for seed	3.5	4.5			
Cotton	1,110.6	1,428.6	797.9	890.0	1,293.0
Rice	349.2	449.2	273.6	305.1	476.0
Sugar cane		0.0			
Other broadacre crops		0.0			41.0
Fruit and nuts	701.2	901.9	1,011.0	1,127.7	1,006.0
Grapes	785.2	1,010.0	720.8	804.0	715.0
Vegetables for human consumption and seed	467.7	601.5	554.6	618.6	657.0
Nurseries, cut flowers and cultivated turf	90.3	116.1	149.8	167.1	
Dairy production	803.6	1,033.7	901.4	1,005.4	909.0
Production from meat cattle	382.8	492.4	592.5	660.9	612.0
Production from sheep and other livestock	125.3	161.1	143.3	159.8	155.0
Total GVIAP	5,085.4	6,541.1	5,522.0	6,159.0	6,220.0

Table notes:

(1) for June 2001, the CPI (Australia) was 133.8. For June 2006 the value was 154.3 and for June 2010, the value was 172.1

In the baseline scenario, water use is 10,403 Gl/year. In 2005-06, water use was 7,370 Gl/year.¹⁸⁷ That is, the baseline scenario adds 3,033 Gl to the 2005-06 year, an increase of around 41%. However this addition is not seen in the values for GVIAP, with the baseline scenario GVIAP increasing by only \$61 million or 1%. By one view, the ABARE-BRS (2010c) baseline scenario has added around 3,000 Gl to the 2005-06 year, however that addition has not translated into an increase in production. It is not surprising then that when they deduct 3,500 Gl, the impact on production is small. If

¹⁸⁷ *Ibid*

2000-01 is their model year, then, by comparison with empirical data, their calculated GVIAP underestimates production by 5.2%.

The GVIAP assigned to commodity groups is also of concern. Commodity groups differ widely in profitability on a per Gl basis. This can be seen in table 12 of ABARE-BRS (2010c) where effectively in the Southern basin, water is traded from rice, hay and dairy to other uses. Furthermore the differential between commodities is significant. For example Stubbs *et al* (2010)¹⁸⁸, considering employment, found that horticulture was around 15 times more productive than commodities such as rice on a per Gl of water used basis.

Table 4: Gross Value of Irrigated Agricultural Production (GVIAP), Murray-Darling Basin – proportional breakdown by commodity group

	2000-01	2005-06	Base line
Commodity groups	(\$m)	(\$m)	(\$m)
Cereals for grain and seed	2.9%	3.3%	3.0%
Total hay production	1.6%	2.9%	2.7%
Cereals for hay	0.1%		
Pastures for hay	1.5%		
Pastures for seed	0.1%		
Cotton	21.8%	14.5%	20.8%
Rice	6.9%	5.0%	7.7%
Sugar cane	0.0%		
Other broadacre crops	0.0%		0.7%
Fruit and nuts	13.8%	18.3%	16.2%
Grapes	15.4%	13.1%	11.5%
Vegetables for human consumption and seed	9.2%	10.0%	10.6%
Nurseries, cut flowers and cultivated turf	1.8%	2.7%	
Dairy production	15.8%	16.3%	14.6%
Production from meat cattle	7.5%	10.7%	9.8%
Production from sheep and other livestock	2.5%	2.6%	2.5%
Total GVIAP	100.0%	100.0%	100.0%
Combined horticulture and vegetables	40.2%	44.1%	38.2%
Combined hay and rice	8.4%	7.9%	10.4%

¹⁸⁸ Stubbs, J, Storer, J, Lux, C & Storer, T (2010) *Report 4: exploring the relationship between community resilience and irrigated agriculture in the MDB: social and economic impacts of reduced irrigation water.*

It can be seen from the table above that, by comparison with both 2000-01 and 2005-06, the ABARE-BRS (2010c) baseline overstates the proportion of donor commodities such as hay and rice, and understates the proportion of recipient commodities, such as horticulture and vegetables. Again, it is not surprising that the impact of the introduction of SDLs is slight, as there is more water in uses with low productivity per GI and this water is used as the source of the SDLs.

The Water Trade Model

As stated above, a key assumption of the Water Trade Model is that the supply of land suitable for irrigated production is fixed. This has important implications for the ongoing deregulation of trade. The Water Trade Model states that ‘While there are institutional constraints currently affecting interregional trade, these are expected to be removed when the Basin plan comes into effect’.¹⁸⁹ In policy terms, removal of institutional constraints and the introduction of SDLs are two different things. It seems likely that with the gradual removal of institutional constraints, water will be diverted from less productive to more productive uses via the market system provided there is suitable land available for expansion. There is empirical evidence to support this, with irrigated area in the Victorian Mallee reported to have increased by 30,130 hectares or 75% between 1997 and 2009 with most of this increase by private diverters and with most growth experienced in permanent plantings.¹⁹⁰ The conclusion is that removal of institutional constraints to trade on their own is likely to lead to large increases in GVIAP over time. By 2018-19, when SDLs are introduced, it is likely that more water will have to be taken from more productive uses such as vegetables and horticulture than would have been the case if the SDLs were introduced in 2001 and hence the model will understate the impacts. ABARE-BRS (2010C) models three alternative futures. In the baseline scenario there is no trade and no SDLs, and in the other scenarios there is trade and SDLs. In no scenario is there growth in area under irrigation, coupled with trade and with no SDLs modelled.

It is likely the constraint has been introduced by ABARE-BRS (2010c) in order to make the model more tractable. To illustrate this, Quiggin *et al*¹⁹¹ model a range of different scenarios associated with different climate scenarios over different time periods. In particular, and by comparison with ABARE-BRS (2010c), they allow the area of horticulture to increase by 50% in response to trade.¹⁹² The sensitivity of the modelling to such assumptions is evident in the output of Quiggin *et al*, with their table 9 showing (for 2040), reductions in irrigated water use of 28% (similar to that modelled by ABARE-BRS

¹⁸⁹ ABARE-BRS (2010C), *op cit*, page 15.

¹⁹⁰ Mallee Catchment Authority, (2010), *Mallee Irrigated Horticulture 1997 to 2009*, Mildura, page 8.

¹⁹¹ Quiggin, J., D. Adamson, P. Schrobback and S. Chambers. (2008). *Garnaut Climate Change Review: The Implications for Irrigation in the Murray-Darling Basin*. University of Queensland.

¹⁹² *Ibid*, page 20.

(2010c)) resulting in a 65% reduction in output, 13 times the impact predicted by ABARE-BRS (2010c) for similar reductions in irrigated water use, and with the impacts on productivity much greater in quantum than the impacts on water availability.

It is particularly concerning that assumptions appear to have been selected that will put the impact of the introduction of SDLs in the best light. It is also likely that the outputs of the model will be highly sensitive to varying assumptions around the baseline scenario and growth in irrigated area. In addition, the conflating of trade with SDLs is not transparent. Finally, alternative futures are not compared, rather the model appears to compare the present with a future in which trade and SDLs exist.

For these reasons, sensitivity analysis is required, with model output provided across a range of scenarios including those used by ABARE-BRS (2010c). These should include modelling land use scenarios which align with 2000-01 and 2005-06 GVIAP data, and should include models which allow for 25%, 50%, 75% and 100% increase in irrigated land area. (If a growth value was selected based on evidence, the 75% value would be defensible based on Victorian Mallee data). Different futures should be modelled explicitly and the data presented in a transparent way, comparing, for example, a future with trade and no SDLs and a future with trade and SDLs. Because of the likely complexity and dynamic nature of the model, it could be theoretically expected that the model is quite sensitive to some critical assumptions. A scientific paradigm would require testing of the hypothesis that the model reflects the operation of irrigation dependent regional economies. This is quite straightforward to test. For example, and as discussed above, the model can be run to see if it predicts the rural economy measured in 2000-01. (A review of data above suggests that the model fails this most basic test). Alternatively, 2000-01 data could be used to calibrate the model, and then the year 2005-06 could be modelled, and that output compared to empirical data.

[The AusRegion model](#)

The AusRegion model compares results with what would otherwise have occurred in the economy in the absence of the scenario.¹⁹³ The reference case is ‘what ABARE considers to be the likely path that the Australian economy will follow’. Some notable assumptions include ‘demographic changes and investment being the key primary factors behind growth’. ‘Assumptions about international migration are incorporated into the reference case’. The base case is not articulated, but it is likely to be based on ongoing growth in the economy as ‘other industries absorb a significant proportion of the labour

¹⁹³ http://www.abare.gov.au/publications_html/models/models/Ausregion.pdf accessed 18 November 2010 at page 1-7.

released from the agricultural industries'.¹⁹⁴ Because of the assumptions regarding international migration and the easy movement of labour, it is likely that the low level of employment loss predicted by the model arises from a replacement of externally sourced migrant labour to fuel economic expansion with internally sourced displaced labour.

There is evidence to suggest that the movement of labour is not frictionless. Economic orthodoxy on this matter is quite straightforward.

- “Taken literally, the classical model implies that there is no unemployment. In equilibrium, everyone who wants to work is working. But there is always some unemployment... Because it takes some time for an individual to find the right new job, there will always be some **frictional unemployment** as people search for jobs... It is also possible that there is *mismatch* between the skills available in the work force and the skills required by firms attempting to create employment... This is called **structural unemployment**.”¹⁹⁵

However the real world may not match the ideal world of economists. As an example, the Wollongong Steelworks underwent significant restructuring in the early 1980s. “In 1981, the unemployment rate was relatively low throughout the city [of Wollongong], and close to the NSW average... By the time of the 1996 Census, areas around the steelworks had close to one-quarter of adult workers, and up to 41 per cent of young people aged 15 to 24 out of work. This was in sharp contrast to areas in the south-western escarpment foothills where only 5 percent of adults and 10 percent of young workers were not in paid employment.”¹⁹⁶

Some 25 years later, in 2006, unemployment in two southern Wollongong suburbs near the Steelworks of Warrawong and Cringila were 19.0% and 17.6% respectively by comparison with the NSW rate of 5.2%. We do not believe that such empirical evidence of embedded and prolonged structural unemployment is consistent with assumptions of rapid and frictionless adjustment to unemployment arising from structural change.

ABS, ABARE & BRS (2009a) Socio-economic context of the MDB (descriptive report)

¹⁹⁴ ABARE-BRS (2010C), *op cit*, at page 33.

¹⁹⁵ Dornbusch, R., Bodman, P., Crosby, M., Fischer, S. and Startz, R. (2003), *Macroeconomics*, McGraw Hill, Roseville.

¹⁹⁶ Stubbs, J., (2003) *Battle for the Rights to the City Opportunities for an Emancipatory Social Practice in an Polarising Urban Landscape*, PhD Thesis, RMIT, Melbourne, page 49.

This report provides a description of the socio-economic context of water use for the Basin and its regions. This report establishes, “a baseline of information which can be updated and analysed to assist in progressively monitoring the socio-economic circumstances of the Basin and its communities”.¹⁹⁷

As with the majority of profiles and socio-economic benchmarking that has been done in preparation of the Basin Plan, the geographies used in this review, based on the Sustainable Yield Regions, are in many ways far too large to show the diversity of communities within each region and across the Basin. The Condamine-Balonne SYR is an example of this where large towns like Toowoomba and Dalby, which are also much less remote than other communities in the region, tends to mask the trends of some of the smaller and more remote parts of the catchment such as the Balonne Shire and its communities.

The Moonie region is noted to be an area with considerable portions that are remote or very remote, has a small population, and experienced a decline in population between 2001 and 2006.¹⁹⁸ In contrast, the Condamine-Balonne with its large urban centres like Toowoomba and Warwick is described as relatively fast growing. St George, within the Balonne Shire, is identified as the only urban centre in the region to have declined in population (-7.0% change) between 2001 and 2006.¹⁹⁹ Table 5 below shows that the population trend for the local area is more likely to be a larger decline of 12 to 17% for the five year period.

The Moonie region was highlighted as a region with significant declines in the proportion of young people,²⁰⁰ the highest occupancy ratio,²⁰¹ a very low dependency ratio due to a low proportion of residents over 65,²⁰² and low unemployment rates despite population loss.²⁰³ While the low unemployment rate for Moonie may be correct, there is no exploration of the number or percentage of jobs lost over this period.

¹⁹⁷ ABS, ABARE & BRS (2009) Socio-economic context for the Murray-Darling Basin: a descriptive report, report for the Murray-Darling Basin Authority, Canberra, Pg v.

¹⁹⁸ ABS, ABARE & BRS (2009) Ibid, Pg 14.

¹⁹⁹ ABS, ABARE & BRS (2009) Ibid, Pg. 17.

²⁰⁰ ABS, ABARE & BRS (2009) Ibid, Pg. 22.

²⁰¹ ABS, ABARE & BRS (2009) Ibid, Pg. 34.

²⁰² ABS, ABARE & BRS (2009) Ibid, Pg 24.

²⁰³ ABS, ABARE & BRS (2009) Ibid, Pg. 73.

ABS, ABARE & BRS (2009b &c) – Profiles of Condamine-Balonne & Moonie

ABS, ABARE & BRS (2009b&c) have developed basic profiles for the Sustainable Yield regions of the Murray Darling Basin, including the Condamine-Balonne and Moonie regions. These profiles include aspects and trends for each area's population, land use, employment, agriculture, economic resources, community resources and community resources. While the majority of information contained in these profiles is acceptable, there are a few key points of disagreement particularly with regard to the stated changes in population for St George between 2001 and 2006 and changes in GVIAP for the MDB from 00/01 to 05/06.²⁰⁴

With regard to Population

The report discusses how in the MDB and the Condamine-Balonne region between 2001 and 2006, larger and more urbanised towns (with more than 10,000 people) have generally increased in size while smaller and more remote communities have shown declines. The authors state that, “St George was the only town above this population which declined (by 7.0% or 182 people).” The table titled ‘Population of urban centres and localities (a): 2001 – 2006’ indicates that the population of the St George UCL (urban centre/locality) in 2001 was 2592 and 2410 in 2006, equating to a -7.0% change.²⁰⁵ The Moonie regional profile also uses these figures for the St George population.

Unfortunately, ABS Census data for 2001 ‘Usual Resident Population’ for the St George UCL (2592 according to the authors) is not freely available. However, the population trend between 2001 and 2006 for other relevant geographies in and around St George, such as the 4487 postcode (which is equivalent to the St George State Suburb) and the Balonne LGA show a much greater population decline of 12% to 17% depending on the geography. Even the ‘place of enumeration’ count for the St George UCL, or the number of people counted in St George on Census night, shows a nearly 13% reduction.

Table 5: Change in Population 2001-2006 for St George area

²⁰⁴ Please note that there are no page numbers included in these profile documents and have been nominated by the reviewer.

²⁰⁵ ABARE, BRS, ABS (2009b) Condamine-Balonne sustainable yield region regional profile, report for the Murray-Darling Basin Authority, Canberra, Pg 4.

	2001	2006	% change
St George UCL (URP)	?	2410	
St George UCL (PEP)	2779	2424	-12.78%
Post Code 4487 (URP)	3779	3120	-17.44%
Balonne LGA (URP)	5323	4627	-13.08%

Source: ABS (2001) and (2006) Census of Population and Housing

URP = Usual Residents Profile, PEP = Place of Enumeration Profile

With regard to Agriculture

The authors state that “irrigation in decline but agricultural production is increasing” as the amount of land used for irrigated agricultural production declined by 9.3% across the Basin, from 1.82 million hectares in 2000-01 to 1.65 million hectares in 2005-06. However, the gross value of agricultural production (GVAP) increased by 7.1% from \$14,001 million to \$14,991 million. The gross value of irrigated agricultural production (irrigated GVAP) was \$5,522 million in 2005-06 rising 8.6% from \$5,085 million in 2000-01.²⁰⁶

Based on correspondence with ABS Water Statistics staff²⁰⁷ and a thorough review of the ABS Explanatory Notes for the Experimental Estimates of the Gross Value of Irrigated Agricultural Production²⁰⁸, we understand that the values presented by the ABS are in year end current dollar figures and have not been adjusted for inflation. Once this adjustment is made, instead of growth in GVAP and GVIAP in the MDB between the 2000/01 and 2005/06 seasons, these values have actually decreased by

-5.8% for GVIAP and -7.2% for GVAP.

Table 6: Change GVIAP and GVAP 00/01-05/06 ‘year end current \$’ vs CPI adjusted

	2000-01 (\$m)	2005-06 (\$m)	% Change 00/01-05/06	Change (\$m)
MDB GVIAP (non adj)	5085.4	5522.0	8.6%	\$437
MDB GVIAP (adj)	6256.0	5890.6	-5.8%	-\$365
MDB GVAP (non adj)	14001.1	14990.9	7.1%	\$990
MDB GVAP (adj)	17224.1	15991.6	-7.2%	-\$1,233

Source: ABS, Experimental Estimates of the Gross Value of Irrigated Agricultural Production, 2000-01 to 2007-08; ABS, Consumer Price Index, Australia, 6401.0

²⁰⁶ ABARE, BRS, ABS (2009b) Pg 8.

²⁰⁷ Telephone and email correspondence with ABS Water Statistics, 12 November 2010.

²⁰⁸ Available online at

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4610.0.55.008Explanatory%20Notes12000-01%20-%202007-08?OpenDocument>

Whilst this profile does not look beyond the 2005/06 season, the difference between adjusted and non-adjusted GVIAP and GVAP values is even more apparent to the 07/08 season. By using the adjusted data, the idea that “irrigation in decline but agricultural production is increasing” is replaced by ‘irrigation in decline and agricultural production in serious decline’.

Table 7: Change GVIAP and GVAP 00/01-07/08 ‘year end current \$’ vs CPI adjusted

	2000-01 (\$m)	2007-08 (\$m)	% Change 00/01-07/08	Change (\$m)
MDB GVIAP (non adj)	5085.4	5078.9	-0.1%	-\$6.5
MDB GVIAP (adj)	6256.0	5078.9	-18.8%	-\$1,177.1
MDB GVAP (non adj)	14001.1	15575.9	11.2%	\$1,574.7
MDB GVAP (adj)	17224.1	15575.9	-9.6%	-\$1,648.2

Source: ABS, Experimental Estimates of the Gross Value of Irrigated Agricultural Production, 2000-01 to 2007-08; ABS, Consumer Price Index, Australia, 6401.0

Frontier Economics (2010) Structural adjustment pressures in the irrigated agriculture sector in the Murray–Darling Basin

This report identifies a range of matters that are likely to adversely impact on opportunities for structural adjustment in Balonne Shire. The following has been extracted from the report and is largely self-explanatory.

From Table 1 the following factors are considered to be important adjustment factors with respect to Wine/Horticulture and Cotton.²⁰⁹

²⁰⁹ Frontier Economics (2010) *Structural adjustment pressures in the irrigated agriculture sector in the Murray–Darling Basin*, table 1.

Pressure	Wine/Horticulture	Cotton
Adjustment pressures and outcomes not related to water		
Market Factors	Very high – slowing export demand created the current glut in wine markets which is depressing prices.	High –the recent increase in world prices was offset by exchange rate appreciation. Chinese demand is influential in the Australian market.
Social, technological and legacy factors	The relative importance of the agricultural sector in regional economies is declining and there is an overall decrease in agricultural employment. Farmers are ageing and young people are leaving rural areas, although ‘tree changers’ are moving to some rural areas with high amenity values and good transport connections. There is a general movement of people and services from small towns to regional centres. Declines in the viability of any agricultural communities will have a feedback effect on adjustment decisions made by individuals. Farms will continue to consolidate to remain competitive, although small land parcels in public irrigation districts are a constraint so land use policy and planning will influence outcomes.	
Other government policy	Drought assistance distorts and delays adjustment decisions. Tax effective MIS schemes have had a major impact on recent investment in the horticulture sector. Land use planning and policy will be important in managing the impacts of change, including the need for further farm consolidation and pressures from competing land uses.	
Adjustment pressures related to water availability for irrigation		
Prolonged drought	High – changes in production and increased	Very high – major reduction in production.

	costs to purchase water.	
Climate change	Uncertain but potentially very high, due to water availability impacts, severe weather events and market impacts due to changes in global agricultural commodity markets.	
Competing uses	Medium – demand from urban users depends on climate change and drought. Impacts of mining, forestry, and power generation need case-by-case assessment.	
Water policy factors affecting water availability and adjustment		
Buyback	Medium / high - the \$3.1 billion budget for buyback will have a significant impact on water availability for irrigation in the Basin. However, irrigators are given a financial injection, which may not be available under a planned reduction in water availability.	
The Basin Plan	Uncertain. The impact depends on additional reduction in water availability due to SDLs in addition to the buyback program, and how this is shared in wet and dry sequences. The extent of market, drought and climate change driven adjustment before the Basin Plan is adopted will also be important. Risk assignment provisions are uncertain and could influence adjustment outcomes.	
Water markets and trade barriers	Water markets have been critical in reducing the impacts of drought. The overall movement of water out of irrigation districts in the southern system (i.e. from dairy and rice to horticulture) is much less than the reductions due to drought.	
Irrigation charges and termination fees	Generally expected to be of less importance compared to other factors, but major increases in prices will increase farm costs and competitiveness. Where triggered, termination fees effectively decrease the net return from water entitlement sales or the underlying value of the land that is ceasing to be irrigated.	
Public investment in irrigation renewal	Uncertain but potentially high. There are risks that these projects will: distort private investment, result in inefficient / inappropriate irrigation infrastructure that fails to recognise the impacts of reduced water availability, be inappropriately sequenced with buyback, restrict buyback in renewal areas, force adjustment, and result in poor adjustment decisions by irrigators due to information asymmetries.	
Metering policy	Lack of clarity about cost-sharing and implementation creates uncertainty.	

Impacts of Adjustment²¹⁰

At any time, any industry may contain a mix of static, growing and contracting enterprises as a result of adjustment and competitive pressures. For an expanding sector of the economy, the growth in successful firms is greater than the decline in others. For a contracting sector, the converse applies. At an aggregate level, this type of structural change drives economic growth by fostering productivity and innovation and ensuring that resources are utilised flexibly to maximise their value as society's needs change.

However, while the autonomous process of adjustment is essential for economic success in a dynamic and ever changing world, there are often costs of adjustment incurred by some agents, at least in the short term. That is, there are distributional impacts of adjustment—winners and losers. Despite the fact that adjustment frees up capital and labour to move to more efficient and often more sustainable uses in the longer term, this transition also involves some costs and many tough personal decisions are made which affect individuals, families and communities.

Framework and approach

In general, these impacts are more significant when:

- the local or regional economy is more highly dependent on the industry in question rather than containing a mix of diverse economic activities
- the pressures for adjustment are severe and/or unexpected
- the individuals affected by adjustment pressures have limited skills, capacities and alternative opportunities to respond to change.

Concern about adjustment is often particularly strong when community viability may be called into question (i.e. where adjustment decisions by private agents are expected to have flow-on economic and social effects in a community). For example, consolidation of the agricultural sector in a region may mean reduced patronage and therefore viability of a local football club, transport service or school.

However, there is debate about the extent to which industry adjustment is necessarily a bad thing for regional communities. For example, McColl and Young (2005) found **that**

²¹⁰ *Ibid*, page 5

□ one of the most important characteristics of adjustment at the regional level is that relatively inefficient businesses or practices are replaced by more efficient ones. Thus regional impacts are often much less than those that occur in an industry sector.

Cotton²¹¹

The Murray-Darling Basin accounts for nearly all cotton production in Australia (approximately 92 per cent of production in 2005-06) (ABS 2008). The main cotton growing regions are in the northern part of the Basin and include the Border Rivers, Condamine-Balonne, Gwydir, and Namoi regions. The vast majority of cotton production is irrigated. Cotton production in the Basin decreased substantially from 2000-01 to 2007-08, with large variations between years (Figure 14). These changes in production were reflected in the area of land used for cotton production, with the area of land used for cotton production in 2007-08 less than half that in 2000-01.

Cotton production is opportunistic and changes dramatically each year depending on water availability. Figure 16 illustrates the effects of drought on annual water allocated in selected cotton-growing regions of the northern MDB. This reduction in water availability is linked to the overall reduction in cotton production from 2000-01 to 2007-08. Seasonal weather and pest conditions also contribute to cotton yields in a given year.

The cotton industry has experienced significant improvements in yields in recent decades due to use of transgenic crop varieties and other developments in technology (MDC 2008). It is also notable that Australian average yields are approximately three times the world average.

Despite the pressures in the cotton industry including reduced water availability and the short-term effects of the global financial crisis on demand for cotton, ABARE (2009) recently reported a positive outlook for the industry:

Cotton is expected to remain the most profitable irrigated crop in its traditional growing areas in Australia over the medium term. As a result, average cotton production is projected to increase to around 719 000 tonnes by 2013-14.

²¹¹ *Ibid*, page 26

Employment²¹²

The agricultural sector as a whole is a large employer in the Basin, employing around 97,000 people. However this is only approximately 10.8% of the total employment in the Basin. The proportion of people employed in irrigated agriculture in the future is expected to be much lower.

There was a notable decline in agricultural employment in the Basin between 2001 and 2006 of approximately 12%, despite an overall increase in employment in the Basin of 8.3%. Farm employment is also in decline within the Basin and across Australia. From 2001 to 2006 there was a 7.4% decline in the number of farmers in the Basin from 73,140 in 2001, and a 9% decline across all of Australia (ABS et al 2009). Further data shows that over the last 10 years farm employment has fallen by 1.6% per annum and the agricultural industry experienced the largest decline in employment of all industries.

However, there is significant variation across the Basin. In the Sustainable Yields regions with the most farmers (i.e. Murray and Murrumbidgee), farmers represent about 10% of the total people employed. In the Moonie and Paroo regions, there are only small numbers of farmers, but they form 50% and 40% of the total of people employed, respectively. By region, the population of farmers declined most between 2001 and 2006 in the Eastern Mt Lofty Ranges (-16.2%), the Murray region (-12.1%), and the Wimmera (-11.4%).

Community dependence on irrigation²¹³

Any declines in irrigation industries due to autonomous adjustment pressures, water availability and water policy may have impacts on social and economic outcomes at the community level (see Figure 1). For example, there may be fewer shops, schools may close or combine classes, and health services might be reduced. This will then impact on the decisions made by remaining irrigators depending on the importance they place on these community outcomes.

Key issues to consider are:

- the economic dependence of a community on irrigation

²¹² *Ibid*, page 31

²¹³ *Ibid*, page 35

- the availability of alternative economic opportunities
- the adaptive capacity and resilience of a community.

Alternative economic opportunities²¹⁴

The presence of alternative economic opportunities and employment will be a key factor determining whether regional communities can adapt to adjustment pressures. All other things held constant, a more diverse regional economy may also assist communities to overcome downturns in any particular industry. A number of indicators may inform a more detailed assessment of such alternative economic opportunities.

Resilience and adaptive capacity²¹⁵

The potential for alternative economic opportunities may not be realised if the individuals involved in declining industries do not have the skills or capacity to adapt to new employment opportunities. As such the adaptive capacity of individuals is important in determining how resilient they will be to change. Adaptive capacity and resilience may also be assessed at the community level, where formal and informal institutions play an important role. Adaptive capacity varies significantly from town to town and is best assessed by social scientists through fieldwork and community engagement. However we understand that coarse measures based on ABS data are being developed and applied in the Basin. For example, educational levels, age and other demographic factors all play a role.

Impacts of drought²¹⁶

In considering the impacts of drought it is important to take into account the characteristics of the water resource from which irrigation is occurring:

- In regulated systems: Irrigated agriculture is often dependent on access to a highly reliable water supply, particularly for non-interruptible industries such as horticulture or semi-interruptible industries with high capital components such as dairy. Annual crop industries, such as rice and cotton, can also use irrigation water when it is relatively abundant.

²¹⁴ *Ibid*, page 37

²¹⁵ *Ibid*, page 37

²¹⁶ *Ibid*, page 41

- In unregulated systems: Irrigated agriculture may be more focussed around opportunistic irrigation activities such as annual crops that are better suited to the characteristics of the available water resource.
- In farm dam or overland interception circumstances: Irrigated agriculture may be more focussed around opportunistic irrigation activities such as annual crops that are better suited to the characteristics of the available water resource.

Rate of return²¹⁷

Figure 23 shows comparative rates of return by region and industry for 2006-07. For Condamine-Balonne, rates of return were -2.1% for dryland broadacre, 0.6% for dairy, 1% for irrigated broadacre and 5.9% for horticulture.

Cotton²¹⁸

The cotton industry in the north of the Basin is generally considered to be profitable and flexible with production reduced in response to the drought. Localised reductions in water availability due to drought, climate change, the Basin Plan and buyback could be expected to have an impact on the cotton industry. The communities in the north are generally smaller, more varied and more isolated than those in the south.

Additional impacts²¹⁹

Despite efforts to minimise localised costs, the Basin Plan may still be linked with declining water use and economic activity in some irrigation dependent communities. This could contribute to financial losses, unemployment and other social and economic impacts. Such residual impacts are likely to affect irrigators as well as suppliers of inputs and downstream industries directly dependent on irrigation activities (e.g. dairy manufacturers, rice mills).

Governments may decide that additional assistance is warranted, beyond measures generally available under the welfare system. This could involve a mix of financial and non-financial measures. Non-financial measures include: the provision of financial advisory and other counselling services, training and capacity building, better and more flexible land use planning and regulatory tools, and the development of policy tools and incentives to encourage sustainable land use outcomes, for example. Such measures may

²¹⁷ *Ibid*, page 44

²¹⁸ *Ibid*, page 73

²¹⁹ *Ibid*, page 76

be implemented in response to particular outcomes, or as a pre-emptive strategy to minimise the transition costs.

It is unlikely that the MDBA is best placed to design and implement these measures. However, there is an opportunity for the MDBA to identify where adjustment pressures associated with the Basin Plan might be most prevalent and to provide advice to other government agencies on the types of measures that might be relevant and beneficial in any particular community.

IRF & Tim Cummins and Associates (2010) Sensitivity of Goondiwindi Regional Council and Parts of the BROC Region to a Reduction in Water Availability

In August 2009, the Goondiwindi, Tenterfield, Gwydir and Balonne Councils engaged the Institute for Rural Futures at the University of New England, and Tim Cummins & Associates to conduct a socio-economic sensitivity analysis relevant to reductions in access to water for irrigation in the Border Rivers catchment, due either to climate change and ongoing drought, or Government policies (such as water buyback schemes and increasing environmental flows).²²⁰

This report uses similar terminology and methodology (exposure, sensitivity, potential impact, adaptive capacity and vulnerability) that has developed in recent years for understanding how as reductions in the amount of available irrigation water for agricultural production and climate change may affect communities as per ABARE-BRS (2010b), IPCC (2001) and Allen Consulting (2005).²²¹

The research included profiles of each of the study LGAs, mapping the indices of adaptive capacity to gauge vulnerability to external stresses, and a series of interviews with key informants in each region regarding sensitivity to reduced water availability.

²²⁰ Institute for Rural Futures & Tim Cummins and Associates (2010) Sensitivity of Goondiwindi Regional Council and parts of the BROC Region to a reduction in water availability, report to Goondiwindi Regional Council, January, Pg 1.

²²¹ IRF & Tim Cummins and Associates (2010) Pg 4.

Based on this analysis, the authors explored the possible impacts of future reductions in water availability.²²²

A key finding of the authors with regard to the Lower Balonne and other cotton growing areas was that,

- “Policy-related reductions in water availability are likely to bring about more severe adjustment among lower valley operations growing only cotton and utilising flood and overland flows. These irrigators would appear to have fewer adjustment options than the more diverse operations in the middle and upper parts of the river valleys. It is important to note that irrigators growing only cotton and utilising high-flow licences and overland flow licences account for most of the irrigated area in the study region. Those interviewed report that, while they can and will grow other crops in some circumstances, cotton still offers them the best returns from their investments in water entitlements, land and physical capital”.²²³

The authors also made particular predictions of likely impacts for St George. Whilst conservative in their assessment, the authors express optimism about the future of St George and its ability to withstand future stresses from reduced water. The authors state that,

- “The development phase of irrigation, particularly in the lower parts of the river valleys, was responsible for considerable growth in a number of urban centres. However, in the larger centres of St George and Goondiwindi, this growth was accompanied by considerable diversification of their economies, with the result that these two centres have become less dependent on irrigated agriculture. Future trends and developments, such as continuing growth of inland tourism, in-migration of retirees and tree-changing younger families, and coal seam gas development would suggest these two centres are unlikely to become more dependent on irrigated agriculture in the future. However, the amenity of these centres that makes them attractive to in-migrants is dependent upon continuing access to water. In addition, regardless of the robustness of the local economy, a period of adjustment in broadacre irrigated agriculture brought about by policy-related reductions in water availability is likely to impact on land values and the rating base for local government, and may be grounds for Commonwealth adjustment assistance if this impact is severe”.²²⁴

With regard to vulnerability of St George, this assessment relies on a purported increasing diversification of the local economy. There is some evidence that the composition of jobs in industry categories has changed between 2001 and 2006 (following the expansion of the agricultural industry) in the St George area.

²²² IFR & Tim Cummins and Associates (2010) Pg 29.

²²³ IFR & Tim Cummins and Associates (2010) Pg 32.

²²⁴ IFR & Tim Cummins and Associates (2010) Pg 42.

The table below shows the composition of all jobs by industry for two geographic areas, Post Code Area of Usual Residence 4487²²⁵ and the Balonne LGA for 2001 and 2006. The industries highlighted in 'blue' are those that increased in the share of overall jobs in both geographies from 2001 to 2006. These industries include Education, Finance and Insurance, Government Administration, Health and Community Services, Mining, Personal and Other Services, Retail Trade, and Transport and Storage.

Table 8: Industry Composition and Change 2001-2006

	2001 (PC4487)	2006 (PC4487)	Composition Change	2001 (BalLGA)	2006 (BalLGA)	Composition Change
Accommodation, Cafes and Restaurants	5.1%	5.0%	-0.1%	4.8%	5.0%	0.2%
Agriculture, Forestry and Fishing	32.3%	26.8%	-5.5%	39.4%	37.5%	-1.9%
Communication Services	0.7%	0.7%	0.0%	0.9%	0.8%	-0.1%
Construction	5.8%	5.8%	0.0%	5.6%	4.8%	-0.8%
Cultural and Recreational Services	0.3%	0.0%	-0.3%	0.6%	0.4%	-0.2%
Education	6.6%	7.6%	1.1%	6.6%	7.5%	0.9%
Electricity, Gas and Water Supply	1.9%	1.9%	0.0%	1.1%	1.3%	0.2%
Finance and Insurance	1.4%	1.9%	0.5%	0.9%	1.3%	0.3%
Government Administration and Defence	4.9%	5.4%	0.5%	4.0%	4.3%	0.2%
Health and Community Services	8.2%	9.5%	1.3%	7.4%	8.4%	0.9%
Manufacturing	4.4%	4.7%	0.3%	3.7%	3.6%	-0.1%
Mining	0.2%	0.5%	0.4%	0.0%	0.3%	0.3%
Personal and Other Services	2.9%	3.6%	0.7%	2.8%	3.1%	0.4%
Property and Business Services	4.0%	4.0%	0.0%	3.3%	3.4%	0.1%
Retail Trade	13.9%	15.7%	1.8%	12.1%	12.4%	0.3%
Transport and Storage	1.8%	3.5%	1.7%	2.3%	3.4%	1.0%
Wholesale Trade	5.7%	3.1%	-2.5%	4.5%	2.5%	-1.9%
Total (Minus Not Stated & Non Classifiable)	100.0%	100.0%	0.0%	100.0%	100.0%	0.0%

Source: ABS (2006) & (2001) Census of Population and Housing, Census Tables: Industry by Employment 1993 ANZIC Division, by Place of Usual Residence.

Many of these industries are related to the public sector and general service industry and do not necessarily demonstrate a diversification into new or expanding commercial industries, but rather more of a consolidation to the public sector and service industry. While the share of Agriculture, Forestry and Fishing jobs in the overall workforce of the LGA has reduced between 01-06 by nearly 2% to 37.5% of all jobs held by residents, it is hard to say that the community is much less dependent on agriculture than it used to be or is likely to be in the future. Moreover, in 2006 8.4% of all jobs (n=189) in the LGA were associated with Cotton Growing, Cotton Ginning and Cotton Textile Manufacturing – arguably jobs that are all highly reliant on irrigated agriculture occurring within the LGA and the region. This equates to approximately 1 out of every 12 jobs associated with irrigated agriculture. While the local economy may be slightly 'less dependent on agriculture than it used to be' - it is difficult to suggest that the area is

²²⁵ Post Code Area of Usual Residence was used as data by smaller geographic area, such as St George UCL is not freely available from the ABS. The boundaries of PC 4487 is slightly different between 2001 and 2006, however using this geography does provide a way of looking at the St George area and its immediate surrounds. Note that PC4487 in 2006 is equivalent to the St George State Suburb.

not highly dependent on irrigated agriculture and would likely experience significant impacts if jobs were lost in this industry.

Between 2001 and 2006, the Balonne LGA lost a significant number and proportion of jobs (n= 394, -15%). This decline was experienced across nearly all industry sectors, with the most significant loses in Wholesale Trade, Cultural and Recreational Services and Construction. There were a few industries that actually gained employment between 2001 and 2006 including Finance and Insurance, Mining and Transport and Storage. Across the LGA the three industries gained four, seven and fourteen jobs respectively. The table below shows the percent change in employment by industry for the 4487 Post Code and the Balonne LGA.

Table 9: Change in Employment by Industry Sector 2001-2006

	PC4487 % Change 01- 06	Bal LGA % Change 01- 06
Accommodation, Cafes and Restaurants	-21.9%	-11.1%
Agriculture, Forestry and Fishing	-34.3%	-19.0%
Communication Services	-21.4%	-21.7%
Construction	-20.2%	-26.4%
Cultural and Recreational Services	-100.0%	-46.7%
Education	-8.1%	-2.9%
Electricity, Gas and Water Supply	-22.2%	0.0%
Finance and Insurance	7.7%	16.0%
Government Administration and Defence	-12.9%	-10.3%
Health and Community Services	-7.8%	-4.1%
Manufacturing	-15.7%	-17.3%
Mining	166.7%	**
Personal and Other Services	-1.8%	-2.7%
Property and Business Services	-20.0%	-12.5%
Retail Trade	-10.3%	-12.8%
Transport and Storage	55.9%	22.6%
Wholesale Trade	-56.1%	-51.7%
Total - Not Stated - Non Classifiable	-20.8%	-14.9%

Source: ABS (2006) & (2001) Census of Population and Housing, Census Tables: Industry by Employment 1993 ANZIC Division, by Place of Usual Residence.

By looking at Table 5 and 6 together, we see that many of the industries whose share of overall employment that increased between 2001 and 2006 also shed significant portions of their workforce. For example, from 2001 to 2006 while the share of Education jobs in the LGA workforce increased by +0.9%, the industry contracted by 2.9% or a loss of 5 jobs.

Upon review of the status of Balonne LGA against a range of indicators such as population change, unemployment rate, workforce in agriculture, median weekly household income the authors state that,

- “At face value, these figures suggest there is no cause to suspect that the Balonne LGA as a whole is any worse off than many other areas in the MDB with respect to its capacity to adapt to declines in water availability. However, the LGA has a low economic diversity and there are areas of relatively higher disadvantage in Dirranbandi and rural areas to the south-west of the town”.²²⁶

The status of Balonne LGA compared to the MDB averages for many of the indicators referenced are not disputed – for example, the LGA did report a lower unemployment rate than the MDB and a higher median household income. However, it would appear difficult to suggest that as a whole Balonne would be no ‘worse off’ than many other areas. Not only does agriculture (and particularly irrigated agriculture) form a very large proportion of the total economy of the LGA, but the area is further disadvantaged locationally in its distance from larger service centres and markets; its large and expanding Aboriginal population; its small (and declining) population size; and limited alternative economic opportunities. While in-land tourism, in-migration of retirees and coal seam gas may provide for some further diversification in the area, though the authors acknowledge that these opportunities also rely on continuing access to water, these ‘industries’ would by no means be anywhere near a replacement for irrigated agriculture.

- The authors state, “...regardless of the robustness of the local economy, a period of adjustment in broadacre irrigated agriculture brought about by policy-related reductions in water availability is likely to impact on land values and the rating base for local government, and may be grounds for Commonwealth adjustment assistance if this impact is severe”.²²⁷

Mallawaarachchi, T, Adamson, D, Chambers, S & Schrobback, P (2010) Economic analysis of diversion options for the Murray–Darling Basin Plan: returns to irrigation under reduced water availability

²²⁶ IFR & Tim Cummins and Associates (2010) Pg 35.

²²⁷ IFR & Tim Cummins and Associates (2010) Pg 42.

Summary of predicted impacts on Balonne

The report uses a water trade model to quantify the impacts of reductions in irrigation water as a result of introduction of SDLs. The model uses historical data to develop three states of nature, normal, dry and wet with associated probabilities and contains a range of assumptions regarding yield, prices and costs. A baseline scenario is calculated using the model data, with outcomes represented for area irrigated, water used, surplus (profit) and the Gross value of irrigated agriculture with no trade allowed between catchments. Two outputs are provided, an expected value (probability by state value) and a state contingent model reflecting a more flexible agricultural model where producers can change from one crop to another more easily.

The model is then rerun using the proposed SDLs and two sets of outputs are provided. One is based on trade in water within valleys only, that is water can be moved within valleys to different uses, and the other is based on trade within valleys in the southern connected Murrumbidgee and Murray Rivers.

There are a number of caveats in the report. These include:

- *The analysis does not take into account variations in the security attached to water entitlements such as low and high reliability. (page 3)*
- *... Consequently, farmers' actual yields, prices received and the costs associated with irrigated production will vary significantly from the gross margin budgets used here (page 14)*
- *... estimates for GVIAP are presented in current (2007-08) prices; therefore changes between the years shown in these tables partly reflect the effects of price changes (ABS 2009c) (page 18)*

The impacts predicted for Maranoa Balonne are summarised in the table below. Note that data has not been provided in the report for the trade between valleys scenario.

Table 10: Summary of predicted impacts of the introduction of SDLs for Maranoa Balonne

Measure	Table reference	Condamine region (trade within valleys)
Impact on irrigated area (Expected value)	Tables 4 and 16	No change
Impact on irrigated area (State contingent value)	Tables 4 and 16	-9,000 ha (-20%)
Impact on water use (Expected value)	Tables 5 and 17	-63 Gl (-34%)
Impact on water use (State contingent value)	Tables 5 and 17	-35 Gl (-20%)
Impact on GVIAP (Expected value)	Tables 6 and 18	-\$59 million (-29%)
Impact on GVIAP (State contingent value)	Tables 6 and 18	-\$9 million (-4%)

The results between the expected value model and the state contingent model are quite divergent, and cover a wide range of values. The irrigated area varies between nothing and -9,000 ha, water use by a factor of two and GVIAP by a factor of 6. Only summary data is presented for the effects of inter valley water trading, but unrestricted trade only applies to the southern basin.

The model does not attempt to quantify job losses associated with the introduction of SDLs.

As discussed below, the state contingent model assumption is that chickpeas will be grown in drier years. There is no empirical evidence to support this assumption, and so the state contingent values are unlikely to represent reality. Similarly, the model forecasts an increase in irrigated area with reduced water and historical data suggests a reduction in area with reduced water. We believe no confidence can be placed in any of the predictions of the model due to its very poor alignment with empirical data.

Assessment of the modelling approach

What is the best science?

As discussed previously (under ABARE-BRS (2010c) above), critical areas include the base case and sensitivity of the model to variation in parameters. Furthermore, the testing of a hypothesis with regard to empirical data is fundamental to the scientific method.²²⁸ Importantly, unsupported hypotheses should be modified or rejected. As discussed below, it is likely that the model is highly sensitive to assumptions embedded in the model. By comparison with empirical data, the predictions of the model are not supported, suggesting that the hypothesis that the model represents the 'real' world should be rejected.

What does the model do?

The model makes a range of assumptions, and uses these to predict the behaviour of farmers. The baseline is calculated by the model, rather than through adopting empirical data, or using such data to calibrate the model.

Water use is optimised to maximise economic returns. The model allows area to expand in response to change in factors. In the state contingent approach, farmers are modelled to change their crops in response to changing conditions. Cotton farmers are modelled to grow cotton in normal, wet and dry years or to grow chickpeas in dry years.

The Baseline

By contrast with the ABARE model discussed above, the RSMG model develops a baseline based on the assumptions inherent in the model.

There are a number of concerns with the model output for the baseline and the alignment with empirical data. These are discussed in turn with reference to empirical data.

The model predicts at table 3 that as conditions become drier, more land will be irrigated. In the wet climate, 1,367 thousand hectares are irrigated, increasing by 51% in a normal year to 2,067 thousand hectares and further increasing by 8% in a dry year to 2,229 thousand hectares. For Maranoa Balonne, the irrigated area is said to remain constant in dry, normal and wet years at 45,000 hectares.

²²⁸ See for example http://teacher.pas.rochester.edu/phy_labs/appendix/appendix.html

By reference to Table 3 and Table 9, we have assumed that 2000-01 was a wet year, 2005-06 was an intermediate year between dry and normal and 2006-07 was a very dry year. A comparison is shown below with the baseline for a range of factors.

Table 11: Comparison of baseline with empirical data

Parameter	2000-01		2005-06		2006-07	
	Actual data	Baseline prediction (wet)	Actual data	Baseline prediction (normal)	Actual data	Baseline prediction (dry)
Total area irrigated (,000 ha) (Tables 3 and 7)	1,824	1,367	1,654	2,067	1,101	2,229
% change	NA	NA	-9%	+13%	-33%	+8%
GVIAP (\$million) (Tables 3 and 6) (2)	6,256	14,629	5,891	10,238	5,144	6,224
% change	NA	NA	-6%	-30%	-13%	-39%
Irrigated cotton area Balonne (1) ('000 ha)	45	45	21	45	Not known	45
% change	NA	NA	-53%	0%	Not known	0%

Table notes:

- (1) From ABS 71250DO016_200506 Agricultural Commodities: Small Area Data, Australia, various years.
- (2) From ABS Murray-Darling Basin - Gross Value of Irrigated Agricultural Production, 2000-01 to 2007-08 and CPI adjusted to 2007-08

It can be seen that the model is very poor at predicting the behaviour of farmers, finding for example that irrigated area should increase as years become drier while empirical data shows the converse and predicting that farmers in Balonne should irrigate the same area whereas the actual response of cotton farmers to reduced water is to plant less cotton.

The assumptions regarding the mitigating effect of trade are also problematic. For the southern basin, the baseline estimates the area of 'donor' crops such as rice and cereals at

44% of total area compared to 24% for actual data, an overestimate of 83%. On the other hand, the high value 'recipients' of grapes and horticulture are estimated at 10% of total area compared to 10% for actual data, an appropriate estimate, and dairy farming is estimated at 20% compared to 42% for actual data, an underestimate of 110%. Essentially, considerably more area is given to lower value uses, providing much more opportunity for other commodities to donate water to higher value uses, and so overestimating the impact of trade.

The contingent state approach seems to be unrealistic for Balonne. Land use data suggests that the response of cotton farmers to reduced water is to grow less cotton. In 2005-06, there were 3,600 ha of legumes grown in Balonne compared to 3,400 ha in 200-01, however over the same time, cotton area decreased from 45,000 to 21,000 ha, and suggesting that chickpea production is largely constant across wet and dry years. We have not examined other systems as to their alignment with empirical data.

Marsden Jacob Associates et al (2010) Economic and social profiles and impact assessments for the Murray–Darling Basin Plan: synthesis report

In this report, Marsden Jacob Associates et al (2010) developed economic and social profiles of twelve regional irrigation communities within the Murray Darling Basin in order to assess the social and economic impacts that may result from reduced water availability due to the Basin Plan.²²⁹ With regard to findings that are of relevance the Balonne LGA, the authors found that,

- “For a hypothetically uniform percentage reduction in water availability from historical LTCEs...in the north, the Balonne and the Border Rivers would face the full brunt of a hypothetical uniform percentage reduction”.²³⁰
- “Regional communities are larger and more complex systems than farms and farm sectors. As a result, their sensitivity to changes in water allocations is more difficult to articulate. In addition, aggregate regional data can conceal importance

²²⁹ Marsden Jacob Associates, RMCG, EBC Consultants, DBM Consultants, The Australian National University, McLeod, G & Cummins, T (2010) Economic and social profiles and impact assessments for the Murray–Darling Basin Plan: synthesis report, report for the Murray–Darling Basin Authority, Pg. i.

²³⁰ Marsden Jacob Associates et al (2010) Ibid, Pg. v.

of intra-regional differences, including the greater dependency of small towns on irrigated agriculture”.²³¹

- “Across the regions at least 75% of total farm operating expenditure takes place in the regional economy, typically within 50 kilometres of the farm gate; and almost all irrigated production is processed in the same region or a nearby region. Thus, reducing the intensity of irrigated agriculture within a region, be it via dryland conversion, less intensive irrigation, or some other mechanism, will directly reduce economic activity in regional communities. The differences in intensity between an irrigation sector and dryland are greatest for horticulture and dairy and least for cotton and rice”.²³²
- “Regional communities are vulnerable because of the drought. In addition to eroded capital reserves and employment, many regional people are disillusioned about irrigation farming and feel that the national vision of the MDB as a productive foodbowl has been lost. In some cases, regional people report feeling abandoned by governments and their capital city counterparts, and as a consequence are lacking confidence and self-esteem. People suggest that some regional towns and cities are sliding towards welfare-dependency. For the cotton regions of Queensland and northern NSW, small towns, particularly those that are located further inland, tend to be more sensitive to potential reductions in water availability. The Balonne region in Queensland is notably sensitive, with approximately 36% of employment directly in agriculture – more than any other region in Queensland. People interviewed suggested that small cotton-dependent towns already have significant social issues, and also highly mobile workforces. People are concerned that these towns could lose these workers, lose critical mass for community services, and slide into welfare-dependency if cotton-related activity declines in the long-term”.²³³
- “At a 20% reduction in water for irrigation, the Lower Balonne will see investments in water use efficiency and some sale of entitlements where that is allowed. At 40% and 60% reduction in LTCEs, cotton expansion will reduce, farmers will become increasingly likely to exit, some properties will consolidate and cotton gins will start to close, with a decline in employment opportunities and increased migration of people from the region. People in the region see limited alternative employment opportunities in the Lower Balonne”.²³⁴
- “Debt levels are relatively high due to agricultural expansion prior to the drought and during the drought they increased significantly. Banks reluctant to provide further debt funding due to uncertainty of future water availability and higher degree of commercial risk”.²³⁵

²³¹ Marsden Jacob Associates et al (2010) Ibid, Pg. ix.

²³² Marsden Jacob Associates et al (2010) Ibid, Pg XI.

²³³ Marsden Jacob Associates et al (2010) Ibid, Pg XII.

²³⁴ Marsden Jacob Associates et al (2010) Ibid, Pg XVI.

²³⁵ Marsden Jacob Associates, RMCG, EBC Consultants, DBM Consultants and expert advisors (2010c) Lower Balonne community profile: irrigation region, report for the Murray–Darling Basin Authority, Canberra, Pg 10.

- “Potential for extremely low or negative equity in enterprises if SDLs significant – would make accessing capital for adjustment or exiting the industry difficult”.²³⁶
- “Reasonable to expect some consolidation of ginning capacity should permanent reductions in SDLs be implemented in the region”.²³⁷
- “SDLs will result in some WUE initiatives, but mostly reductions in areas under production. Pressures on irrigators further increased as water services charges for remaining customers as fixed costs of supply are spread across a smaller customer base”.²³⁸
- “Council ability to maintain current service levels will be compromised where costs are shared across a diminishing population and rate base”.²³⁹

With regard to potential mitigations of the impacts identified the authors state that,

- “There is very substantial scope to mitigate the final impacts of the Basin Plan on irrigation farms, supply and marketing chains and communities. Conversely, there is substantial scope to exacerbate these impacts if wrong decisions are taken, or if right decisions are taken but poorly executed. Thus, the answer to the question, ‘what will the impacts of reduced water availability be on irrigation regions?’ is – it depends.”²⁴⁰

However, with regard to their findings for the Lower Balonne particularly there does not appear to be ‘substantial scope to mitigate the final impacts of the Basin Plan’ on the communities of this region. The authors identify the following impacts and potential mitigations for the Lower Balonne:²⁴¹

With regard to mitigation through trade

- Permanent water trading between irrigators as a market-driven structural adjustment mechanism is not possible in the Lower Balonne.
- Temporary water trade is not possible in the Lower Balonne Water Management Area which reduces options for water availability risk management.
- Temporary trade is possible in SunWater’s St George Irrigation Scheme, largely to finish off crops (typically less than 20,000 ML/annum).

²³⁶ Marsden Jacob Associates et al (2010c) Ibid, Pg 11.

²³⁷ Marsden Jacob Associates et al (2010c) Ibid, Pg 15.

²³⁸ Marsden Jacob Associates et al (2010c) Ibid, Pg 21.

²³⁹ Marsden Jacob Associates et al (2010c) Ibid, Pg 21.

²⁴⁰ Marsden Jacob Associates et al (2010) Ibid, Pg Xviii.

²⁴¹ Marsden Jacob Associates et al (2010) Ibid, Pg 150-151. For all mitigation referenced here, others with additional footnotes refer to Marsden Jacob Associates (2010c)

- The sale of permanent water to the Commonwealth is now possible in the Lower Balonne.

With regard to mitigation through improved efficiencies

- Enhancements to scheme efficiencies by SunWater (e.g., lining channels) are limited as they generally are not commercially viable within current pricing arrangements.
- While there is technically some scope for further water use efficiency, commercially viable water use efficiency opportunities are limited, particularly given policy uncertainties and the prohibitive capital cost of many remaining options.²⁴²
- As most irrigators are now utilising soil moisture testing and efficient application timing, the most likely viable water use efficiency option is to deepen on-farm storages.²⁴³
- Options for further efficiencies in cotton extremely limited by absence of co-investment.²⁴⁴

With regard to mitigation through diversification of crops

- Opportunities for diversification into higher value crops (margins per ML) are agronomically possible but options are commercially limited by a lack of competitive advantage in the Lower Balonne and access to capital; markets tend to be very small and wholesale crop changes would likely result in significant reductions in prices received (due to oversupply into key markets).
- Significant moves into irrigated grapes are unlikely to be commercially viable due to constrained demand.²⁴⁵
- The most likely response to any permanent and material reduction in SDLs would be a wholesale shift into lower value dryland broadacre crops, with irrigation only being practiced on the rare occasions when water is very plentiful.
- A wholesale shift out of cotton would be a major concern to the region as irrigated cotton produces over eight times as much employment per hectare as dryland crop alternatives.
- Growth in other sectors (particularly beef) to offset losses in irrigated ag is likely in the long term, but could also be constrained by other factors (eg. vegetation management regulations).²⁴⁶
- Opportunities for market-led transformation into other forms of agriculture are limited in the absence of structural adjustment.²⁴⁷

With regard to mitigation of social impacts

²⁴² Marsden Jacob Associates et al (2010c) Ibid, Pg 5.

²⁴³ Marsden Jacob Associates et al (2010c) Ibid, Pg 5.

²⁴⁴ Marsden Jacob Associates et al (2010c) Ibid, Pg 12.

²⁴⁵ Marsden Jacob Associates et al (2010c) Ibid, Pg 15.

²⁴⁶ Marsden Jacob Associates et al (2010c) Ibid, Pg 21.

²⁴⁷ Marsden Jacob Associates et al (2010c) Ibid, Pg 23.

- Concern amongst the community that the permanent introduction of reduced SDLs would trigger further declines and permanent losses of key services (e.g., health clinics and schools). The recent drought has already resulted in population decline, specifically in areas such as Dirranbandi. This has already resulted in a decline in some community services.
- Further loss of flow-jobs and expenditure.
- Under high cut scenarios (40% and 60% reductions) permanent migration out of area and resultant closures for some businesses and loss of social services. The demographics of the region would be likely to change and welfare dependency would be likely to increase sharply, particularly in areas with a less mobile labour force (e.g., Indigenous people working in Dirranbandi).
- Off-farm income in region is also limited.²⁴⁸
- Modest but expanding tourism industry, centred on region's natural and historic heritage and recreational activities. Many 'grey nomads' injecting relatively minor expenditure in local economy.²⁴⁹

Most importantly with regard to the wider opportunities to mitigate impacts at the community level, the authors state that, *“From a structural adjustment perspective, the Lower Balonne provides a difficult challenge as there are few, if any, viable alternative economic activity opportunities in the region”*.²⁵⁰

Marsden Jacob Associates et al (2010) Condamine Balonne community profile

- N/A – basic overview of region, no issues.

Marsden Jacob Associates et al (2010) Lower Balonne community profile

- The findings from this profile report are included in the summary of the Synthesis report detailed above.

²⁴⁸ Marsden Jacob Associates et al (2010c) Ibid, Pg 10.

²⁴⁹ Marsden Jacob Associates et al (2010c) Ibid, Pg 19.

²⁵⁰ Marsden Jacob Associates et al (2010) Ibid, Pg 152.

Marsden Jacob Associates et al (2010) Moonie community profile

- N/A – basic overview of region, no issues.

Marsden Jacob Associates (2010a) Community survey technical report

Marsden Jacob Associates completed a telephone survey of 292 residents across 11 irrigation regions in the MDB. The survey received fewer than 30 responses from the Balonne region. The authors state that, “Due to small sample numbers in these regions statistical testing is not reported for these regions separately”.²⁵¹ Therefore, it would not be possible to make any kind of generalised statements about the findings of the survey for the Balonne region as it is defined. A troubling aspect of this research is a reference to the website ‘wikipedia.org’²⁵² with regard to sample size methodology, which would not be regarded as appropriate scholarly literature or best practice let alone ‘best available science’ at a fundamental level.

Based on the presentation of results, it appears that this assessment assumes that the appropriate sampling distribution is the ‘normal distribution’. We believe this is incorrect as the variable sampled is not continuous; rather it is discrete in that people either hold one opinion or another, and hence the appropriate distribution is the ‘binomial distribution’. At best the researchers have assumed that their Likert scale is a pseudo-continuous variable.

It is also a concern that the survey, or at least the technical reporting of the survey, largely focuses on an assessment of “community support for the reallocation of water from the consumptive pool to environmental watering directly” in order to “develop targeted consultation strategies” and “to convince households of the importance of reallocating water to environmental watering”.²⁵³ Statements such as this seem to suggest that the purpose of this survey was not to genuinely understand the opinions, concerns, possible impacts and mitigations of reduced water availability in irrigation

²⁵¹ Marsden Jacob and Associates (2010) Delivering the Basin Plan: Economic and social profiles of Murray Darling Basin Communities, Appendix 3a – Community survey technical report, July. Pg 9.

²⁵² Marsden Jacob Associates (2010) Ibid, Footnote Reference No 5, Pg 9.

²⁵³ Marsden Jacob Associates (2010) Ibid, Pg 19.

communities of the MDB but rather to identify information and trends that will allow for improved social marketing messages to increase support for a policy decision to return water to the environment.

Marsden Jacob Associates (2010b) Irrigator survey technical report

Marsden Jacob Associates completed a survey of 1,021 irrigators and dryland farmers across 11 irrigation areas of the MDB. 11 surveys were completed with farmers from Balonne region (7 irrigators and 4 dryland farmers). This report provides an analysis of the irrigator survey, including econometric models developed to assess irrigators' decisions to adjust farming operations, maintain the status quo, or exit farming following reductions to water availability.

The stated objectives of the survey were to develop profiles of irrigators of the Murray Darling Basin; identify strategies irrigators would adopt in response to permanent changes in average annual water supply, as foreshadowed by the Basin Plan; and to evaluate systematic relationships between the five capitals (human, social, natural, physical and financial) on farm, and farmer decisions to exit farming, remain on farm and change enterprise mix, or remain on farm and not change enterprise mix in the face of irrigation water supply reductions; and to forecast farm sector and regional impacts of the introduction of the Basin Plan.²⁵⁴

The authors state that, "The use of non-random sampling means that estimates will not be representative of the region, unless the samples (in particular the split between irrigator and dryland respondents) match the regional population breakdown. Validation of the post survey sample in this paper to 2006 ABS agricultural census and recent ABARE national farm survey data (Dale Ashton, 2010) show a strong concordance, and this would seem to verify the representativeness of the farm sample."²⁵⁵ Due to the small number of irrigators sampled for Balonne the authors report that any findings for this area should be 'treated with caution'²⁵⁶. Also, due to the small number of respondents who are cotton farmers the authors are unable to report findings for this group in general.

²⁵⁴ Marsden Jacob and Associates (2010b) Delivering the Basin Plan: Economic and social profiles of Murray Darling Basin Communities, Appendix 3b – Irrigator survey technical report, July. Pg 6-7.

²⁵⁵ Marsden Jacob and Associates (2010b) Ibid. Pg 13.

²⁵⁶ Marsden Jacob and Associates (2010b) Ibid. Pg 13.

There is reference to farmers in the Balonne with regard to differences in concern by region and demographics.

- “Regional issues again show a strong north south Basin division: Farmers in Balonne, GMID, Murrumbidgee, NSW Central Murray, Riverland, and Sunraysia reported significantly lower levels of time stress than farmers in the remaining regions. The same farmers rate concern about the impact of drought and water availability on their farm operations significantly higher than farmers in Balonne, Border Rivers, Gwydir, Lachlan, Namoi, and Macquarie Valley”.²⁵⁷

This statement is confusing as it seems to report that farmers in Balonne are supposedly the ‘same famers’ that rate concerns higher than farmers in Balonne. It is unclear whether this finding is an error or simply poorly expressed.

Productivity Commission (2010) Market mechanisms for recovering water in the Murray-Darling Basin

In this report the Productivity Commission, amongst other things, considered the regional impacts of the introduction of SDLs.

- “While the impacts of the buyback should be moderate at the southern Basin level, some towns and regional centres could experience large reductions in gross product. As mentioned above, the Basin-level impacts are moderated by the small share of irrigated agriculture in the Basin economy. By contrast, some towns are heavily reliant on irrigated agriculture (for example, Coleambally), and moreover, could experience substantially larger reductions in water availability than the southern Basin average. The impacts of the buyback could be substantial in these communities. The impacts of the buyback in the northern Basin have not been modelled. However, the overall impacts are unlikely to be substantially different from those in the southern Basin. The percentage of workers employed in agriculture is a key determinant of the impact of a contraction in agricultural activity on the regional economy. In 2006, this was around 6 per cent in the Victorian MDB and 8 per cent in South Australian MDB. This is similar to the Queensland MDB, where around 7 per cent of the labour force was employed in agriculture.”²⁵⁸

²⁵⁷ Irrigator survey, Pg 18.

²⁵⁸ Productivity Commission (2010), *Market Mechanisms for recovering water in the Murray-Darling Basin*, Appendix D, page 344.

It is clear that the regional or local adverse impacts will be significant, and will be experienced differentially.

The Productivity Commission had a number of broad criticisms related to the Water Act and the setting of SDLs. In particular, it strongly recommended that the opportunity cost of water be considered when allocating water to the environment.

- “SDLs must be based on scientific assessments of the amount of water that is required to avoid compromising key environmental assets and processes. Good science is a necessary but not sufficient basis for optimising the use of the Basin’s water resources. The value people place on environmental outcomes, the opportunity cost of foregone irrigation, and the role of other inputs, such as land management, must also be considered. If the Water Act 2007 (Cwlth) precludes this approach, it should be amended”.²⁵⁹

The commission was also critical of subsidising infrastructure as a measure to return water to the environment.

- “The same cost effectiveness tests should be applied to all water recovery options. Purchasing water from willing sellers (at appropriate prices) is a cost-effective way of meeting the Government’s liability for policy-induced changes in water availability. Subsidising infrastructure is rarely cost effective in obtaining water for the environment, nor is it likely to be the best way of sustaining irrigation communities”.²⁶⁰

²⁵⁹ *Ibid*, page xxii.

²⁶⁰ *Ibid*, page xxii.

Rizza, A (2010), The potential effects of changes to water allocation policy on financing the agricultural sector and businesses in the Murray Darling Basin.

Summary of predicted impacts on Balonne

The author notes a wide range of adverse impacts expected from the implementation of SDLs in communities dependent on irrigated agriculture. Given the circumstances of Balonne Shire, it is likely that these adverse impacts will be experienced here.

Points of particular concern include:

- Banks consider a reduction in water allocated to consumptive use in the Basin of 20% will be equivalent to perpetual drought conditions and cuts of 30-35% are viewed with grave concern.²⁶¹ The historical effect of drought conditions has been significant.²⁶² This is by contrast with the 20-40% reductions proposed in Condamine Balonne with the introduction of SDLs, that is the SDLs will impose permanent drought conditions on Balonne Shire.
- Compensation for funds received from a water buyback scheme is likely to transfer directly to banks. Little of these funds will stay in the local community.²⁶³
- Debt levels are at record levels and up to 70% of borrowers in the basin are estimated to be in financial stress.²⁶⁴
- The sale of permanent water attached to farm land is likely to lead to a reduction in the capacity of that land, even where temporary water is available. Consequently, once the permanent water has been sold, the remaining land will be treated as dry land and the value, and ability to

²⁶¹Rizza, A (2010), *The potential effects of changes to water allocation policy on financing the agricultural sector and businesses in the Murray Darling Basin*, pages 5, 12, 16 and 26.

²⁶² *Ibid*, pages 23, 41 and 47.

²⁶³ *Ibid*, pages 6, 27 and 41.

²⁶⁴ *Ibid*, page 6.

borrow to restructure, will reduce markedly.²⁶⁵ Without water, much infrastructure will be valueless.²⁶⁶

- Towns with populations of less than 25,000 and heavily reliant on irrigated agriculture, are unlikely to be sustainable without a thriving agricultural industry. Towns are likely to lose population and there is evidence of small businesses suffering adverse impacts in the recent drought.²⁶⁷ St George has been identified as a community that may struggle to remain viable in the absence of sufficient water for irrigation and as one highly reliant on irrigation.²⁶⁸
- For 80% of small businesses in the basin with loans, their security is the family home.²⁶⁹ As the value of those homes falls, small business owners are unlikely to retain sufficient equity after retiring debt to start again. These businesses employ 90% of workers in many regions in the basin.²⁷⁰ Other larger scale businesses will also be effected as throughput decreases.²⁷¹
- Businesses dependent on the irrigation sector are unlikely to be provided with compensation with the introduction of SDLs.²⁷²
- Banks are unlikely to provide financing towards implementation of water efficiency schemes.²⁷³
- Banks are likely to be quite sensitive to even small changes in cash flow and levels of gearing, so any change could trigger action to recover debts due to the bank.²⁷⁴
- The effect of drought has been to increase the cost of capital by 2 percentage points.²⁷⁵
- Diversification strategies by agribusinesses are likely to focus outside their community of origin and so are unlikely to flow to local communities.²⁷⁶

²⁶⁵ *Ibid*, pages 6, 17, 28, 29, 30 and 32.

²⁶⁶ *Ibid*, page 30.

²⁶⁷ *Ibid*, pages 6, 16, 17, 23, 33, 39, 40 and 41.

²⁶⁸ *Ibid*, pages 6, 16, 23, 28 and 29.

²⁶⁹ *Ibid*, pages 6 and 12.

²⁷⁰ *Ibid*, pages 12, 22, 29, 32, 36 and 39.

²⁷¹ *Ibid*, page 23.

²⁷² *Ibid*, pages 7, 11 and 40.

²⁷³ *Ibid*, page 7.

²⁷⁴ *Ibid*, page 8.

²⁷⁵ *Ibid*, page 9.

²⁷⁶ *Ibid*, page 12.

Based on these various predicted impacts, a range of likely impacts on Balonne can be forecast. In the recent drought (between the 2001 census and the 2006 census) the population of Balonne Shire decreased by 15%. This population loss will become permanent, and another 15% population loss could be expected as water cuts will be twice the level predicted to represent permanent drought.

These impacts will manifest in various ways. Where irrigation enterprises have sufficient equity, they will diversify out of the region, probably using additional capital obtained through the buyback. Where they lack equity, any funds from the buyback will be used to retire debt and again leave the community. While opportunities may exist to restructure towards dry land use or to implement water efficiency measures, enterprises will be unlikely to obtain financing for such schemes.

There will be a major flow on to other businesses in the community as their income drops. Many of these businesses are likely to become bankrupt or to lose all their assets as their income drops and their main form of security, the family home, reduces in value.

Stubbs, J, Storer, J, Lux, C & Storer, T (2010) Report 4: exploring the relationship between community resilience and irrigated agriculture in the MDB: social and economic impacts of reduced irrigation water.

Summary of predicted impacts on Balonne

This study uses Balonne Shire (amongst others) as a case study area²⁷⁷ to examine the likely impacts of reduced irrigation water.

The report finds that Balonne is likely to be very vulnerable to a permanent reduction in irrigation water, with significant job and population loss, and considerable adverse impacts on a range of socio-economic indicators of community resilience and wellbeing

²⁷⁷ Stubbs, J, Storer, J, Lux, C & Storer, T (2010) *Report 4: exploring the relationship between community resilience and irrigated agriculture in the MDB: social and economic impacts of reduced irrigation water*, Appendix 1

projected in the long-term. This is likely to entrench higher levels of disadvantage, particularly among older people and Aboriginal residents. Exacerbating factors include Balonne Shire's locational disadvantage, including its remoteness and isolation from major service centres; its large, growing and disadvantaged aboriginal population; and its dependence on agriculture with limited opportunities for economic diversification. Of relevant factors considered important to community resilience, Balonne Shire scores poorly on nearly all factors.

Irrigated agriculture (cotton, grapes, vegetables, fruit) employed directly 236 people in 2006, one quarter of agricultural employment and 10% of all employment.²⁷⁸ Employment is likely to be understated as seasonal labour is probably not included. Using multipliers, it is likely that 80% of employment in Balonne Shire is associated with agriculture, suggesting that irrigation comprised 20% of the economy of Balonne Shire in 2006. Among other modelling, a 25% reduction in irrigation water was predicted to result in a 4.8% decrease in employment and a 6.6% decrease in population. A 50% reduction predicted a 9.6% and 13.3% reduction in employment and population respectively.²⁷⁹ It should be noted that this modelling is based on employment in 2006, a drought year, and if modelling was carried out based on 2001 data, it is likely the impacts will be higher. By comparison, drought conditions between the 2001 census and the 2006 census led to a population decrease for Balonne Shire of 15% and an employment decrease of 17% with this employment decrease reflecting impacts on both irrigated and non irrigated agriculture.²⁸⁰

Assessment of the modelling approach

The approach taken is quite different to that used by other modellers (ABARE-BRS (2010a and b), Mallowaarachchi *et al* (2010), Wittwer (2010)), with the model based on an empirical approach using a statistical derivation of the relationship between water usage in irrigated agricultural sectors and employment in those sectors. The economy is modelled in terms of employment. By contrast, the other approaches model the behaviour of farmers to changing availability of water given knowledge of costs and returns related to various cropping options and the availability of trade and use that approach to calculate impacts on agricultural production in dollar terms. In effect they attempt to model the response of the economy from the bottom up.

The advantages of the statistical approach is that it contains many fewer assumptions and inputs by comparison with other models and hence could be expected to be more robust.

²⁷⁸ *Ibid*, Table 3.2

²⁷⁹ *Ibid*, Table 4.1

²⁸⁰ *Ibid*, Calculated from table 3.3

Importantly the relationship is statistically defensible as it is descriptive of the irrigation industries in the MDB in 2006. In addition, the approach can be applied at different scales, so that local and regional impacts can be understood.

The model may overestimate impacts as it considers average, rather than marginal impacts, and does not allow for trade or reuse of infrastructure. At the same time, the authors believe this is likely to be more than offset by other factors such as underestimation of employment, drought effects in 2006 and cumulative and threshold effects from water reduction.²⁸¹

Table 12: Changes in GVIAP (CPI adjusted to 2007-08) and water usage over time

Year	GVIAP (CPI adjusted (\$m ₂₀₀₇₋₀₈))	% change in GVIAP	Water use (Gl)	% change in water use
2000-01	6256.0		10516 (1)	
2005-06	5890.6	-5.8%	7370	-29.9%
2006-07	5143.8	-12.7%	4458	-39.5%
2007-08	5078.9	-1.3%	3142	-29.5%
2008-09	4286.6	-15.6%	3493	+11.2%

Source: ABS, Murray-Darling Basin - Gross Value of Irrigated Agricultural Production, 2000-01 to 2008-09 and calculations

Table notes:

(1) Data not published by ABS. Mallawaarachchi *et al* (2010) report this value at table 9 referencing ABS.

Stubbs *et al* predict an annual loss of \$2.7 billion associated with a 50% reduction in water availability using 2005-06 as a base year. As can be seen from the table above, the reduction in irrigation water between 2005-06 and 2008-09 was about 53%, with a reduction in GVIAP of \$1.6 billion. Assuming GVIAP equates to added value (almost certainly an overestimate) and allowing a multiplier of 0.9 for flowons to other industries, the impact of reduced water availability was a reduction of about \$3.0 billion, suggesting that the estimate of Stubbs *et al* is a reasonable representation of the short term impacts of reductions in water availability.

There is considerable fluctuation in GVIAP, as the makeup changes depending on annual crops and commodity prices. In particular, the sustained GVIAP in 2007-08 is probably because of high commodities prices and differential impacts on sectors.

²⁸¹ *Ibid*, page 1.

Reductions in irrigation water are not evenly distributed between irrigation uses as shown in the table below. In particular, reductions are differentially experienced in industries such as rice and cotton, with low levels of employment per Gl. The data probably reflect, in addition to overall reductions in the level of irrigation water used, diversion of irrigation water in the northern basin from cotton to cereals, and in the southern basin, from rice to fruit and nuts, grapes, vegetables and nurseries.

Table 13: Relationship between changes in irrigation water and GVIAP, with preliminary calculation of the impact of commodity price changes

Commodity groups	Reduction in irrigation water 2005/06-2007/08	% change	Reduction in GVIAP 2005/06-2007/08 (\$m ₂₀₀₇₋₀₈)	% change	Estimated price rise (1)
Cereals for grain and seed	181,589	29%	76.9	40%	9%
Total hay production	-308,150	-47%	-32.6	-19%	53%
Cereals for hay					
Pastures for hay					
Pastures for seed					
Cotton	-1,291,867	-82%	-657.7	-77%	28%
Rice	-1,225,217	-98%	-284.5	-97%	50%
Sugar cane					
Other broadacre crops	-32,325	-27%			
Fruit and nuts	-56,571	-14%	103.5	10%	28%
Grapes	-80,957	-16%	334.9	44%	71%
Vegetables for human consumption and seed	-27,985	-18%	126.7	21%	48%
Nurseries, cut flowers and cultivated turf	-2,790	-23%	65.7	41%	83%
Dairy production	-662,577	-64%	-0.1	0%	180%
Production from meat cattle	-395,234	-71%	-467.5	-74%	-10%
Production from sheep and other livestock	-307,613	-70%	-59.5	-39%	103%
Total volume applied	-4,228,148	-57%	-811.7	-14%	100%

Source: Murray-Darling Basin - Gross Value of Irrigated Agricultural Production, 2000-01 to 2007-08 and calculations

Table notes:

(1) For example, for hay, estimated price rise = $(1-.19)/(1-.47)=.53$

It should also be noted that some of the variation in GVIAP is likely to be because of price changes rather than solely from changes in output. Assuming output is linear to water use (that is if water use is halved, production such as tonnes of crop is halved), then the differential between the change in GVIAP and in water reduction for 2007-08 can be attributed to price change.²⁸²

Modelling of impacts of proposed SDLs on Balonne

The impacts of the proposed SDLs on Balonne Shire have been modelled using the methodology in Stubbs *et al* (2010) but with some modifications. The results of that modelling are tabulated below.

The modelling assumes that cuts in irrigation water will come progressively from cereal, then cotton followed by other uses. Because of the magnitude of irrigation water use for cotton, effectively the reductions in irrigation water are taken from cotton.

The primary impact is a loss of employment of between 5% and 8% across the range of proposed SDLs, or in absolute numbers, between 109 and 172 lost jobs. Correspondingly, population loss of between 7% and 10% is expected, or between 306 and 481 people.

With regard to socio-economic indicators, significant changes include a reduction in SEIFA disadvantage and economic resources, an increase in rates of premature death, decreased labour force participation, decreased household income, increased rate of disability support pension recipients, increased median age, decreased skills base, increased rates of youth and general unemployment, and higher levels of crime. The main driver of the general deterioration of socio-economic indicators is because the model assumes those people losing employment will leave the town, and predicts those remaining are likely to be older and/or Indigenous. Both these groups are more disadvantaged than the Australian population generally, and will comprise a larger proportion of the remaining population. The trend will be towards increasing residualisation.

²⁸² An alternative explanation is improvements in efficiency, but this would suggest for example producing the same amount of nursery product with half the water. The magnitude seems unlikely but the hypothesis could be tested with reference to production data rather than GVIAP data.

2005-06 was a drought affected year in Balonne Shire. In 2005-06 the production of cotton was well down by comparison with 2000-01. In 2005-06, there were 21,864 ha of cotton cultivated compared to 44,975 ha in 2000-01, an increase of around 106%, or more than double. In 2000-01 around 400 people²⁸³ were employed in cotton in Balonne Shire, about double the 2005-06 figure. It can be inferred that if 2000-01 was an average year, then calculated job losses associated with SDLs would increase by between 70 and 100 direct cotton jobs, and, including a multiplier, between 133 and 190 jobs. The conclusion is that the effect of drought conditions in 2005-06 is to understate the magnitude of, and proportional reduction in, employment as a result of SDLs.

By another view, the introduction of SDLs at the 45% reduction level is similar to the impact of drought conditions between 2000-01 and 2005-06, with an approximate halving of cotton production. In that period Balonne Shire lost 17% of jobs, and 15% of population. While these figures include job losses associated with dry land farming as well as irrigated farming, it suggests that the calculated job losses (8% for a 45% reduction) are probably an underestimate, or at least defensible. On the same basis, the population estimates appear somewhat high. This is probably because the model assumes 2.8 people per job in line with Australian averages, but at odds with the Balonne Shire ratio of 1 job per 1.9 people for 2001, and 1 job per 2.0 people for 2006.

If the modelled proportions are assumed, that is assuming the drought has affected all sectors equally, the absolute loss in jobs expected from the introduction of SDLs based on 2000-01 levels of employment is between 138 and 211 jobs. If the increase in cotton jobs only are considered, the absolute loss in jobs, again based on 2000-01, will be between 242 and 362 jobs. The latter estimates are more likely and reflect percentage reductions of between 9% and 13%.

²⁸³ ABS Census 2001 and adjusted for not stated and improperly coded.

Table 14: Modelling of social and economic impacts of proposed SDLs in Balonne Shire

Indicator	Base case	Predicted indicators for 2006 for reduction in irrigation water trade assumed			
	2006	29% reduction	34% reduction	39% reduction	45% reduction
irrigation water use (GJ)	167.0	118.6	110.2	101.9	91.9
Employment (total) (1)	2284	2175	2155	2136	2112
% decrease in employment		4.8%	5.6%	6.5%	7.5%
Employment (Vegetables)	6	6	6	6	6
irrigation water use (GJ)	0	0.0	0.0	0.0	0.0
Employment (Fruit)	4	4	4	4	4
irrigation water use (GJ)	0	0.0	0.0	0.0	0.0
Employment (Grapes)	27	27	27	27	27
irrigation water use (GJ)	1.6	1.6	1.6	1.6	1.6
Employment (Grazing)	513	518	519	519	520
irrigation water use (GJ)	0	0.0	0.0	0.0	0.0
Employment (Cereal)	75	75	75	75	75
irrigation water use (GJ)	1.7	0.0	0.0	0.0	0.0
Employment (Rice)	0	0	0	0	0
irrigation water use (GJ)	0	0.0	0.0	0.0	0.0

Employment (Cotton)	199	137	126	115	101	
irrigation water use (GI)	163.7	117.0	108.6	100.3	90.3	cotton usage not published but estimated from totals
Employment (Balance Agriculture)	113	113	113	113	113	
Employment (Total Agriculture)	937	880	869	859	847	
Population (3)	4625	4319	4265	4210	4144	remains below 5,000 threshold
estimated % decrease in population		6.6%	7.8%	9.0%	10.4%	
Indigenous population (4)	14.9%	15.3%	15.4%	15.5%	15.6%	
Number of indigenous people	689	662	657	652	646	
Dependent variables:						
SEIFA disadvantage	942	937	936	934	933	from changing age and indigenous structure
SEIFA Economic Resources	928	922	921	920	918	
Premature death	288.8	291.7	292.3	292.9	293.6	from changing indigenous structure
LFP 15+	70.3%	69.0%	68.8%	68.5%	68.2%	from changing age and indigenous structure
Median Household income	\$974	\$ 938	\$ 931	\$ 924	\$ 916	from changing age and indigenous structure
Disability support pensioners	4.5%	4.9%	4.9%	5.0%	5.1%	from changing age and indigenous structure

Profound or severe disability	3.1%	3.3%	3.3%	3.4%	3.4%	from changing age structure
Chronic ill health	255.8	253.4	253.0	252.5	252.0	from reduced cotton employment
LFP 65+	22.5%	21.8%	21.7%	21.6%	21.4%	from changing age structure
Median Age	34	35.0	35.2	35.4	35.7	from change in agriculture and indigenous structure
Skills Base	28.1%	27.6%	27.4%	27.3%	27.2%	from changing agriculture and age and indigenous structure
Education participation	63.9%	64.0%	64.0%	64.1%	64.1%	
SEIFA Education and Occupation	957	957	957	957	957	
Polarisation	0.83	0.83	0.84	0.84	0.84	
Youth unemployment	6.8%	7.1%	7.2%	7.3%	7.4%	from changing age and indigenous structure
Unemployment	3.3%	3.6%	3.6%	3.7%	3.8%	from changing age and indigenous structure
Change of SLA five years ago	24.2%	23.2%	23.1%	22.9%	22.7%	
Voluntary work	31.8%	32.3%	32.4%	32.5%	32.6%	from change in agriculture and age
Assault (Non domestic violence)	1659	1699	1707	1715	1725	2006 value estimated
Assault (Domestic violence)	1549	1595	1605	1614	1625	2006 value estimated
Property Crime	9520	9514	9350	9318	9286	2006 value estimated

Notes:

- (1) Includes factor of 1.11 to account for census under reporting, and allows loss of 0.9 jobs for each lost agricultural job
- (2) Estimates using data from Table 3.1 of report two and using regression analysis data to account for dryland production, factor of 1.11 included)

(3) Assumed one job per household, 2.8 people per household, unemployed households leave the area

(4) In 2006, the indigenous LFP rate was 64%, compared to 76% for the non indigenous population

We have assumed that job losses will therefore have a lesser effect on indigenous populations, leading to an increased proportion of indigenous people in the population, at the rate of the loss of one indigenous person for each 1.2 non-indigenous persons.

ABS (2010) Experimental Estimates of the Gross Value of Irrigated Agricultural Production 2000-01 to 2007-08

This data set has been discussed briefly above. While the data gives an understanding of the impacts of drought and reductions in the availability of irrigation water, there are two important caveats when interpreting the data. The **data has not been adjusted for inflation**, and this adjustment is required to properly understand trends over time. Adjusting for inflation, GVIAP **fell** by 5.8% between 2000-01 and 2005-06, however the unadjusted figures show an 8.6% increase.

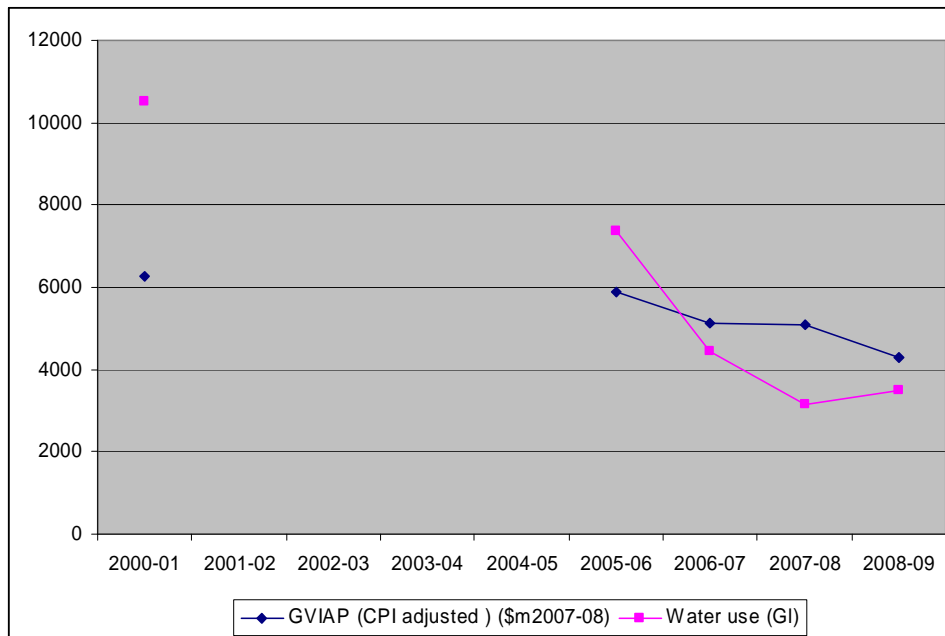


Figure 1: GVIAP (CPI adjusted) 2000-01 to 2008-09

Source: ABS

Changes in GVIAP reflect changes in both commodity prices and in output. Some preliminary calculations carried out elsewhere in this submission suggest that the decrease in GVIAP between 2005-06 and 2007-08 is about half what would be expected from reductions in water. Data is shown in the table below. An alternative explanation is that that massive efficiency gains have been made. For example, in 2007/08, 60% less water grew the same amount of grapes. Such figures seem implausible, except perhaps in the case of dairy production and livestock production, where feed may have been imported.

Table 15: Relationship between changes in irrigation water and changes in GVIAP 2005/06-2007/08

Commodity groups	Reduction in irrigation water 2005/06-2007/08	% change	Reduction in GVIAP 2005/06-2007/08 (\$m ₂₀₀₇₋₀₈)	% change	Estimated price rise (1)
Cereals for grain and seed	181,589	29%	76.9	40%	9%
Total hay production	-308,150	-47%	-32.6	-19%	53%
Cereals for hay					
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Dairy production	-662,577	-64%	-0.1	0%	180%
Production from meat cattle	-395,234	-71%	-467.5	-74%	-10%
Production from sheep and other livestock	-307,613	-70%	-59.5	-39%	103%
Total volume applied	-4,228,148	-57%	-811.7	-14%	100%

Source: Murray-Darling Basin - Gross Value of Irrigated Agricultural Production, 2000-01 to 2007-08 and calculations

Table notes:

(1) For example, for hay, estimated price rise = $(1-.19)/(1-.47)=.53$

Data for 2008-09, suggests that GVIAP was sustained by commodity price rises in 2007-08. Compared to 2005-06, 2007-08 showed a reduction in water availability of 53% with a corresponding 27% decrease in the CPI adjusted value of GVIAP.

We are particularly concerned that this data set has been consistently misrepresented to minimise the likely impacts of the introduction of SDLs on regional and local economies, both by the MDBA and by external commentators, including those in the environmental movement, through a failure to properly consider the impacts of inflation and of commodity price changes.

Alston et al (2010) The social impacts of declining water availability and ongoing drought in the MDB

Alston et al (2010) conducted a qualitative research study involving in-depth interviews with 49 people in irrigation communities close to the Murray River in Northern Victoria and Southern NSW including human/social service providers and key informants and a series of focus group interviews with women. The research focused on the personal, family and community impacts of on-going drought and recent Commonwealth water policies aimed at purchasing water for the environment under the Water Act 2007 in irrigation communities close to the Murray River in Victoria and NSW.²⁸⁴ These impacts included:

- Increased stress associated with making decisions about future of farm and family
- Health impacts related to stress
- Limited funds to stretch across family and farm costs
- Increased bankruptcies
- Inability to afford farm labour, putting pressure on women and children to work on-farm
- Need to source off-farm income
- Difficulty finding and accessing alternative employment
- Involuntary separation of family when either women or men away for extended periods of time to work
- Conflict between parents and children about future
- Conflict between husband and wife about future
- Putting retirement plans on-hold to continue farming
- Increased use of drugs or alcohol to cope with stress

While these impacts were identified in the Southern Basin, research by others suggests that those in the Balonne region are likely to have experienced similar impacts as a result of the on-going drought, changes in water policy. They are also likely to experience these impacts as a result of further reductions in water availability related to the introduction of new SDLs.

The authors also identified a range of what they described as ‘gendered impacts and adaptations’ that are unique and different for men and women.

²⁸⁴ Alston, M, Whittenbury, K & Haynes, A (2010) *The social impacts of declining water availability and ongoing drought in the Murray-Darling Basin: short report*, Monash University.

Impacts and adaptations for men included:

- More susceptible to negative adaptations in the areas of health and welfare, and are more prone to social isolation; and
- May turn to alcohol and other drugs in order to cope with their situation, which can lead to further family problems including domestic violence.

Impacts and adaptations for women included:

- Sourcing off-farm income and protecting their family members,
- Likely to ignore their own health and welfare and work hard in all areas of their lives, including caring that extends beyond their family to their communities²⁸⁵

The authors also provide a series of recommendations in response to impacts identified including:²⁸⁶

- That both Commonwealth and State Governments place equal emphasis on the actual and anticipated social impacts of policy changes as economic and environmental considerations. Social impacts need to be considered at individual, family, community and regional levels.
- That there be an explicit focus on regional and community planning in water policy development and that the anticipated regional and community level impacts of water policy are identified and monitored during, and after, policy implementation.
- That a key component of the regional and community planning mentioned above is centred on service delivery, infrastructure and resources and the changing needs of affected rural and regional communities. This research highlights particular needs related to mental health, violence, increased drug and alcohol use and financial counselling but also the loss of mainstream health and education services.
- That researchers, industry bodies, service delivery agencies, regional bodies and governments incorporate gender considerations as a key element of their understanding of social and economic impacts.
- That both Commonwealth and State Governments take immediate steps to work towards; equitable gender representation on decision-making bodies relating to water policy development and implementation, including members with social and community development and planning expertise on all community representative bodies and expert or technical bodies, and continually improving and diversifying opportunities for rural and regional community involvement in planning and decision making and committing to more effective and regular communication with these communities.

²⁸⁵ Alston et al (2010) Pg 8-9.

²⁸⁶ Alston et al (2010) Pg 14.

Ashton, D, Hooper, S and Oliver, M, (2009), An economic survey of irrigation farms in the Murray-Darling Basin: Industry overview and region profiles 2007-08

Of note, this report identified significant price and income increases in the dairy and horticulture industries for 2007-08. This has implications for interpretation of the ABS GVIAP data set discussed elsewhere. About 30% of farms traded temporary water, and 4% traded permanent water. Of those not buying, the main reason was extra water was not required and/or the price was too high. Of those who didn't sell, the main reasons were they used all available water, preferred to carry over water or were not interested. This was about two in three farms.

Around 9% planned to increase irrigation area, while 13% planned to reduce area, with half planning no change. Two thirds cited uncertainty of allocations as a major constraint against expanding the area irrigated. In Condamine Balonne, 2007-08 showed an improvement in conditions by comparison with 2006-07, with an increase in average area, a 2.5 times increase in irrigated crops and a 2.3 times increase in water applied. Circumstances changed from an average loss of \$25,000 per farm to an average profit of \$36,000.

Jackson, S, Moggridge, B & Robinson, CJ (2010) Effects of changes in water availability on Indigenous people of the Murray–Darling Basin: a scoping study

This report by the CSIRO is a comprehensive scoping study of the impacts of changes in water availability on Indigenous communities of the MDB. The report includes extensive background information, literature review, exploration of three case studies, a draft descriptive characterisation of the potential impacts, areas, industries and Indigenous groups, and preliminary advice and recommendations to enhance and mitigate impacts arising from the Basin Plan, including issues requiring further research.²⁸⁷ While we are not able to undertake a full review of this study, we present the following key findings likely to be of interest to the Balonne Shire.

²⁸⁷ Jackson, S, Moggridge, B & Robinson, CJ (2010) Effects of changes in water availability on Indigenous People of the Murray-Darling Basin: a scoping study, report for the Murray Darling Basin Authority, Pg. 8.

- The authors' review of relevant literature reveals that, "Indigenous people stress the critical importance of the Basin's river systems to social, cultural and economic life and the need for balance in meeting the needs of other stakeholders. The desire for restoration of environmental systems and the relationships Indigenous people have maintained with their countries is a key motivation behind Indigenous participation; indeed it is compelling obligation within Indigenous value systems and law".²⁸⁸
- "Reductions in water availability and an increasing Indigenous population characterised by existing levels of socio-economic disadvantage requires that critical human needs, social well-being and environmental health are taken into account in Basin planning. Indeed, lack of access to water is noted as a source of social disadvantage and a health risk in the Productivity Commission's recent evaluation of the status of Australian Indigenous people (Steering Committee for the Review of Government Service Provision 2009)".²⁸⁹
- "It is clear from the literature that matters of resource use assessment technique are presently less important to Indigenous people than the establishment of appropriate terms of engagement for partnerships. Foremost attention has been given to resource governance as Indigenous groups seek to assert their rights and create inclusive processes and collaborative relationships based on recognition of cultural difference, including Indigenous law and custom, equity and trust".²⁹⁰

The report provides information on the concept of 'cultural' or 'Indigenous' flows.

- While there are a number of concepts and definitions regarding 'cultural flows', the Murray Lower Darling Rivers Indigenous Nations (MLDRIN) for example, indicates that a 'cultural flow' ought to be available to meet and advance economic needs. The group has put forward the following definition that states,
 - "'Cultural Flows' are water entitlements that are legally and beneficially owned by the Indigenous Nations of a sufficient and adequate quantity and quality to improve the spiritual, cultural, environmental, social and economic conditions of those Indigenous Nations (Atkinson 2009)".²⁹¹
- "A separate cultural flow may be a way of encouraging governments and the wider community to enhance their efforts to satisfy Indigenous water requirements. It could further serve to increase the pressure to translate the requirements of the NWI and the Basin Plan into specific legal obligations and responsibilities, and to focus attention on the need to resolve conflict between Indigenous people and other water uses over the use of shared water".²⁹²

²⁸⁸ Jackson, S, et al (2010) Ibid, Pg. 8.

²⁸⁹ Jackson, S, et al (2010) Ibid, Pg. 55.

²⁹⁰ Jackson, S, et al (2010) Ibid, Pg. 57.

²⁹¹ Jackson, S, et al (2010) Ibid, Pg 70.

²⁹² Jackson, S, et al (2010) Ibid, Pg 72.

Potential impacts from changes to water availability

1. Enhanced environmental flows are highly likely to generate positive impacts

- “Given the vision for a healthy Murray Darling system articulated by Indigenous groups throughout consultations undertaken by either the MDBC or the MDBA, it is clear that general improvements to the environmental condition of the Basin will be viewed positively by many Indigenous people”.²⁹³

2. SDLs could limit Indigenous economic development options

- “Indigenous people own land in the agricultural districts of the Basin; some have formal entitlements to water and Indigenous people are employed in agricultural industries and the service sectors that support primary industries. Although economic dependence on water-based agriculture appears from the demographic literature to be relatively low, the disadvantaged status of Indigenous populations generally suggests that they are particularly vulnerable to negative impacts on Indigenous businesses or employment rates”.²⁹⁴
- “An exclusive focus on ‘cultural values’, if construed as non-commercial and non-consumptive, might preclude consideration of the economic impacts on Indigenous communities from changes to SDLs and the consequent indirect effects on holistic land management aspirations. An exclusive focus on socio-cultural impacts may also result in the omission of potentially negative economic impacts. Although economic dependence on waterbased agriculture appears from the socio-economic literature to be relatively low, the disadvantaged status of Indigenous populations generally suggests that they are particularly vulnerable to negative impacts on Indigenous businesses or employment rates. It is not possible to measure the impacts of SDLs because of the severe lack of quantitative data on Indigenous water uses and values. In the absence of sufficient information on Indigenous water use and sensitivity to changes in SDLs a precautionary approach should be adopted”.²⁹⁵
- “To mitigate the final impacts of the Basin Plan on Indigenous enterprises and communities, further research and monitoring is required during the life of the Plan. Baseline socio-economic and demographic data should be collected and a monitoring program designed to track the effects of changes in SDLs on Indigenous access to water and economic participation. Because the final impacts are contingent on Government policies and Plan implementation, there is substantial scope to exacerbate some impacts as well as the potential to forego opportunities to maximise benefits. Again, lack of information has created uncertainty in this area. Marsden Jacob and Associate’s socio-economic assessment argues that the ultimate socio-economic impacts from the introduction of the Basin Plan depend on how governments implement and mitigate the Plan (2010). The same follows for the impacts on Indigenous communities”.²⁹⁶

²⁹³ Jackson, S, et al (2010) Ibid, Pg 148.

²⁹⁴ Jackson, S, et al (2010) Ibid, Pg 149.

²⁹⁵ Jackson, S, et al (2010) Ibid, Pg 153-154.

²⁹⁶ Jackson, S, et al (2010) Ibid, Pg 153-154.

For the Balonne LGA, there is a clear reliance on irrigated agriculture with limited opportunities for diversification and new alternative industries. To a large extent, this employment landscape is the same for Aboriginal and non-Aboriginal residents. The profile of employment by industry is somewhat similar for Aboriginal and non-Aboriginal residents in Balonne Shire, as the table below demonstrate. Jobs in agricultural, forestry and fishing comprise a larger proportion of the non-Aboriginal workforce compared to the Aboriginal workforce at 40% compared to 20%. However, many of the industries that employ large amounts of the Aboriginal and non-Aboriginal workforce such as Retail, Education and Training, and Health Care and Social Assistance; are in many ways related and reliant upon the wellbeing of economic base of the community – which is agricultural. Many of these jobs would likely be threatened in the face of further population declines due to out-migration as a result of a declining agricultural sector.

Table 16: Comparison between Indigenous and Non-Indigenous Workforce in Balonne Shire by Industry

Top 10 Industries for Indigenous Employment	% Indigenous Employment	Top 10 Industries for non-Indigenous Employment	% Non-Indigenous Employment
Agriculture, forestry & fishing	20%	Agriculture, forestry & fishing	40%
Health care & social assistance	15%	Retail trade	10%
Retail trade	12%	Education & training	8%
Administrative & support services	11%	Health care & social assistance	7%
Education & training	7%	Accommodation & food services	5%
Manufacturing	7%	Public administration & safety	5%
Construction	6%	Construction	5%
Transport, postal & warehousing	6%	Transport, postal & warehousing	4%
Public administration & safety	4%	Other services	3%
Accommodation & food services	4%	Manufacturing	3%

Source: ABS (2006) Census of Population and Housing, Indigenous Profile: Balonne LGA

The Nous Group (2010) Integration of socioeconomic assessments of the Murray-Darling Basin Plan

This report integrates, synthesises and evaluates the findings of two studies [ABARE 2010 and MJA 2010] in order to assess the socioeconomic effects of SDLs and related policy issues that the studies also explored.²⁹⁷ The following key findings are likely to be of interest to the Balonne Shire.

²⁹⁷ The Nous Group (2010) Integration of socioeconomic assessments of the Murray-Darling Basin Plan, Pg 4

- The Condamine-Balonne and Moonie are identified as two of the regions likely to be most severely impacted in terms of reduced GVIAP due to reduced availability of irrigation water.²⁹⁸
- The Nous Group examines issues associated with and impacts of compensation where ABARE and MJA do not. They state that, “It seems likely that the more generous the level of compensation and the wider it is available, the less the adjustment pressure likely to confront rural communities following the introduction of SDLs”.²⁹⁹
- “The impacts at the Basin or economy wide level should not be confused with the hardship and challenges many farmers and rural communities could face as a result of SDLs. Irrigated agriculture is often part of a value adding chain consisting of processing, packing, storage, transport and marketing and these associated activities typically occur in the same or neighbouring regions to where the primary products are produced”.³⁰⁰

Policy responses and related issues

- “Both studies commissioned by the MDBA point to significant industry, regional and community impacts. Both have also drawn on their findings to suggest options to mitigate the socioeconomic effects. Addressing these issues in conjunction with the SDL regime may be the key to winning support for the implementation strategy for the Basin Plan”.³⁰¹

Compensation³⁰²

- “Adequate compensation for lost irrigator access to water is a significant issue made more complicated by the uncertainty surrounding the risk assignment process and whether over-allocation of water resources is to be addressed at the same time as policy based acquisition of water for environmental purposes.”
- “The Water for the Future initiative has already provided compensation to some via the water buybacks made possible through the Restoring the Balance program. It will be important to clarify who will benefit from the remainder of this program and whether alternative assistance will be available to any irrigators not receiving compensation if there happens to be misalignment between the spatial impact of the SDL regime and the geographic distribution of the buyback program.”
- “As important as the level and distribution of compensation may be, it is unlikely to be a panacea addressing all the socioeconomic impacts of SDLs. In fact, much of the actual adjustment will need to be commercially justified and will occur autonomously in response to the underlying economic factors at play and in the minds of farmers, downstream industries and the finance sector.”

²⁹⁸ The Nous Group (2010) Ibid, Pg 4.

²⁹⁹ The Nous Group (2010) Ibid, Pg 6.

³⁰⁰ The Nous Group (2010) Ibid, Pg 5.

³⁰¹ The Nous Group (2010) Ibid, Pg 6.

³⁰² The Nous Group (2010) Ibid, Pg 31-32.

- “Compensation will, however, assist farm family households with the wealth effects of lost water access and, to some extent, related expenditure will be seen in Basin towns, although some can be expected to leak outside the Basin.”

Transition and structural adjustment assistance³⁰³

- “Some towns in the Basin and their local communities are sufficiently large to withstand the effects of a smaller irrigation sector and less downstream processing and servicing while others are heavily reliant on the presence of these industries and irrigator expenditure.”
- “In some towns, unemployment may emerge in response to departing or downsizing agri-food processors and service providers and the demand for welfare services can be expected to increase. The most problematic communities are likely to be the more remote locations where labour is less likely to be mobile due to limited skills capable of transfer elsewhere. Such communities could find themselves without critical mass and in a vicious circle as house values decline to reflect the difficult circumstances ahead.”
- “Anticipating these developments and recognising the potential to intervene to avoid their realisation is a significant opportunity that could be addressed through a structural adjustment program.”
- “Such a program will need to be sufficiently flexible to respond to the very different socioeconomic challenges facing Basin communities. Its design could draw upon community input and tailored to target specific community circumstances.”

Morrison, M and Hatton MacDonald, D (2010) Economic valuation of environmental benefits in the Murray-Darling Basin

The authors estimate the value to the community of improvements in the environmental indicators of native vegetation, fish populations, water bird breeding and number of species at \$3.3 billion and the value of improving the Coorong from poor to good quality at \$4.3 billion. Data is presented as present value.

The approach taken in the valuation of benefits is philosophically quite different to the approach taken to the valuation of costs in other studies prepared for the MDBA. The effect is to maximise

³⁰³ The Nous Group (2010) Ibid, Pg 32-33.

the benefits associated with the introduction of SDLs. We have contrasted the approach of the authors with the approach taken by ABARE-BRS (2010c).

If the authors had taken an approach similar to that taken by ABARE-BRS (2010c) we believe that the value placed on environmental benefits would be zero. This would be because there are other habitats available for native vegetation, fish, water bird and other species and similar areas exist elsewhere to the Coorong. This means that if people wanted to experience these benefits, they could just go somewhere else to experience them.

Alternatively, if ABARE-BRS (2010c) took a similar approach to the authors of this paper, they would estimate the opportunity cost associated with the water hypothesised to go to the environment. If we assume 3,500 GJ as a target SDL, in 2007-08 vegetable production in the MDB had a GVIAP of \$5.8 million per GJ of water. Hence 3,500 GJ would equate to a total GVIAP of \$20.3 billion per annum. If this was represented as net present value, and using a discount rate of 8%,³⁰⁴ the figure would be \$254 billion or 59 times the environmental value of the flows. While there would be some input costs to be deducted, there are also flow-ons to other industries, so this figure might be reasonably accurate in representing the opportunity cost to the community of the proposed environmental flows.

More importantly, good practice would require the consideration of a number of ways of achieving purported environmental benefits, and select that method that maximises the difference between cost and value. That is, dilution or additional flow might not be the best way of achieving the environmental outcomes.

Wittwer, G (2010) The Regional economic impacts of Sustainable Diversion Limits

The modelling predicts, for Condamine Balonne, a loss of 204 jobs in 2026 with a 3,500 GJ target SDL.³⁰⁵ Real GDP is forecast to decline by 0.92%. The 3,500 GJ is said to be equivalent to a 33.1% reduction in water course diversions.

This modelling takes a similar approach to that used by ABARE-BRS and Mallawaarachchi *et al.* Similar critiques can be made of this model as made for the other models. These include failure

³⁰⁴ Refer for example NSW treasury guidelines for cost benefit analysis

³⁰⁵ Wittwer, G (2010) *The Regional economic impacts of Sustainable Diversion Limits*, table 8.

to align with empirical data, unrealistic or optimistic assumptions, lack of transparency and a failure to properly compare alternative futures.

We have compared the forecast of the model to actual data for 2000-01 and 2005-06. Area of cotton under cultivation in Balonne Shire decreased by 51% between 2000-01 and 2005-06. Over the same period, employment in cotton decreased from 329 to 170 people, a decrease of about 48%.³⁰⁶ It could be concluded the relationship is effectively linear. Taking 2000-01 as an average year, it could be concluded that the impact of a 33.1% would be a loss of 109 jobs. Assuming a multiplier of 1.9,³⁰⁷ the cut would correspond to a loss of 207 jobs in Balonne Shire. Some jobs would be recovered from dryland grazing, at a rate of one job for each 12.5 lost, giving a net number of jobs of 190 lost from a 33.1% SDL. Even though Balonne Shire is one part of the Condamine Balonne region, the modelling by Wittwer suggests that it will probably account for 190 jobs or 93% of the predicted lost jobs in the region. This seems implausible, as backcalculating from tables 7 and 8,³⁰⁸ total employment in Condamine Balonne in the base line is about 44,000. By contrast, in 2000-01, 2,724 people were employed in Balonne Shire, suggesting Balonne Shire represents around 6% of the economy of Condamine Balonne.

Considering the LGAs of Balonne, Dalby, Jondaryan, Wambo and Millmerran, in 2000-01, 917 people were employed in cotton and cotton ginning. A 33.1% cut would equate to a loss of 304 jobs, and with multipliers, 577 jobs. Allowing for dryland grazing as a next best use, the jobs would be around 531. This is around two and one half times the lost jobs forecast by Wittwer (2010). It is clear from such calculations that the model does not align with empirical data and appears to grossly underestimate losses in employment. As another check, 206 Gl of water is required from Condamine Balonne. In terms of opportunity cost, if all this water was to be used for cotton, there would be an increase in employment of around 470 jobs using a 0.9 multiplier.³⁰⁹ This figure is over twice the forecast job losses across the entire region.

The model appears to contain some optimistic assumptions that are likely to skew output towards minimising impacts. Those that can be gleaned from the documentation include:

- The use of a drought year, 2005-06 as a baseline. This assumes that communities will never recover from the drought but this is at odds with historical data.³¹⁰
- Compensation for water is modelled to remain in the area rather than being used to retire debt. This is at odds with the findings of Rizza (2010) discussed above.
- The model lacks transparency. The model is stated to “include detail of the economic structure of the rest of Australia”.³¹¹ It could be inferred that general economic

³⁰⁶ ABS census employment by usual residence, cotton and cotton ginning.

³⁰⁷ Stubbs *et al*, *op cit*

³⁰⁸ Wittwer, *op cit*.

³⁰⁹ Stubbs *et al*, *op cit*, table 3.7.

³¹⁰ Wittwer, *op cit*, page 14.

³¹¹ *ibid*, page 6.

growth, coupled with reductions in immigration, act as a significant offset to the impacts of reductions of SDLs. The model almost certainly conflates trade with SDLs as evidenced by the low levels of job losses predicted in the southern basin.

- The model almost certainly fails to compare alternative futures. This can be clearly seen. For example, consider the effect if 3,500 GJ of water was taken from environmental flows and made available for irrigation in 2026. If that water was used to grow rice or cotton, then it would equate to an extra 4,725 jobs, and nearly 9,000 jobs with multipliers. In fact the model predicts a loss of 354 jobs.