Namoi community profile

Irrigation region

Key issues for the region

1. Region’s population — The Namoi region has approximately 88,300 people, and the ABS records around 690 irrigating agricultural businesses. Many of these businesses must hold more than one water entitlement since there are around 2,800 entitlements recorded for the system as a whole.

2. Gross value of irrigated agricultural production
   • The gross value of irrigated agricultural production in the Namoi was $231 million in 2006.

3. Water entitlements (approximate)
   • Surface Water Long-term Cap (long-term average annual extraction volume) — 238 GL.
   • High Security — 4 GL.
   • General Security — 240 GL.
   • Supplementary licences — 122 GL.
   • Groundwater entitlements — 191 GL in Access licences, plus 59 GL Supplementary licences (with the Supplementary licences being reduced to 0 GL over 10 years).

4. Major enterprises — Cotton is the major irrigated enterprise, but cereal crops, fodder crops, fruit and vegetables are also grown in different parts of the catchment.

5. Government buyback — The Commonwealth Government’s buyback activities in the Namoi have equalled around 6 GL.

6. Water dependence — Water dependence in the Namoi is high, due to the importance of irrigated cotton to the region.

7. Current status
   • The Namoi is an agricultural region. Dominated by one large town, Tamworth, which has a diverse economy, the Namoi also encompasses several medium-sized service centres such as Gunnedah and Narrabri. Gunnedah is currently experiencing a mining boom. Mining is also having a growing influence on Narrabri, but as Narrabri is more irrigation dependent, it is more likely to be affected by the move to sustainable diversion limits. Several smaller towns are even more vulnerable. Because agriculture is such a large employer, any hit to that sector also takes its toll on the next largest regional employment sectors, retailing, and health and community services.
   • The smaller irrigated agricultural towns are working towns adapted to the variability of water availability; people move if irrigated agriculture is not providing work. Other small towns, such as Wee Waa and Walgett, have large Indigenous populations with strong links to country. The residents of these towns tend to stay in the region during the good and bad times, living in expectation of employment returning to the region when bad times are over.
Reduced water availability because of drought has significantly reduced economic activity in the region over the past five years. A study of the impacts of drought on Wee Waa by the Cotton Catchment Communities CRC provides a stark illustration of this. It found that the gross turnover of surveyed businesses had fallen from $116 million to $56 million over six years. Like many rural communities, 95% of local businesses in Wee Waa said they rely on a healthy agricultural and cotton industry. As a consequence of the drop in local business turnover, the wider impacts on the community have been significant. It led to job losses of both permanent and casual positions with casual employment suffering a 40% reduction. As a result of the job losses, two-thirds of these employees had left the region, contributing to a 21% decline in student enrolments at local schools.

The most immediate issue is the potential for business recovery following the drought. The economic prospects for irrigated cotton are strong, but those prospects cannot be realised without water. After several years of low incomes, those irrigators with high debt levels may struggle to recover from the drought.

Water use efficiency, in terms of the cotton produced per ML of total water use has been improving steadily. There has been gradual adoption of pressurised irrigation in some regions, but for many irrigators the reliability of the water is already too low to justify costly capital investment. Pressurised irrigation also brings with it the risk of increasing energy costs over time. Drip irrigation is not suited to the cracking clay soils common in many areas.

There is some scope to increase fruit and vegetable and fodder production in the upper and middle reaches of the region. Nonetheless, it is highly unlikely that these enterprises will make significant inroads into the dominance of the cotton industry. Moreover, the outlook for cotton production is good, if there is sufficient water to support that production.

Commodity prices will continue to fluctuate. If agriculture were still the large share of exports it was a generation ago, cycles in international prices would be partly offset by changes in exchange rates. The future is uncertain, but the recent rapid growth of mining suggests that future exchange rates will not be significantly affected by the ups and downs of agriculture. By contrast, agricultural profitability will be affected by changes in exchange rates. Agriculture has no choice but to continue to adapt as it has in the past.
8. Responses to water availability scenarios

- The relationship between water availability and economic activity is more or less a straight line. The more water available for irrigation, the more economic activity will occur. Consequently, outside the usual concerns about variable water availability, uncertainty about future water security, that is, uncertainty about sustainable diversion limits, is influencing confidence and investment in irrigation enterprises. In particular, uncertainty about the nature of the move to sustainable diversion limits is eroding confidence and investment.

- If the sustainable diversion limit is achieved through buyback, something that local communities are now familiar, but uncomfortable, with then the remaining irrigators will keep on with business as usual. For them, yields, quality and productivity will continue to improve, and terms of trade pressures will continue to grow, as they do for all of agriculture. Increasing competition for labour from mining industries will continue to make skilled labour more scarce and it will increase the need for capital efficiency. Commodity price trends, input price trends and exchange rate trends will continue to drive the search for economies of scale.

- If the sustainable diversion limit were to be achieved through universal cuts to existing entitlements, then the effects on overall economic activity would be much the same, but the number of individuals directly affected would increase. Total transaction costs would be greater with this sort of approach. A series of market adjustments would be required help to consolidate the remaining water on to fewer farms. Irrigators are wary of this approach as they feel it would not give significant recognition to previous reforms that have already reduced the volumes of water that they can expect to receive, and the reliability with which they can expect to receive those nominal volumes. Irrigators would welcome recognition of what they have already done to improve the sustainability of irrigation.

- Whatever approach to sustainable diversion limits is adopted, people would feel better about the change if they had confidence that environmental benefits were transparent and achievable. Their worst case scenario is that there might be a lot of economic pain for little or no environmental gain. They want to understand the potential environmental gains. Since the Namoi River does not end in terminal wetlands, unlike the Gwydir and Macquarie rivers, people are genuinely concerned to understand what environmental benefits would be achieved by further reductions to consumptive use. They are worried that any water intended for South Australia’s Lower Lakes would end up being evaporated in the Menindee Lakes or ‘lost’ to evaporation or groundwater recharge along the way.

- The owners of small businesses in the smaller agricultural towns feel particularly vulnerable to the potential reduction in diversions. Their livelihoods are affected, but they don not have any control over the decisions to buy or sell water.
Regional overview

The Namoi catchment, an area of approximately 42,000 km², is bounded by the Great Dividing Range in the east, the Liverpool Ranges and Warrumbungle Ranges in the south, and the Nandewar Ranges and Mt. Kaputar to the North. Major tributaries of the Namoi River include Cox’s Creek, and the Mooki, Peel, Cockburn, Manilla, and McDonald rivers, all of which join the Namoi upstream of Boggabri.

The Namoi is home to around 100,000 people, concentrated mostly along the Namoi River and its tributaries between Tamworth and Narrabri. The major towns are Boggabri, Burren Junction, Gunnedah, Narrabri, Quirindi, Tamworth, Walgett and Wee Waa. Of these, irrigation is particularly important to Boggabri, Burren Junction, Gunnedah, Narrabri, Walgett and Wee Waa. The Kamilaroi people inhabited the entire Namoi catchment before European settlement. Today, there are 12 local land councils representing some 6,500 people.

Annual regional output is estimated at over $1 billion, with agriculture representing approximately half of this amount. This is around 11% of the New South Wales’ on-farm production from 6.25% of the state’s area. Major industries include cotton, livestock production, grain and hay, poultry and horticulture. The dominant land use is cattle and sheep grazing. Wheat, cotton and other broadacre crops are grown on the alluvial floodplains. Around 112,000 ha were irrigated in 2000 with around 80,000 ha (or over 70%) used for cotton production. The region has one wetland of national importance, Lake Goran, adjacent to the Liverpool Plains. Keepit and Split Rock dams store water for irrigation supply. The region uses 2.6% of the surface water diverted for irrigation in the Murray–Darling Basin. Surface water diversions were around two-thirds of total water use in 2000–01 and around one-third of total water use in 2003–04. The region has the highest level of groundwater development in New South Wales and one of the highest levels of groundwater extraction in the MDB. Groundwater use in the region is 15.2% of the MDB total.

A range of land and water management issues affect the Namoi catchment including water quality decline, soil and land degradation, dryland salinity, and loss of native vegetation and decline in biodiversity.

Irrigation overview

History of irrigation

The history of irrigation on the Namoi is a large part of the history of irrigated cotton in Australia. It has also played a pivotal role in the history of irrigation in the northern Basin.

The Namoi catchment region covers 42,000 km². The main population centres are Tamworth, Gunnedah, Narrabri, Manilla, Walgett and Wee Waa. Of these, Narrabri, Walgett and Wee Waa are most likely to be affected by a reduction in water availability. Gunnedah would also be affected but it has the benefit of a more diverse economy. Around half of Walgett’s residents are Indigenous, as are about 15% of Wee Waa’s.

Keepit Dam, the main publicly owned storage, was completed in 1958. It was augmented by Split Rock dam in 1988 in an effort to redress the over-licensing of Keepit Dam. The relatively small Chaffey Dam on the Peel River was completed in 1979. Its main function is to secure town water for Tamworth, but it also provides some 31,000 ML of General Security water for irrigation. Groundwater started to be used for irrigation during the droughts of the late 1960s.
Figure 1  Location of irrigation district
Australia’s first commercial irrigated cotton crop was planted in Wee Waa in 1961. Until then it had literally been impossible to give away Namoi irrigation licences — even the demand for stock water from Keepit Dam had been much lower than anticipated. Into this vacuum stepped a handful of families taking refuge from government-regulated agriculture in the United States of America. They made contact with an Australian-based cotton breeder, who had escaped Soviet-controlled Hungary after giving unpopular advice about the foolishness of trying to grow cotton in a cold climate. They concluded that north of the Namoi there were then no dams to support an irrigated cotton industry, immediately south of the Namoi there was insufficient potential to support a gin, and south of the Lachlan was too cold. Therefore, the Namoi was the place to start.

Once they proved that cotton could be grown profitably, the pace of development was rapid. It was akin to a gold rush. By 1965, just three years after the first cotton harvest, cotton irrigators were using about 80% of the water from the Keepit Dam. At that stage there was something in the order of 10,000 ha of cotton being grown. In 1976, with 70,000 ha of the Namoi Valley under irrigation, the issuing of licences was finally closed off.

It was on the Namoi that irrigators first started to build large on-farm storages to augment supplies from the publicly owned storages. In part this was a reaction to the evolution of river management rules. The public dams were new, and different conditions in northern NSW called for different institutions to those being used in southern NSW where large numbers of relatively small farms in irrigation districts were being supplied through publicly owned delivery infrastructure. The north was different. On the supply side were a small number of river managers endeavouring gradually to reshape institutions designed for a different task. On the demand side were a small number of individuals, marshalling large amounts of capital, capable of responding rapidly to any perceived advantage (or disadvantage) in changes to the operating rules. Each time government acted to change the system’s operating rules the irrigators reacted swiftly to adjust their exposure to risk.

The 1967–68 drought saw irrigators being given projected allocations for the year. They then had to decide whether to plant a reduced amount in keeping with a lower allocation, or take a punt on getting rainfall through the season to keep a larger crop alive. It was not long before every irrigation farm had its own private off-river storage. Some large farms were able to store water up to three times their basic allocation. The rules around General Security allocations, Supplementary licences and overland-flow harvesting gradually evolved to accommodate and regulate this reality.

Australian cotton production has been transformed since then, largely as a result of the research effort centred in Narrabri. Australian average cotton yields per ha are the highest of any major cotton producing country in the world; they are almost three times the world average. Australian cotton is considered a premium quality product on world markets. In addition, there is strong evidence that growers have increased their water use efficiency by 3 to 4% per year or 20% in the last decade.iii

Rural water supply

Regional system description

Publicly owned storages account for more than half of the total water storage in the Namoi Valley. On the other hand, groundwater accounts for almost half of the water used for irrigation.

The Namoi has the highest rate of groundwater use in NSW, but it is important to understand that major reforms in groundwater management are currently being implemented. The upper catchment has been divided into 13 discrete zones with the lower catchment treated as one separate zone. The water sharing
plan for the Upper and Lower Namoi Groundwater Sources covers 12 of the upper zones and the lower Zone. The Peel Valley groundwater source will have its own water sharing plan. Under the water sharing plan many irrigators have been given supplementary licences that provide a 10-year adjustment period for high-level users to adapt to a reduction in the volume of water they previously extracted. These supplementary licences are not tradeable, and cannot be carried over into subsequent years. The adjustment process has been very difficult and people in the Namoi are keen to see recognition for the work they have already done in working towards sustainable yields.

There are no irrigation districts as such; irrigators have their own bores and their own pumps on the river. Irrigators do, however, have to order water to be released for them from Keepit Dam. When that water is released from the dam, it is accounted against their allocation. Because groundwater is expensive to pump, many irrigators use it primarily as a drought reserve.

The NSW Government has signalled that all existing floodplain harvesting works and floodplain harvesting extractions will be licensed. Licensing will focus initially on controlling the structures, but with movement towards specifying volume limits and flow related access conditions, including metering of pumps. Once licensing is completed, an assessment of long-term use, resulting from authorised structures against that from structures which existed in 1994, will be carried out and appropriate steps taken to keep harvesting to Cap levels.

The region contains three distinct landforms; tablelands, slopes and plains, each with distinctive patterns of drainage, soils, native vegetation, settlement and land use. The plains have been extensively developed for both grazing and dryland and irrigated agriculture (cereals, cotton, pulses and oilseeds). Cotton is the main irrigated crop on the plains.

### Table 1  Surface-water and groundwater entitlements for the Namoi Valley

<table>
<thead>
<tr>
<th>Licence type</th>
<th>Volume GL</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Security</td>
<td>240</td>
</tr>
<tr>
<td>High Security</td>
<td>4</td>
</tr>
<tr>
<td>Supplementary Water</td>
<td>122</td>
</tr>
<tr>
<td>Groundwater</td>
<td>191</td>
</tr>
<tr>
<td>Supplementary Groundwater</td>
<td>59 reducing to 0 over 10 years.</td>
</tr>
</tbody>
</table>

**The farm**

Please note: due to low respondent numbers, this profile does not include some of the farm type analysis that was able to be included in other regional profiles.

**Natural capital**

The climate and soils in the lower reaches are suited to cotton production. Cereal rotations are part of the farming system; however irrigators make their money from cotton. The middle reaches are better suited to lucerne production, vegetables and fruit crops. Large scale changes to the crop mix are thought unlikely.
Financial capital

Cotton farmers have very sophisticated and financially savvy management systems, for example, forward selling means that when a crop is planted the selling price is already known. The Namoi’s longer history of irrigation meant that, relative to other regions, many growers had lower levels of debt going into the drought. Nonetheless, many farms now have high levels of debt and limited financial capacity to recover from the drought. Others with less debt have been able to contain their costs and wait for the opportunity to generate revenue once water becomes available. They have done this mainly by shedding staff and reducing their spending in local towns and local businesses. In the more remote areas the opportunities for increasing off-farm income are low.

Human capital

Levels of stress amongst farming families have increased over the last five years. In some areas there has been a doubling in the number of people accessing health support counselling due to the drought. A continuation of current conditions will see considerable adjustment and fewer farmers. Reduced water availability will compound these strains. Outside the large centres, there is limited capacity to support farming families through further change. Wherever possible, irrigators have tried to retain their skilled staff. There are high opportunity costs associated with having water available without skilled staff to help convert this into cotton.

Financial ratios

Debt to equity ratios have increased because low water availability during the drought has reduced the potential to generate revenue from the different forms of capital held on the farm. By contrast interest payments mean that there is a steady stream of costs.

The following pages provide more detail about farms within different sectors in the region.

The farm: livestock farms

The figures and table on this page present results from the telephone survey of irrigation farmers undertaken in the region. They include:

• farmers’ ranking of a range of issues that they considered problematic;
• farm financial measures (note that 35% of livestock farmers in the Namoi have off-farm income (34 survey respondents)); and
• measures of optimism, and how satisfied farmers are with a range of life issues.

Table 2  Farm financial measures

<table>
<thead>
<tr>
<th>Ratios</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on assets¹</td>
<td>1.10%</td>
</tr>
<tr>
<td>Debt ratio²</td>
<td>8.52%</td>
</tr>
<tr>
<td>Value of Water/total assets</td>
<td>0.59%</td>
</tr>
</tbody>
</table>

¹ Profit/Assets
² Total debt / Total assets
Figure 2 Regional issues — livestock farms^v

Note: 1 = No problem to 5 = Significant problem. Number of respondents = 73

Figure 3 Survey respondents by farm type^v

Number of farms = 57. Some reported multiple types
Figure 4 Farm issues — livestock farms

Note: 1 = No problem to 5 = Significant problem Number of respondents = 34

Figure 5 Farm financial measures
Figure 6 Optimism — livestock

Note: 1 = Completely dissatisfied to 10 = Completely satisfied Number of respondents = 34

Figure 7 Farm issues — broadacre and livestock farms

Note: 1 = No problem to 5 = Significant problem. Number of respondents = 11
The farm: Broadacre and Livestock farms

'Broadacre' includes cotton farming; this is an ABS definition.

The figures and table on this page present results from the telephone survey of irrigation farmers undertaken in the region. They include:

- farmers' ranking of a range of issues that they considered problematic; and
- measures of optimism, and how satisfied farmers are with a range of life issues.

Note that 45% of livestock and broadacre farmers in the Namoi have off-farm income (also note there were only 11 survey respondents).

On-farm irrigation water use

Irrigation application methods

Drip irrigation is used for fruit and vegetable crops, but the vast majority of cotton is furrow irrigated. Drip irrigation is generally not suited to heavy self-mulching clay soils.

Some irrigators have installed travelling irrigators and are reporting improved efficiency. Changes over the past five years have mostly focused on decisions around the right time to irrigate and the right volume to apply, which has improved efficiency.

Technically, more efficient systems are possible for cotton, but they come with extra costs. Efficiency will continue to improve. There may be scope to limit evaporation from on-farm storages.

Most cotton farms depend on river pumps, ring tanks, open-channel conveyance systems and siphon-fed furrow irrigation. Groundwater pumps are an important adjunct in many places. The efficiency of furrow irrigation has increased by applying water at faster rates and by irrigating only every second row.

Opportunities/trends

Reduced water availability combined with the potential to sell water entitlements will continue to encourage improvements in water use efficiency. The cotton industry is actively researching the potential to reduce evaporation from on-farm storages by making them deeper to reduce the surface area to volume ratio or through the application of thin films to the water surface. There is potential to halve existing evaporation losses. The main technical problem is wind shear of the films; wind-induced wave action breaks the films up and allows evaporation to continue.

Water entitlements

As with the other valleys in the northern Basin, irrigators in the lower reaches of the river, where large on-farm storages are viable, rely on a mix of three water entitlement types to meet their needs. General Security licences allow them to pump limited volumes from rivers during low, regulated flows. Supplementary licences allow them to pump limited volumes from rivers once flows exceed a predetermined rate, and overland-flow harvesting allows them to capture and store rainfall run-off from their properties.
Figure 8  Optimism — broadacre and livestock

*Note: 1 = Completely dissatisfied to 10 = Completely satisfied. Number of respondents = 11*

Table 3  On-farm irrigation management (2007–08)\textsuperscript{vii}

<table>
<thead>
<tr>
<th>Irrigation parameter</th>
<th>Livestock %</th>
<th>Broadacre &amp; livestock (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flood flow</td>
<td>0%</td>
<td>9%</td>
</tr>
<tr>
<td>Travelling</td>
<td>6%</td>
<td>9%</td>
</tr>
<tr>
<td>Microjet fixed sprinklers</td>
<td>3%</td>
<td>9%</td>
</tr>
<tr>
<td>Drip/trickle</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>3%</td>
<td>9%</td>
</tr>
<tr>
<td>Timing irrigation on the basis of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil moisture measuring tools</td>
<td>3%</td>
<td>18%</td>
</tr>
<tr>
<td>Calendar based</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Weather forecast</td>
<td>0%</td>
<td>18%</td>
</tr>
<tr>
<td>Own observations/knowledge</td>
<td>12%</td>
<td>18%</td>
</tr>
<tr>
<td>Percentage of farms trading</td>
<td>(4 traders)</td>
<td>(3 traders)</td>
</tr>
<tr>
<td>Purchasing</td>
<td>50%</td>
<td>0</td>
</tr>
<tr>
<td>Selling</td>
<td>50%</td>
<td>0</td>
</tr>
</tbody>
</table>
Soil moisture measurement

Soil moisture is monitored in the region using capacitance probes. The scope to improve water use efficiency through improved soil moisture monitoring is being continuously refined. The adoption of this technology is very high in the cotton industry relative to other extensive irrigated crops.

Irrigation timing

Best practice irrigation management is about applying the right amount of water at the right time. Irrigators use their understanding of soil moisture levels and evaporative demands to guide their decisions about when to irrigate. The aim is to apply irrigation water late enough to ensure that the technical limits of the application method will not result in waterlogging, but not so late that the crop suffers from moisture stress.

Regional agricultural production

Regional agricultural value chain

Agriculture is a significant part of the regional economy. Therefore, climatic variability is a major economic driver. Dryland agriculture will be unaffected by the move to sustainable diversion limits, but irrigated agriculture may change significantly. The people of Gunnedah, Boggabri, Narrabri, Wee Waa, Burren Junction, Pilliga and Walgett depend on the returns from good years to help them ride out the bad years.

The ups and downs of irrigated agriculture have a big impact on other sections of the regional economy. Relative to other agricultural industries a higher proportion of the income generated from cotton goes outside the region. These funds are spent servicing debt and purchasing inputs directly from suppliers outside the region. However, the total revenue involved is so large that what does stay in the regional economy drives many other economic activities and supports many jobs. Low water availability over the past five years has seen a drop in the number of people directly employed in cotton production. On top of this, the move to grow genetically modified cotton has resulted in less demand for unskilled workers to chip weeds.

Water is the major constraint for irrigated agriculture. As just one example, there are seven cotton gins in the Namoi, one near Gunnedah, one near Boggabri and five around Wee Waa. Therefore, at face value, a sustainable diversion limit that reduced long-term average water use by 20% might result in the closure of one or two gins. A 40% reduction might see two or three close and a 60% reduction might see three or four close. A reduction in irrigated agriculture would provide a shock to Narrabri’s economy. However, it would have a big impact on smaller centres like Wee Waa.
Figure 9  Gross value of agricultural production (GVAP) (2006)\textsuperscript{III}$

Figure 10  Gross value of agricultural production (GVAP) $/ML of water used (2006)\textsuperscript{IV}$
The region’s community

![Figure 11 Level of highest school education (2006)](image1)

- Not stated
- Year 11 or 12
- Year 10 or lower

![Figure 12 Higher education (2006)](image2)

- None or not stated
- Bachelor and/or Postgraduate Degree
- Certificate or Diploma
Figure 13  Employment (2006)\textsuperscript{xii}

Figure 14  Nominal income (2006)\textsuperscript{xiii}
The region’s community — education, employment and income

Community overview

The upper reaches of the catchment are dominated by the regional centre of Tamworth, which serves as an economic and social service centre for places as far away as Inverell (Border Rivers) and Moree (Gwydir). Downstream, the economic and social condition of Narrabri is influenced by its role as a provider of research and other services for the Australian cotton industry, which extend well beyond the Namoi. Locations with different mixes of surface water and groundwater will have varying risk profiles. In the downstream areas where surface water is more important, the year-to-year variations in allocations result in more variability in the economic and social conditions of the smaller and less-diversified towns. At the same time, irrigated agriculture’s economic and social linkages are not always with the closest town. For example, the town of Walgett captures little of the economic flows originating in the nearby cotton industry. Similarly, while Wee Waa does capture a significant amount of farm business spending, it does not capture as much of the extra household, social and recreational activity generated by the cotton industry due to the proximity of the larger town of Narrabri only 40 kilometres away.

The region’s community — demographics and key statistics

Table 4 Demographics and key statistics (LGAs within study area. 2006)$^{a,b}$

<table>
<thead>
<tr>
<th></th>
<th>Gunnedah</th>
<th>Liverpool Plains</th>
<th>Narrabri Regional</th>
<th>Tamworth Regional</th>
<th>Walcha</th>
<th>Walgett</th>
<th>Warrumbungle Shire</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>11,538</td>
<td>7,537</td>
<td>12,388</td>
<td>53,420</td>
<td>532</td>
<td>1,731</td>
<td>1,731</td>
<td>88,607</td>
</tr>
<tr>
<td>Total Indigenous persons</td>
<td>1,185</td>
<td>719</td>
<td>1,192</td>
<td>3,710</td>
<td>19</td>
<td>279</td>
<td>109</td>
<td>7,213</td>
</tr>
<tr>
<td>Farm and farm managers</td>
<td>614</td>
<td>593</td>
<td>629</td>
<td>1,244</td>
<td>157</td>
<td>211</td>
<td>213</td>
<td>3,661</td>
</tr>
<tr>
<td>Farm and farm managers as percentage of total employed</td>
<td>13%</td>
<td>20%</td>
<td>12%</td>
<td>5%</td>
<td>53%</td>
<td>27%</td>
<td>31%</td>
<td>10%</td>
</tr>
<tr>
<td>Households</td>
<td>4,498</td>
<td>3,039</td>
<td>4,733</td>
<td>20,530</td>
<td>208</td>
<td>629</td>
<td>717</td>
<td>34,354</td>
</tr>
<tr>
<td>Dwelling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fully owned</td>
<td>40%</td>
<td>44%</td>
<td>36%</td>
<td>37%</td>
<td>51%</td>
<td>31%</td>
<td>49%</td>
<td>38%</td>
</tr>
<tr>
<td>Being purchased - directly or rent/buy scheme</td>
<td>26%</td>
<td>21%</td>
<td>28%</td>
<td>31%</td>
<td>19%</td>
<td>17%</td>
<td>24%</td>
<td>28%</td>
</tr>
<tr>
<td>Rented</td>
<td>25%</td>
<td>21%</td>
<td>26%</td>
<td>26%</td>
<td>13%</td>
<td>32%</td>
<td>15%</td>
<td>25%</td>
</tr>
<tr>
<td>Community services and wellbeing by remoteness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population per education employee</td>
<td>33</td>
<td>36</td>
<td>35</td>
<td>28</td>
<td>53</td>
<td>19</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>Population per health employee</td>
<td>25</td>
<td>25</td>
<td>27</td>
<td>18</td>
<td>30</td>
<td>27</td>
<td>25</td>
<td>21</td>
</tr>
<tr>
<td>Population per culture and recreation employee</td>
<td>175</td>
<td>184</td>
<td>275</td>
<td>138</td>
<td>177</td>
<td>244</td>
<td>157</td>
<td>158</td>
</tr>
</tbody>
</table>
Figure 15 Regional issues

Note: 1 = No problem to 5 = Significant problem. Number of respondents = 73

Figure 16 : Optimism (regional people)

Note: 1 = Completely dissatisfied to 10 = Completely satisfied. Number of respondents = 73
The regional economy

Employment is concentrated in agriculture and retailing. Health and community services is the next biggest employing industry. The relative share of employment in agriculture tends to be higher in the downstream reaches around Narrabri and Walgett.

The regional economic structures of various cotton communities have been documented in a set of case studies. In the case of Narrabri they concluded that agriculture is the dominant industry, accounting for 29% of gross regional production and 70% of the exports from the region.

Uniquely, scientific research is an important component of the Narrabri economy. Of the communities studied, Narrabri has the highest proportion of people with tertiary qualifications.xv

Main future risks, opportunities and constraints to the major industries

Cotton has excellent prospects for the future, provided there is water to support its production.

Further growth in the feedlot industry may further augment demand for crop and fodder production.

Regional response over the past five years

Water shortage

Water shortages have had a very high impact in the Namoi over the past five years, having reduced incomes substantially and made the business of cotton production very difficult.

![Industry segmentation (2006)](image-url)
Regional response

In general, cotton farmers have scaled back production and tried to minimise costs. They have taken what opportunities they can to grow other crops opportunistically, but there is very limited potential for them to transform their businesses. Most farms are too small to be viable dryland enterprises, and most farmers want to generate a return from their existing investments in on-farm water infrastructure. Cotton is where they have most potential to make money in the long run and the future for the cotton industry is bright if there is enough water to produce a viable crop.

While water trade has played an important role in farm adjustment, it has played a limited role in managing the risk of drought. In each of the northern valleys, cotton is the dominant crop, diminishing the scope for individual irrigators to swap risks with each other. By contrast, in the southern Basin, horticulturists and dairy farmers have been able to buy water from rice farmers. This has allowed the horticulturists and dairy farmers to maintain their enterprises, and it has allowed rice farmers to make more money from selling their limited allocations than they would have by using it.

For larger cotton farming enterprises, one risk management strategy has been to have a presence in more than one valley. This has helped to ride out the variability. Within each valley there has been some consolidation of water from several farms on to individual farmers held in the same ownership. Often the chosen farm offers better water use efficiency, but sometimes it might be the one closest to the gin, thereby helping to contain transport costs.

Some cotton farmers have now run down the equity in their businesses and will struggle to recover from the drought. A long-term reduction in the average amount of water available for irrigation will see a reduction in the total number of farm businesses.

Regional vulnerability

Regional vulnerability

A few of the larger towns in the region, such as Tamworth, have relatively diverse economies and are therefore less vulnerable than many smaller towns and the towns that are heavily dependent on irrigated agriculture. The very high labour force participation rates in some parts of the region show that these are working towns and people will move out if there are insufficient employment opportunities.

Regional water dependence

The region is vulnerable to changes in sustainable diversion limits because irrigated agriculture plays a prominent role in the regional economy. Irrigation is important to Gunnedah, Narrabri, Walgett and Wee Waa, which are likely to be affected by the move to sustainable diversion limits. Smaller towns likely to be affected include Boggabri and Burren Junction.

Community resilience to change in water allocation

Community resilience to change in water allocation is low in the small irrigation dependent towns. Larger towns such as Tamworth have more capacity to adapt.
Figure 18. Index of Relative Socio-economic Advantage and Disadvantage (2006)\textsuperscript{vii}

Figure 19. Unemployment and labour force participation (2006) \textsuperscript{viii}
Scope for regional transformation

Scope for farm adjustment

Typically, cotton accounts for 70–80% of farm income while in any one year it might account for as little as 10% of the farm area. The rest of the farm is typically taken up with other crops, crop fallow areas, pastures, roads, irrigation channels, dams and native vegetation. Wheat, sorghum and beef cattle are often part of the enterprise mix.xix The farm system has dryland components, but the farms are usually too small to be viable dryland farms in their own right.

There is very low capacity for cotton farms to transform profitably into the production of different commodities, though a few may be able to make the shift to large scale vegetable production, vegetable markets would soon be saturated if everyone tried to make the change.

There may be scope for other broadacre irrigation enterprises to transform their crop mix, but in the absence of any restrictions on water trade it is likely that water would move away from these enterprises to support the cotton industry.

Scope to strengthen irrigation management

There is limited scope to further strengthen irrigation management in the cotton industry. Further changes are likely to be evolutionary rather than revolutionary. Reduced water availability may result in some consolidation of farms and the cessation of irrigation on some marginal lands.

There is scope to further strengthen irrigation management in other broadacre crops, and more active water trade might also drive improvements in water management.

Water availability scenarios — introduction

Description of scenarios

Face-to-face interviews of key stakeholders, and a telephone survey of dryland and irrigation farmers, businesses and community members, were undertaken in the region.

In addition to providing information for the development of the community profile, respondents were asked about the likely impacts of a range of water availability scenarios.

The following pages present the results of those discussions.

Water availability scenarios were expressed relative to the long-term cap equivalent (LTCE) water entitlements for the irrigation region, which were estimated. Baseline data are provided below.

It is important to note that these figures do not include the volumes harvested as overland flows, which are estimated to average 88 GL.xv

Table 5 Baseline water data by region (LTCE, approximate, rounded)

<table>
<thead>
<tr>
<th>Region</th>
<th>LTCE allocation volume (GL, approx, rounded)</th>
<th>Drought average use (GL, July 2002 to June 2009)</th>
<th>Buybacks (GL) (already delivered, or committed to)</th>
<th>Efficiency project savings (GL, committed)</th>
<th>Number of irrigators (number, approx)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Namoi</td>
<td>240xxi</td>
<td>80</td>
<td>5xxii</td>
<td>-</td>
<td>690</td>
</tr>
<tr>
<td>Groundwater (not included in LTCE surface water) (excluding 59GL Supp)</td>
<td>190</td>
<td>170</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This profile uses a range of scenarios of possible changes in water availability to support discussions (20%, 40% and 60% reductions against the long-term average). These scenarios are not linked to possible Sustainable Diversion Limits; rather, they are intended to test a range of responses from irrigators, and flow-on effects in communities.

Note groundwater is important in the Namoi, and equivalent groundwater scenarios also were discussed.

**Table 6 Water availability scenarios — reductions from estimated LTCE entitlement volume**

<table>
<thead>
<tr>
<th>Region</th>
<th>Sector</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Namoi</td>
<td>not differentiated</td>
<td>190</td>
<td>145</td>
<td>95</td>
</tr>
</tbody>
</table>

**Water availability scenarios — direct impacts (face-to-face interviews)**

*Cotton*

Cotton accounts for more than 80% of the irrigated area.

The relationship between water availability and economic activity is more or less a straight line; the more water available for irrigation, the more economic activity.

Under the 20% scenario irrigators would initially scale-back production and try to minimise costs. Irrigators would take what opportunities they could to grow crops opportunistically, but there is very limited potential for business transformation. Most farms are too small to be viable dryland enterprises, and most farmers want to generate a return from their existing investments in on-farm water infrastructure. Cotton is where they have most potential to make money in the long-run and the future for the cotton industry is bright if there is enough water to produce a viable crop.

The 20% scenario would affect profitability and would see some people leaving farming.

The 40% and 60% scenarios would result in major changes. xxiii

A series of market adjustments would consolidate the remaining water on to fewer farms.

**Table 7 Summary of direct (irrigation) responses to water availability scenarios**

<table>
<thead>
<tr>
<th>Region</th>
<th>Key sectors</th>
<th>-20% LTCE</th>
<th>-40% LTCE</th>
<th>-60% LTCE</th>
</tr>
</thead>
</table>
Water availability scenarios — value chain and flow-on impacts (face-to-face interviews)

Communities

A reduction in irrigated agriculture would have a big impact on small centres, which could be reduced to welfare-dependency and a reduction in services. This would make it harder again for farmers in the more remote parts of the catchment to attract and retain skilled workers, especially those with young families desiring ready access to schools and other services. The owners of small businesses in the smaller agricultural towns would be particularly vulnerable to the potential reduction in diversions. Their livelihoods are affected, but they don’t have any control over the decisions to buy or sell water.

Table 8 Summary of indirect (flow-on) responses to water availability scenarios

<table>
<thead>
<tr>
<th>Region</th>
<th>Key sectors</th>
<th>-20% LTCE</th>
<th>-40% LTCE</th>
<th>-60% LTCE</th>
</tr>
</thead>
</table>

Endnotes

2. CSIRO. 2007, Murray–Darling Basin Sustainable Yields Project, Canberra
4. MJA Socio-economic Survey for MDBA 2010
5. MJA Socio-economic Survey for MDBA 2010
7. Australian Bureau of Agricultural and Resource Economics. 2008, Australian Farm Survey Results 2005-06 to 2007-08, Canberra
25. Published figures from the NSW and Commonwealth Governments were used to estimate buybacks.
26. Note that due to insufficient respondent numbers for responses to water availability scenarios, that output from the telephone survey is not included here. Please refer to MJA’s Synthesis Report for information about survey outcomes.
Appendix C  Irrigation district community profiles

Figure 20  Map of irrigation district