Irrigation Futures of the Goulburn Broken Catchment

Final Report 3 – Perspectives of future irrigation
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Authors
Mr David Robertson, Dr Q.J. Wang, Mr Leon Soste, Mr Robert Chaffe and Mr Clive Lyle

Documents in this series.
Final Report - Summary
Provides a brief introduction to the project and how the project objectives have been met.

Final Report 1 – Scenarios of the Future: Irrigation in the Goulburn Broken Region
Provides an overview of the region, drivers for change, scenarios, implications and strategies.

Final Report 2 – Regional scenario planning in practice: Irrigation futures of the Goulburn Broken Region
Provides a manual of project methodology for next-users.

Final Report 3 – Perspectives of future irrigation
Describes scenario implications for irrigation supply infrastructure.

Final Report 4 – Handbook of flexible technologies for irrigation infrastructure
Provides guidelines and tools for irrigation supply infrastructure design.

Final Report 5 – Scenario implications for catchment management
Describes scenario implications and strategies for catchment management.

Final Report 6 – Scenario planning for individuals and businesses
Tool to assist individuals and businesses to assess the scenario implications for their enterprise.

Final Report 7 – Hand book of project plans
Provides project plans including the funding bid, participation, communication and evaluation plans.

Final Report 8 – Project evaluations
Independent evaluation of stakeholder satisfaction and overall project processes

Final Report 9 – Scenario implications for land use planning
Implications of land-use change for zoning, services, economic development and communities

Final Report 10 – Business futures
An entrepreneur’s view on the issues and the support environment needed for product differentiation

Final Report 11 – Water and food: futures thinking
Translating project outputs into school curriculum

Final Report 12 – Fact sheet
One page overview of project aims, processes and outputs

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Irrigation Futures of the Goulburn Broken Catchment

Final Report 3 – Perspectives of future irrigation
Project Team:
Dr Q.J. Wang (Project Leader), Leon Soste (Operational Manager), David Robertson (System Analyst), Sherridan Watt (Project Support) – Department of Primary Industries and Cooperative Research Centre for Irrigation Futures
Robert Chaffe (Workshop Facilitator) – Community Engagement Network, Department of Sustainability and Environment

Governance Committee:
Ian Atkinson, Murray Chapman, Denis Flett, Phillip McGowan, Ian Moorhouse, John Pettigrew (Chair), Sonja Tymms.

Stakeholder Reference Committee:
Mark Allaway, Allen Canobie, Bruce Cumming, Steve Farrell, Peter Gibson (Chair), Colin James, Peter McCamish, Ian Moorhouse, Chris Norman, Russell Pell, Derek Poulton, Ann Roberts, Nick Roberts, Nick Ryan, Ken Sampson, Alan Sutherland, David Taylor, John Thompson, Mark Wood.

Technical Working Group:
Bruce Anderson, David Bourke, Allen Canobie, Bruce Cumming, John Dainton, Joe Demase, Peter Fitzgerald, Lyn Gunter, Shane Hall, John Laing, Peter Langley, David Lawler, Oliver Moles, Bev Phelan, Claire Pinniceard, Derek Poulton, Kevin Preece, Durham Prewett, Peter Sargent, Rien Silverstein, Katrina Tehan, Ross Wall, Gordon Weller.

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National Program for Sustainable Irrigation
Cooperative Research Centre for Irrigation Futures
Perspectives of future irrigation

This document was developed by the Irrigation Futures project team as a contribution to Goulburn-Murray Water’s irrigation reconfiguration processes. It has been included as a chapter in the Shepparton Regional Atlas as a part of Goulburn-Murray Water’s Strategic View of Assets and Service Needs. This document summarises the scenarios and their implications for irrigation infrastructure planning.
Perspectives of Future Irrigation

Prepared by
David Robertson, QJ Wang, Leon Soste, Robert Chaffe and Clive Lyle

on behalf of
Goulburn Broken Irrigation Futures Project

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Introduction

It is critical that irrigation infrastructure planning considers the needs of future irrigated agriculture. However, it is difficult to predict the future for irrigated agriculture as it will be influenced by many uncertain factors. Scenario planning is an approach to deal with the uncertainty by considering a plausible range of futures, so that the planned irrigation infrastructure will be able to serve the needs of the future.

This section contains four scenarios, describing alternative plausible futures for irrigated agriculture in the Goulburn Broken catchment, and their implications for irrigation water supply. Although the scenarios have been developed for the Goulburn Broken catchment, they are also relevant to other irrigation regions in northern Victoria.

The four scenarios, Moving On, New Frontiers, Pendulum, and Drifting Up, summarise the external driving forces, the region’s response to those driving forces and the regional impacts that follow. The impacts focus on those factors relevant to irrigation infrastructure planning.

The four scenarios are not predictions of the future. They are intended to represent a range of possible opportunities and challenges that the Goulburn Broken catchment may face over the next 20 years. Many elements of the scenarios can be interpreted as metaphors or examples of possible events that may occur. For example, the outbreak of fire blight described in Scenario 2 has been used to depict a bio-security threat. Alternative bio-security threats such as foot and mouth disease or avian influenza could have been used. Similarly, government policies described in the scenarios should be considered as plausible, but should not be interpreted as a statement of future government policy or intent.

The four scenarios have been developed by the Goulburn Broken Irrigation Futures project. The project is a community initiative aiming to develop a shared vision for irrigated agriculture in the region. The project engaged the regional community and other key stakeholders through a series of workshops held at 6 locations throughout the catchment. These workshops looked at the community’s aspirations, the possible evolution of external driving forces in the future, and strategies to achieve the aspirations. The outputs of the workshops were developed further by a Technical Working Group to assess implications of the external driving forces and regional strategies.

Each scenario is presented in two forms: a summary and a more detailed description. The scenario summary provides a snapshot of the driving forces, regional impacts and implications for the distribution of water, along with illustrative graphs of land use, irrigated area, water resource and farm gate gross value of production for the Goulburn Broken Irrigation Region. The detailed scenario description contains additional information about the driving forces and impacts on different irrigation-dependent industry groups.

The scenarios are intended to stimulate discussions on strategic approaches to irrigation infrastructure planning including reconfiguration by considering what the future may hold and how the region can ensure it is robust under a range of possible futures. Further work looking at the implications of the scenarios for environmental management and the community will be reported in subsequent publications.
Learning from the Scenarios

The four scenarios presented in this section describe alternative plausible futures for irrigated agriculture in the region and their implications for future irrigation water supply. Some of the drivers are common to all scenarios; for example, the emergence of new economic powers such as China and India providing both threats and opportunities for our industries. Other drivers diverge markedly, resulting in very different scenarios.

Scenario 1 “Moving on” depicts a steadily changing operating environment for the region. The industries in the region evolve successfully in response to international business conditions and moderate climate variability. In Scenario 2 “New Frontiers”, agricultural production in the region declines over time because of a number of unforeseeable conditions, most notably, the rise in synthetic food production. However, there is a sharp increase in the number of people who live in rural areas and work remotely, bringing a new and significant income stream to the region. Scenario 3 “Pendulum” describes how large shifts in water policy can dramatically change the face of the region. Scenario 4 “Drying up” highlights the vulnerability of the region to global economic recession and natural disasters such as drought.

The four scenarios represent very different futures, as highlighted by the graphs below. Even though they are not predictions of the future, they provide useful test beds for examining the effectiveness of management strategies under a range of conditions. In the context of irrigation infrastructure planning, the four scenarios highlight a number of important issues.

Flexibility of irrigation infrastructure

There is great uncertainty in the size of the irrigated area and the amount of water use in the future. There may be periods of rapid contraction and expansion of irrigation. Thus there is a need to build flexibility into irrigation infrastructure, so that it is adaptable to future demands. Flexibility may be achieved through innovative system configurations, flexible distribution technologies, a mix of infrastructure ownership, and improved management systems.

Irrigation service level requirements

One of the themes that emerged strongly from the scenarios is that the competitiveness of the agricultural industries in the region will depend on generating and marketing differentiated products. The industries are thus likely to demand higher levels of service in water supply than today. On the other hand, service requirements for water use on lifestyle properties are likely to be quite muted. Water supply to lifestyle properties may become more significant in the future as indicated by Scenario 3 “New Frontiers”.

Integration with land use and environmental planning

The scenarios describe significant changes in land use over the next 30 years, within and between agricultural, lifestyle and environmental uses. These land use changes can radically alter the viability and requirements of irrigation infrastructure. Irrigation infrastructure planning needs to be closely linked with land use and environmental planning. This calls for a collaborative approach to planning by agencies, industry groups and the community.

Social and economic responsibility

The scenarios highlight the complexity of issues surrounding irrigation and the importance of involving stakeholders, including the community, in decision making. Changes to irrigation infrastructure and irrigation business viability can potentially have wide social consequences. Equity and social adjustment need to be carefully managed during periods of infrastructure change. Likewise, financial planning for infrastructure needs to make provision for industry down times.

Large shifts in government policy on water can dramatically change the face of the region, as indicated by Scenario 3 “Pendulum”. It is critical that the region actively influences all levels of government to ensure that regional concerns and issues are addressed in policy development.

Planning for changes

The scenarios also point to some of the potential weaknesses of the region. For example, the relatively small size of irrigated land panels makes the region uncompetitive when the market demands large-scale production systems, as indicated in Scenario 2 “New Frontiers”. Significant restructuring will be required to overcome some of these weaknesses, but it should be done under the right conditions so that changes can be made smoothly. The scenarios suggest that there are only a limited number of windows of opportunity for large-scale restructuring. In Scenario 3 “Pendulum” for example, government may be lobbied to assist in land amalgamation during periods of major water policy shifts. To seize these opportunities, there is a need for having plans and options prepared in anticipation of future conditions.

The issues highlighted above represent the learnings from the scenarios by the Goulburn Broken Irrigation Futures Project. The scenarios are intended to stimulate discussions on strategic approaches to irrigation infrastructure planning including reconfiguration. Therefore, readers are encouraged to use the scenarios to develop their own thoughts and ideas.
Summary of Scenario 1: Moving On

Driving Forces
2005-2020
- Free trade agreements signed with USA and ASEAN create demand for all agricultural products.
- Use of genetically modified organisms permitted for agriculture.
- Climate change results in a long period with no medium reliability water and hotter, wetter summers.
- 10% of irrigation water is traded to Sunraysia.
- Demand for lifestyle properties remains high.

2020-2035
- India and China become a significant market for agricultural products.
- Affluent consumers are becoming increasing conscious of health and animal welfare issues.
- Climate remains relatively dry with only 25% of medium reliability water available.
- Water trade outside the region reduces.
- C-MW sold to Macquarie Infrastructure; prices increase and cross-subsidisation of infrastructure costs is reduced.
- Demand for lifestyle properties declines.

Impacts
- Regional economy continues to prosper despite global competition.
- Agricultural businesses become larger, more intense and have a greater diversity of products. Larger farms employ people who live in towns. Few small farms remain. Some small towns decline.
- Intensification of agriculture increases the necessity for nutrient management.
- More water in the Goulburn River due to government policy and downstream trade.
- Irrigators move toward the river and the upper reaches of the irrigation system (cheaper water).
- In preparation for privatisation, infrastructure condition and operations are modified to maximise the sale price.

Implications
- Water demand pattern changes as farming systems move toward more annual species.
- Area under irrigation decreases (10%) then increases (30%) as more water becomes available.
- Irrigation water use initially decreases (10%) due to trade and then increases as some (25%) medium reliability water becomes available.

<table>
<thead>
<tr>
<th>Land Use</th>
<th>1997</th>
<th>2005</th>
<th>2020</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dryland</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigated</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Farm Water Use</th>
<th>1997</th>
<th>2005</th>
<th>2020</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy</td>
<td>2000</td>
<td>1500</td>
<td>1000</td>
<td>500</td>
</tr>
<tr>
<td>Horticulture</td>
<td>500</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
</tr>
<tr>
<td>Livestock</td>
<td>0</td>
<td>500</td>
<td>1000</td>
<td>1500</td>
</tr>
<tr>
<td>Cropping</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
<td>2500</td>
</tr>
<tr>
<td>Lifestyle</td>
<td>0</td>
<td>500</td>
<td>1000</td>
<td>1500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Irrigated Area</th>
<th>1997</th>
<th>2005</th>
<th>2020</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy</td>
<td>2000</td>
<td>1500</td>
<td>1000</td>
<td>500</td>
</tr>
<tr>
<td>Horticulture</td>
<td>500</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
</tr>
<tr>
<td>Livestock</td>
<td>0</td>
<td>500</td>
<td>1000</td>
<td>1500</td>
</tr>
<tr>
<td>Cropping</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
<td>2500</td>
</tr>
<tr>
<td>Lifestyle</td>
<td>0</td>
<td>500</td>
<td>1000</td>
<td>1500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Farm Gate Gross Value of Production</th>
<th>1997</th>
<th>2005</th>
<th>2020</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy</td>
<td>500</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
</tr>
<tr>
<td>Horticulture</td>
<td>200</td>
<td>400</td>
<td>600</td>
<td>800</td>
</tr>
<tr>
<td>Livestock</td>
<td>500</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
</tr>
<tr>
<td>Cropping</td>
<td>1000</td>
<td>2000</td>
<td>3000</td>
<td>4000</td>
</tr>
<tr>
<td>Lifestyle</td>
<td>300</td>
<td>600</td>
<td>900</td>
<td>1200</td>
</tr>
</tbody>
</table>
**Description of Scenario 1: Moving On**

### WATER RELATED DRIVERS

**GOVERNMENT POLICY**
- Water reform white paper is progressively implemented, reducing subsidies and allowing for direct pricing.
- Water tariffs increase by 10%.
- Cross-subsidisation of infrastructure costs decreases.

**CURRENT**
- Climate remains drier than historical averages.
- Summer rainfall increases.
- All high reliability and 25% of medium-reliability water available.
- More intensive trade and trade closer to market.

**OTHER**
- Demand for water from Melbourne continues to have little impact.

### NON-WATER RELATED DRIVERS

**GENERAL**
- Global and India grow rice as a water intensive crop for export.
- Increased demand for rice.

**CROPPING**
- Late planting of rice.
- Late change in rice cultivation.

**FORESTRY**
- Demand for wood increases.

### INDUSTRY IMPACTS

**GENERAL**
- Rice production increases 30%.
- Increase in production of high value rice varieties.

**CROPPING**
- Increased demand for rice.

**FORESTRY**
- Increased demand for wood.

### REGIONAL IMPACTS

**GENERAL**
- Increase in rural employment.
- Increase in export opportunities.

**CROPPING**
- Increase in export opportunities.

### 2005-2020

**GOVERNMENT POLICY**
- Cross-subsidisation of infrastructure costs decreases as a result of privatisation.
- Water tariffs increase to build a commercial surplus and through decreased cross-subsidisation.

**CURRENT**
- Climate remains drier than historical averages.
- Summer rainfall increases.
- All high reliability and 25% of medium-reliability water available.
- More intensive trade and trade closer to market.

**OTHER**
- Demand for water from Melbourne continues to have little impact.
Summary of Scenario 2: New Frontiers

Driving Forces
2005-2020
- Free trade agreements signed with USA and ASEAN create demand for all agricultural products. Middle East trading partners lost due to our alliance with United States.
- Large increase in lifestyle developments.
- Genetically modified organisms prohibited.
- Community concern for the environment increases.
- Environmental flow entitlement increased through deal with medium reliability entitlement.
- Climate change results in long period with high reliability allocation of less than 100%.
- 15% of irrigation water is traded out of the region to Sunraysia and Northeast Victoria.

2020-2035
- International free trade is introduced.
- Fireblight and regulation cause a major decline in agricultural production across all industries.
- Synthetic food production significantly reduces the demand for naturally produced foods including dairy, horticultural and meat products, but substantially increases demand for grain.
- Demand for lifestyle properties plateaus.
- Genetically modified organisms allowed.

Impacts
- Initially, a small decline in agricultural activity occurs due to the loss of markets. Followed by a substantial decline due to synthetic food production. Niche agricultural industries on some small properties cater for the health food market.
- Demand for grain causes increase in annual cropping. Large quantities of water trades to New South Wales where grain production is more efficient due to larger land parcel sizes. Water trade increases infrastructure costs for remaining irrigators.
- Regional economy is maintained by new lifestyle development. Lifestyle development is unplanned causing conflicts between agricultural production and lifestyle values.
- Land is reserved for environmental purposes.

Implications
- Major contraction in most irrigated agricultural industries.
- Area under irrigation and irrigation water use decreases substantially (45%) due to water trade.
- Best areas for irrigation may change according to market demand for products and land availability.

Land Use

Farm Water Use

Irrigated Area

Farm Gate Gross Value of Production
Description of Scenario 2: New Frontiers

**WATER RELATED DRIVERS**

**Government Policy**
- Tax breaks for reusing water.
- Government incentives for water conservation.

**Non-Water Related Drivers**
- Increased demand for water due to population growth.
- Agricultural expansion leading to increased water use.

**Industry Impacts**
- Increased demand for water in industries.
- Reduced availability of water for agriculture.

**Regional Impacts**
- Increased competition for water resources.
- Increased water prices.

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**2005-2020**

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**WATER RELATED DRIVERS**

**Government Policy**
- Increased funding for water infrastructure.
- Implementation of water conservation programs.

**Non-Water Related Drivers**
- Population growth leading to increased demand for water.
- Urbanization leading to increased water consumption.

**Industry Impacts**
- Increased water usage in industrial processes.
- Increased water pollution.

**Regional Impacts**
- Increased water scarcity.
- Increased water conflict.

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**2020-2035**

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**WATER RELATED DRIVERS**

**Government Policy**
- stricter regulations on water usage.
- increased support for water conservation projects.

**Non-Water Related Drivers**
- increased demand for water due to population growth.
- increased demand for water due to increased economic activities.

**Industry Impacts**
- increased water usage in industries.
- increased water pollution.

**Regional Impacts**
- increased water scarcity.
- increased water conflict.

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Summary of Scenario 3: Pendulum

Driving Forces

* 2005-2020
  - Free trade agreements signed with USA and ASEAN create demand for all agricultural products.
  - Multinationals take over food processing plants.
  - Genetically modified organisms prohibited.
  - High energy costs create demand for biofuels.
  - Government returns 3500 GL of environmental water to Murray River. Victoria contributes 1500 GL through buy back of all medium reliability and 30% of high reliability water, at premium prices. Some water trades into Goulburn Valley from NSW.
  - Water buy back coupled with government purchase, amalgamation and auction of land.

* 2020-2035
  - Chinese Yuan floated and China grows as a market for agricultural products.
  - Genetically modified free status becomes a marketing advantage.
  - Government reverses policy and returns water to agriculture by auction. Proceeds of auction fund development of distribution infrastructure which is transferred to irrigator cooperatives.
  - Wet climate sequence causes floods.

Impacts

* Initially the regional economy declines as water is returned to the environment. Unemployment rises considerably as demand for service industries decreases.
* Perception of little additional benefit resulting from water being returned to the environment.
* Subsequently, the economy booms as international market conditions improve and policy reversal means more water is available for agriculture.
* Labour shortages occur.
* Planned adjustment of land and water resources allows infrastructure costs to be managed and leads to an improved match between land capability and use.
* Increased rainfall and floods lead to a re-emergence of water logging and salinity problems.

Implications

* Changes in government policy enable large changes in irrigated area and water use to be planned.
## Description of Scenario 3: Pendulum

**2005-2020**

<table>
<thead>
<tr>
<th>WATER RELATED DRIVERS</th>
<th>NON-WATER RELATED DRIVERS</th>
<th>INDUSTRY IMPACTS</th>
<th>REGIONAL IMPACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GOVERNMENT POLICY</strong></td>
<td>Free trade agreements with US and AUSAN create new opportunities for exports, but also problems with cheap imports.</td>
<td>No change in milk production as water remains in dairy and infrastructure.</td>
<td>A rapid planned decline in irrigation occurs, causing significant adverse economic impacts to both agricultural and service industries.</td>
</tr>
<tr>
<td>Water reforms and water pricing mechanisms are partially implemented.</td>
<td>National water corporations own processing facilities in the region.</td>
<td>Fewer farms.</td>
<td>Farming systems will move towards more intensive pasture and crops.</td>
</tr>
<tr>
<td>New government policy to increase water use.</td>
<td>Use of genetically modified organisms is prohibited.</td>
<td>Land area remains constant.</td>
<td>Water use reduction greater than 30%.</td>
</tr>
<tr>
<td></td>
<td>Increase in storage costs and interest rates.</td>
<td>Irrigation water use decreases by 30%.</td>
<td>Irrigation area decreases by 20%.</td>
</tr>
<tr>
<td></td>
<td>Small decline in price.</td>
<td>Irrigation water use diversity declines.</td>
<td>Irrigation area decreases by 30%.</td>
</tr>
<tr>
<td></td>
<td>Increase in competitiveness.</td>
<td>Irrigation area decreases by 20%.</td>
<td>Irrigation water use diversity declines.</td>
</tr>
<tr>
<td></td>
<td>Global demand for fruit and vegetable products remain high.</td>
<td>Irrigation water use diversity declines.</td>
<td>Irrigation area decreases by 30%.</td>
</tr>
<tr>
<td></td>
<td>Growth in the dairy industry.</td>
<td>Irrigation water use diversity declines.</td>
<td>Irrigation area decreases by 30%.</td>
</tr>
<tr>
<td></td>
<td>Increase in demand for beetle food.</td>
<td>Irrigation water use diversity declines.</td>
<td>Irrigation area decreases by 30%.</td>
</tr>
<tr>
<td></td>
<td>Small increase in price.</td>
<td>Irrigation water use diversity declines.</td>
<td>Irrigation area decreases by 30%.</td>
</tr>
<tr>
<td></td>
<td>Demand decreases.</td>
<td>Irrigation water use diversity declines.</td>
<td>Irrigation area decreases by 30%.</td>
</tr>
</tbody>
</table>

**2020-2035**

<table>
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<tr>
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<th>REGIONAL IMPACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GOVERNMENT POLICY</strong></td>
<td>China faces its currency, which strengthens against the Australian dollar.</td>
<td>Dairy area increases by 10%.</td>
<td>Water-related transparency becomes a federal responsibility.</td>
</tr>
<tr>
<td>Water reforms include a new emphasis on environmental flows.</td>
<td>Multinational corporations own processing facilities in the region.</td>
<td>Irrigation water use increases by 30%.</td>
<td>High-quality water and less reliance on water availability.</td>
</tr>
<tr>
<td>Water reforms include a new emphasis on environmental flows.</td>
<td>Australia’s generally modified status becomes a determinant advantage.</td>
<td>Irrigation water use increases by 30%.</td>
<td>Funded to build and rehabilitate irrigation infrastructure in partnership with irrigator-owned water distribution companies.</td>
</tr>
<tr>
<td>Water reforms include a new emphasis on environmental flows.</td>
<td>Expect to sell more Chinese and African market growth.</td>
<td>Irrigation water use increases by 30%.</td>
<td>Irrigation water use increases by 30%.</td>
</tr>
<tr>
<td></td>
<td>Demands in Chinese and African markets increase.</td>
<td>Irrigation water use increases by 30%.</td>
<td>Irrigation water use increases by 30%.</td>
</tr>
<tr>
<td></td>
<td>Increase in competitiveness.</td>
<td>Irrigation water use increases by 30%.</td>
<td>Irrigation water use increases by 30%.</td>
</tr>
<tr>
<td></td>
<td>Global demand for food increases.</td>
<td>Irrigation water use increases by 30%.</td>
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<td>Irrigation water use increases by 30%.</td>
</tr>
<tr>
<td></td>
<td>No change in land area.</td>
<td>Irrigation water use increases by 30%.</td>
<td>Irrigation water use increases by 30%.</td>
</tr>
<tr>
<td></td>
<td>Irrigation water use increases by 30%.</td>
<td>Irrigation water use increases by 30%.</td>
<td>Irrigation water use increases by 30%.</td>
</tr>
</tbody>
</table>

**CIVIL**

- Several seasons of above average rainfall, with floods occurring.
- Groundwater and surface water problems emerge.
- Inland floodwater trading of water occurs at low prices.

**CIVIL**

- New water targeted to best areas.
Summary of Scenario 4: Drying Up

Driving Forces
2005-2020
- Financial crisis in the United States creates a global recession that reduces international trade considerably between 2009 and 2012.
- As global economy recovers, China begins to export high value horticultural products and import cheaper bulk commodities.
- Australian dollar strengthens making agricultural products expensive to overseas purchasers.
- Use of genetically modified organisms prohibited.
- Drought commences in 2012 lasting until 2020. High reliability irrigation water allocations between 2015 and 2020 are 80%, 50%, 30%, 90%, 100%.

2020-2035
- International export markets recover.
- International and domestic markets demand healthy food.
- Genetically modified free status becomes a marketing advantage.
- Government assists restructure and redevelopment of agriculture with focus on health food, environmental sustainability and animal welfare.
- Climate becomes wetter and enables medium reliability allocation of 25%.

Impacts
- Initially, all agricultural industries and the regional economy is decimated by international market collapse and prolonged drought. The population is stable because employment opportunities are poor elsewhere. Unemployment is very high.
- Irrigators unable to pay for costs of infrastructure maintenance.
- Subsequently, regional economy booms as international markets grow and water availability increases. Growth of agricultural industries is constrained by land parcel size.
- Drought increases the frequency of severe bushfires.

Implications
- Initially, a large decrease in irrigation water use and area irrigated as drought decreases allocations, followed by a large increase in irrigated area and water use as the drought subsides.
- Water returns along existing irrigation infrastructure as no re structuring occurred during drought.
- Infrastructure declines during times of little maintenance.

Land Use
- 1997
- 2005
- 2017*
- 2035

Farm Gate Gross Value of Production

Farm Water Use

Irrigated Area

* Graphics depict 2017 drought conditions with high reliability water allocation of 30%.
# Description of Scenario 4: Drying up

## 2005-2020

### WATER RELATED DRIVERS

- **Government Policy**: Government assistance to rural communities and provision of support to accelerate production growth.
- **Waste and Water Availability**: Climate is drier than normal. All high reliability and 25% of medium reliability available.

### NON-WATER RELATED DRIVERS

- **General**: Price of fertilizers and water increases is a trend. Agriculture is increasingly dependent on water for irrigation.

### INDUSTRY IMPACTS (2017)

- **General**: Milk production decreases 10% over 3 years of drought. Drought recovery in 5th year. Milk production increases 10% in the following 5 years. Water use decreases 20%.

### REGIONAL IMPACTS (2017)

- **General**: Regional water resources are limited, and agricultural expansion is limited. Drought recovery in 5th year. Milk production increases 10% in the following 5 years. Water use decreases 20%.

## 2020-2035

### WATER RELATED DRIVERS

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