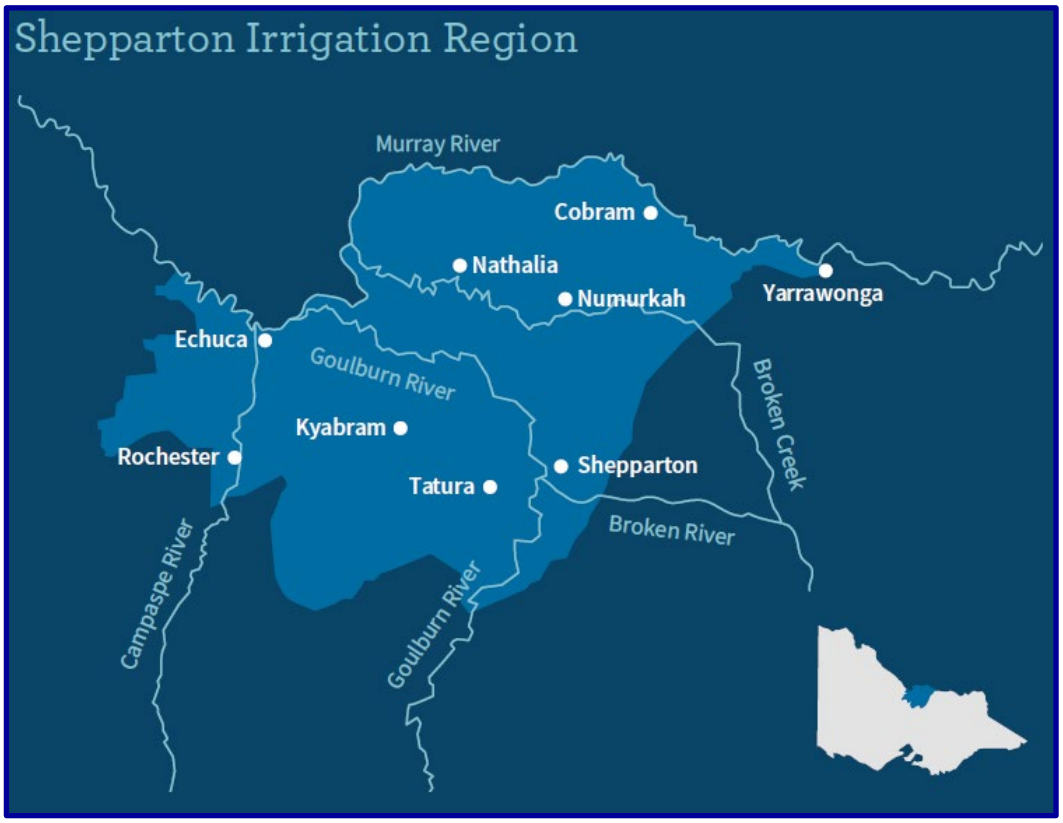
Renewal of the Shepparton Irrigation Region Land and Water Management Plan 2023

Context document



This document provides an easily communicated reference list and summary of issues for **primary community partners to consider prior to workshop discussions on 23 February 2023**. The workshops are part of the process to update the Plan. The references point to easily accessed evidence (mostly hyperlinked).

Primary community partners include:

- community natural resource management groups
- indigenous groups
- agencies
- Murray-Darling Basin Authority
- Victorian Farmers Federation
- Industry groups

Prepared on behalf of the SIRLWMP Update 2023 Steering Committee.

Shepparton Irrigation Region Land and Water Management Plan 2050

VICTORIA State Government

GOULBURN BROKEN CATCHMENT MANAGEMENT AUTHORITY

Contents (hyperlinked)

The Goulburn Broken CMA acknowledges and respects Traditional Owners and Aboriginal communities and organisations. We recognise the diversity of their cultures and the deep connections they have with Victoria's lands and waters. We value partnerships with them for the health of people and Country. We pay our respects to Elders past and present and acknowledge and recognise the primacy of Traditional Owners' obligations, rights and responsibilities to use and care for their traditional lands and waters.

Ph: 03 5822 7700 or visit www.gbcma.vic.gov.auor visit www.gbcma.vic.gov.au

Abbreviations

The Plan	SIRLWMP (see below)
CMA	Catchment Management Authority
DCD	Drainage Course Declaration
DELWP	Department of Environment, Land, Water and Planning (now DEECA)
DEECA	Department of Energy, Environment and Climate Action (formerly DELWP)
EC	Electrical conductivity (used to measure salinity)
GBCMA	Goulburn Broken Catchment Management Authority
GMW	Goulburn-Murray Water
MDBA	Murray-Darling Basin Authority
NCCMA	North Central Catchment Management Authority
NRM	Natural resource management
RCS	Regional Catchment Strategy
SIP	Sustainable Irrigation Program
SIR	Shepparton Irrigation Region
SIRLWMP	Shepparton Irrigation Region Land and Water (Salinity) Management Plan ('salinity' included until 1996)
SIRPPIC	Shepparton Irrigation Region People and Planning Integration Committee

Summary

While it's hard to believe that the Shepparton Irrigation Region Land and Water Management Plan has been in place for more than 30 years, it's now time to start planning the next 30 years.

As you know the irrigated landscape of this region is changing all the time and it's our job to stay ahead of those challenges and look for opportunities to continue to adapt and respond. The need to keep producing more with less water and ensuring we remain the Foodbowl of Australia and a great place to live is important.

This **context document** includes hyperlinks and references to details of achievements since 1990, the policy and legislative context, and current challenges. It provides background for participants in a February 2023 workshop that will consider future pathways. It also includes 11 questions as prompts for participants to enable all material issues to be captured.

The renewal will again be community driven while linking to the GBCMA's Regional Catchment Strategy (RCS) and meeting state guidelines.

The Plan's **longevity and success** is founded on strong, continuous community-member and government-agency **trust and partnerships**, often forged in trying circumstances. Government investment in action has been made locally relevant by connecting scientists, farmers, bureaucrats, indigenous groups, politicians, and other land managers at all scales.

More than **330,000 hectares of on-ground actions** have been implemented through **7,057 incentives over the 30 years**, including installation of irrigation drains, water reuse systems and native vegetation works. This helped protect our natural resource base while generating significant benefits, with **government investment of $650 million**. **Farmers and the community have also contributed $2 billion**. The SIRWLMP's irrigation farm and drainage scheme **benefits to costs** ratio is estimated to be **1.11**. This excludes significant, but less tangible, environmental and social benefits. Progress is recorded in GBCMA's annual report.

Resilience status summary

The SIR's social-ecological systems are transforming: several key tipping points are breaching, creating uncertainty and significant human and environmental stress. While it is proving difficult for government to maintain appropriate levels of support, the SIR's future remains in a diverse and productive agricultural system within a landscape where amenity usage is increasing. A key challenge is to keep building capability to take advantage of strong regional networks, natural assets, existing regional and farm infrastructure, and proximity to markets.

Resilience assessment (SIR)

Critical attribute affecting long-term catchment health	Long-term (10+ years) risk to system thresholds / tipping point	
	Current support [i]	No support [i]
Water availability for the environment	Medium	High
Water availability for agriculture	High	Very high
Water quality	Medium	High
Watertables[ii]	Medium	High
Native vegetation extent	Very high	Very high
Farm and regional viability	High	Very high

i Support includes government funding and community (including individual) in-kind and financial investment for onground works and helping communities and individuals adapt.

ii Regional land salinisation and Murray River salinity impacts is reported under Watertables.

Resilience approach

Ongoing changes in climate, water availability, farm production systems, markets, technologies and social structures and expectations force us to grow the region's resilience so that we can continue to thrive. Natural resources are fundamental to this resilience.

The SIRLWMP is a Goulburn Broken Regional Catchment Strategy sub-strategy and will again use a **resilience approach**. The SIRWLMP will link with current documents and processes, including those of the Murray-Darling Basin, the Goulburn Murray (Irrigation District) Resilience Strategy 2020 (Goulburn Regional Partnership), and Water is Life 2022 (DELWP).

Applying resilience requires an understanding of how a system's resilience changes over time, what causes change and where and how to intervene to influence future direction. It requires a shared understanding of:

- the **identity** of the Shepparton Irrigation Region's **social-ecological system,** including values and sustainability challenges
- **drivers of change**
- **tipping points**
- how a system **responds to change**
- **multiple future pathways**.

There are three decision-making timeframes when developing and implementing the SIRLWMP: **Long** (20+ years), **Medium** (6 years), **Short** (annual).

There are also three different types of actions to be examined and determined to help people think and plan for the longer term rather than being stuck in the here and now: **established** (well understood, business as usual), **pathway** (innovative, bridge to the future) and **transforming** (a new normal).

Reader's notes and comments sheet

Section (and question prompts)	Notes and comments
SIRLWMP overview and history	
1 What important documents or processes are missing (see also Resilience approach overview and References)	
2 What other SIRLWMP history or elements are missing that are important when considering future options?	
Catchment condition	
3 For each critical attribute, what ratings or parts of the narrative need to be changed?	
Water availability general	
Water availability for the environment	
Water availability for agriculture	
Water quality	
Watertables	
Native vegetation	
Farms and regional viability	
4 Are critical attributes a useful way to consider the strategic context?	
5 Which critical attributes might no longer be seen as critical, but might be considered more like business-as-usual?	
6 Which attributes might need to be elevated (or tweaked) and considered critical?	
Resilience approach overview	
7 Given the SIRLWMP scope, what needs to be considered in a description of the SIR's identity and values?	

Section (and question prompts)	Notes and comments
8 What broad, high-level drivers of change need to be considered?	
9 What potential opportunities for alignment in values from different sectors are there?	
10 What potential conflicts in values from different sectors are there? (What strategic dilemmas need to be considered?)	
11 What fundamental or transformational changes in approach to managing the SIR are needed?	

What's next:

Any other comments?

1 Where this SIRLWMP context document fits

The Goulburn Broken Catchment Management Authority's (GBCMA) Shepparton Irrigation Regional People Planning and Integration Committee (SIRPPIC) has determined that a major renewal of the Shepparton Irrigation Region Land and Water Management Plan (SIRLWMP) is needed, building on work done, because:

- there is unfinished work, as indicated in 30 years done! (GBCMA, 2021j);
- the current rate of change with emerging new issues prompts the need for a renewed long-term vision for the irrigated landscape;
- significantly more stakeholders and partners are now involved, such as industry groups, traditional owners, universities, research organisations and corporate farms;
- there have been significant changes in drivers that affect the plan's operations or outcomes;
- major government policy changes have occurred and are occurring;
- the last update of the SIRLWMP was in 2016 and it is now needing renewal; and
- there is a requirement to have a current Land and Water Management Plan that considers the irrigation region.

See also legislative and policy context (p. 9).

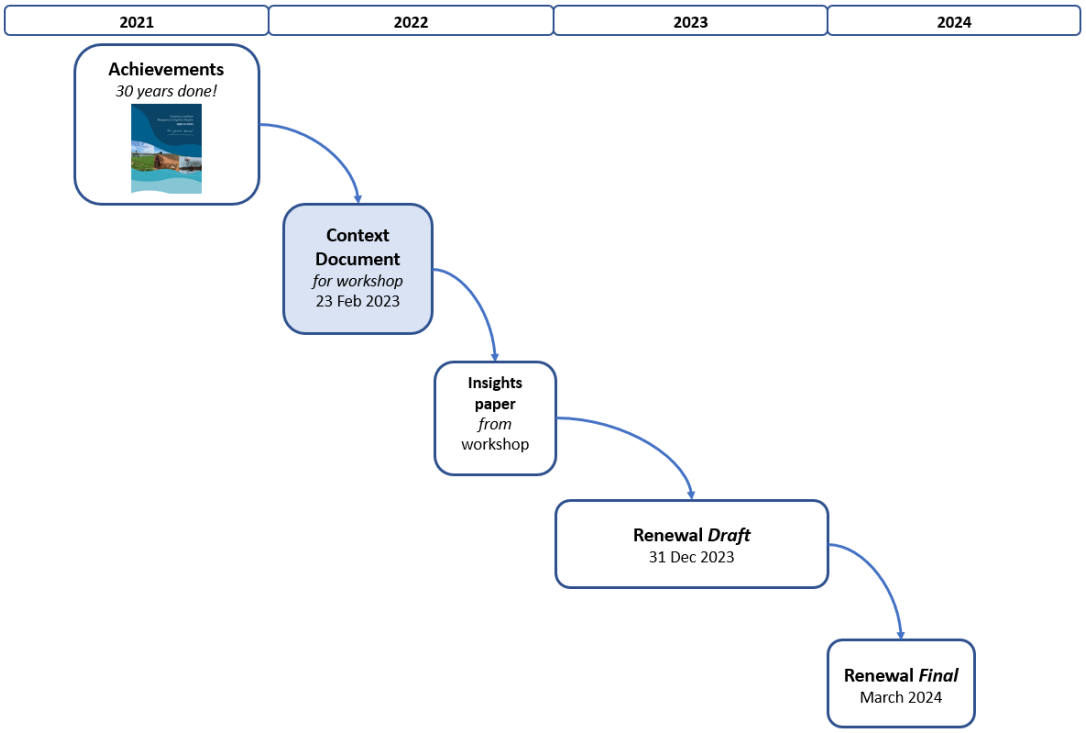


Figure 1. SIRLWMP renewal timeline

SIRLWMP renewal elements not expected to change

Due date of Draft	31 December 2023.
Long term: 20 to 30 years	Strategy timeframe and Plan renewal. (Most Victorian NRM plans are medium term only.)
Medium term: 5 to 6 years	Reasonable timeframe for checking and affirming actions. Annual reviews reaffirm, adjust actions.
Resilience approach	Builds on (and changes) 2016 plan elements and 2021 RCS.
Community driven	Includes and reflects community views. Balances level of community empowerment with government funding realities.
CMA needs	Defines links to RCS. Outlines governance (including accountabilities).
State needs	Meets state Land and Water Management Plan guidelines.

2 SIRLWMP overview and history

This page has been derived from: 30 years done! (GBCMA, 2021j)

Continuity and adaptation

The SIRLWMP (the Plan) has been formally adapted five times since 1990 (GBCMA, 2021j, p. 7). It was most recently updated in 2016 (GBCMA, 2016a). It is rare to be renewing an NRM plan that is more than 30 years old.

Community involvement has been the Plan's biggest achievement. Community members and government agency partnerships have been built on trust and an understanding of how to be good partners, often forged in trying circumstances.

Partnerships have been stabilised by the continuity of many government-agency staff despite frequent major departmental restructures … good people keep participating while they have the power to influence the Plan's destiny. This has led to people's efforts being integrated at all levels, from strategy development to whole farm planning and onground works.

Partners have together withstood many unprecedented changes and events over the 30 years:

- competition for our Catchment's water
- droughts and dry sequences
- information technology changes that revolutionised communication, irrigation water delivery and agriculture
- globalised markets for agricultural produce
- floods and fires
- a global pandemic.

Over the years the focus has broadened from salinity to include water quality, biodiversity, waterway management, environmental water, water availability, climate change, and community resilience.

Government investment in action has been made locally relevant by connecting scientists, farmers, bureaucrats, indigenous groups, politicians, and other land managers at all scales.

The Plan has been underpinned by great science.

Local focus and broader influence

Our region is known internationally for its leadership in natural resource management (Northage, 2014, p. 191).

Legislation that created Victoria's catchment management authorities in 1997 built on many Goulburn Broken Catchment and Shepparton Irrigation Region experiences.

SIRPPIC reports to the Board of the GBCMA.

Key partnerships became easier to nurture when thirteen municipalities were amalgamated to become three in 1994, and when the Lower Goulburn Waterway Management Authority became part of the GBCMA on its 1997 inception.

Further information: one-page timeline table from 1985 to 2020 (The adapting plan in 30 years done! (GBCMA, 2021j, p. 7).

Onground achievements

The process of summarising history in 2021 provided the community with cause to reflect, celebrate and explain the achievements of thousands of individuals and hundreds of groups over 30 years.

More than 330,000 hectares of onground actions have been implemented through 7,057 incentives over the 30 years, including installation of irrigation drains, water reuse systems and native vegetation works. This helped protect our natural resource base while generating significant benefits, with government investment of $650 million. Farmers and the community have also contributed $2 billion.

Further information: one-page list of achievements from 1990 to 2020 (30 years of joint action: the numbers in 30 years done! (GBCMA, 2021j, p. 4).

Legislative and policy context

The SIRLWMP helps implement legislation and policies at local to global scales.

Goulburn Broken Regional Catchment Strategy

Under Victoria's *Catchment and Land Protection Action 1994* (Victorian Government, 2022)(section 12), each Victorian CMA must prepare a regional catchment strategy and coordinate and monitor its implementation.

The Goulburn Broken Regional Catchment Strategy (RCS) (GBCMA, 2022b) is a vision for integrated management of natural resources in the catchment. The purpose of the RCS is to guide actions to improve and protect land, water, biodiversity and community. It is the overarching strategy for directing implementation through sub-strategies and action plans, in accordance with government and community priorities.

The RCS was informed by discussion stimulated by an insights paper (GBCMA, 2020c) that included catchment values and perspectives, drivers of change, catchment profile (environment, social and economic), local landscape changes, indicators of change, and sustainability dilemmas.

SIRLWMP scope

The SIRLWMP (GBCMA, 2016a) is an RCS sub-strategy, encompassing the RCS's Agricultural Floodplains local area as well as part of the North Central Catchment (in the west of the SIR). Progress is recorded in GBCMA's annual report (under Sustainable irrigation) (GBCMA, 2022a, p. 75).

SIRPPIC agreed that the resilience approach used in the SIRLWMP (GBCMA, 2016a, p. 3) would be built upon as part of the next renewal.

Goulburn Murray (Irrigation District) Resilience Strategy 2020

The Goulburn Murray Resilience Strategy (Goulburn Regional Partnership, 2020, p. 11) identifies resilience principles and five intervention streams:

- Futures of agriculture
- Learning for change
- Circular economy
- Natural and built assets
- Leadership and coordination.

Many of the same partners and people are involved in developing and implementing both the Strategy and the SIRLWMP, ensuring that overlaps create efficiencies rather than duplication.

The Strategy also provides much of the broad community context for SIRLWMP's environmental management.

A Regional Resilience Taskforce is implementing the Strategy's actions (Regional Development Victoria, 2021). Taskforce partners are:

- Community (nine representatives)
- Goulburn Regional Partnership
- Mallee Regional Partnership
- Murray River Group of Councils
- Fairley Community Leadership
- Committee for Echuca Moama
- Committee for Greater Shepparton
- Greater Shepparton City Council
- GBCMA
- NCCMA
- GMW
- DEECA
- Regional Development Victoria
- National Emergency Management Agency (Australia)

Further information:

YouTube (30 minutes) overview of the Goulburn Murray Resilience Strategy (Goulburn Regional Partnership, 2022)

Water is Life

Water is Life, released in 2022, provides a framework to balance Traditional Owner self-determination in water access and management, and the rights and entitlements of a range of stakeholders (DELWP, 2022).

The Victorian Government will work with the water sector, existing entitlement holders, Traditional Owners and the broader community to adaptively implement Water is Life actions.

Other legislation and policy

A timeline of water resource management in the Murray-Darling Basin is here (MDBA, n.d.).

Pertinent other local, regional, national and international policies and legislation that impact on the RCS and therefore the SIRLWMP are here.

Partners

The SIR's natural resources are influenced and managed by many individuals, communities and organisations: parties other than the Goulburn Broken CMA do most of the work to achieve the SIRLWMP vision. Enduring partnerships have been pivotal in adaptively addressing rapid technological, social, economic and environmental changes. Strong partner relationships are therefore critical in agreeing on actions.

SIRPPIC monitors internal communication and engagement plan actions each meeting.

Partners engage with the SIRLWMP appropriate to their needs.

Further information:

30 years done! back page includes logos of key partners

SIRWLMP Part B (GBCMA, 2016b, p. 31)

Funding and benefits

Information derived from an internal GBCMA document (RMCG, 2021).

Government investment in the SIRLWMP for the 30 years since 1990 is estimated to be $665 million (expressed in 2020 dollars), while farmers and the community have contributed $2 billion.

The SIRWLMP's irrigation farm and drainage scheme benefits to costs ratio is estimated to be 1.11. This excludes significant, but less tangible, environmental and social benefits.

Questions for the community

Please consider and perhaps make notes and comments in the sheet provided (p. 5) to prepare for 23 February 2023 workshop:

1 What important documents or processes are missing (see also Resilience approach overview and References)?
2 What other SIRLWMP history or elements are missing that are important when considering future options?

3 Catchment condition

Summary
from GBCMA Annual Report (GBCMA, 2022a, p. 76)

The SIR's social-ecological systems are transforming: several key tipping points are breaching, creating uncertainty and significant human and environmental stress.

Over the past three decades, the SIR community has responded to challenges, created opportunities, and contributed more than its share to the broader Murray-Darling Basin objectives. The community has pioneered approaches to salinity management, water quality improvement action, water-sharing for all uses, biodiversity protection in a heavily populated landscape, and building stakeholder partnerships.

While it is proving difficult for government to maintain appropriate levels of support, the SIR's future remains in a diverse and productive agricultural system within a landscape where amenity usage is increasing.

A key challenge is to keep building capability to take advantage of strong regional networks, natural assets, existing regional and farm infrastructure and proximity to markets. Coronavirus (COVID-19) and 2019-20 fires and recent floods remind us we are part of nature and that food production must be environmentally sustainable

Since 1990, the SIRLWMP has evolved from focussing on salinity to a focus on several critical attributes. A **critical attribute** is one which:

- is critical to a system's identity and how it functions;
- has limits, range or distribution that are at or near threshold levels in terms of maintaining the system's identity and function; and
- can be influenced through intervention and is therefore a focus for shared decisions around socio-ecological system risks and opportunities.

Table 1. Resilience assessment (SIR); from GBCMA Annual Report 2021-22, p. 75

Critical attribute affecting long-term catchment health	Long-term (10+ years) risk to system thresholds / tipping point	
	Current support [i]	No support [i]
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i Support includes government funding and community (including individual) in-kind and financial investment for onground works and helping communities and individuals adapt.

ii Regional land salinisation and Murray River salinity impacts is reported under Watertables.

Question for the community

Please consider and perhaps make notes and comments in the sheet provided (p. 5) to prepare for 23 February 2023 workshop:

3 Please consider the ratings in the above table AFTER reading through the narratives on the following pages. *For each critical attribute, what ratings or parts of the narrative need to be changed?*

Water availability

Most of the Goulburn Broken Catchment's water flows through the SIR. The Catchment generates 11 per cent of Murray-Darling Basin water (CSIRO, 2008).

Extended dry sequences linked to climate change are reducing storage inflows (DELWP, 2021a), while water demand has escalated to meet environmental requirements and the world's increasing food demands (Fakhrul Islam & Karim, 2020). Water is also being transferred out of the SIR (DELWP, 2021b) to other parts of the system as Murray-Darling Basin water users and communities adjust to a different water future. Inter-valley transfers of water to help meet downstream demand, such as from the Goulburn to the Victorian, New South Wales or South Australian Murray systems, have caused high unseasonal flows, impacting on streambank stability along the River Murray and lower Goulburn River. (Horne, et al., 2020).

a Water availability for the environment

Many of the SIR's rivers, streams and floodplain wetlands are internationally significant (MDBA, 2010), including the Ramsar-listed Barmah Forest (DELWP, 2021c).

Water began being stored and deployed specifically for the SIR's environment in the early 1990s[1]. There was mixed success in those pioneering years because the small volumes of water delivered for the environment also relied heavily on natural flooding to meet objectives, such as getting waterbirds to nest and raise their young through to the fledgling stage[2].

The 6619 gigalitres of water delivered for the environment since the early 1990s has targeted diverse objectives and sites such as: public land biodiversity of the Barmah-Millewa Forest floodplain, Kinnairds Wetland near Numurkah and Reedy Swamp near Shepparton; private land biodiversity of Brays Swamp near Kyabram; and water quality of the Goulburn River and Broken Creek (GBCMA, 2021a)[3].

More water has been made available for the environment by reducing losses in storage and delivery as well as purchase of water from irrigators (GBCMA, 2016a, p. 18). In recent years, a marked increase in water delivered for the environment (Figure 2 below) has reduced environmental risks, sometimes significantly.

See also Streamflows and wetland inundation in the Waterways section of the GBCMA Annual Report (GBCMA, 2022a, p. 40).

b Water availability for agriculture

SIR prosperity depends on water deliveries for irrigated agriculture (Agriculture Victoria, 2020). Deliveries have declined significantly (Figure 2 below).

Downstream of the SIR, large horticultural enterprises continue to increase water-use for new permanent plantations and maturing trees. In drier years, horticultural enterprises usually outbid dairying and others for water, resulting in significant net trade of water downstream (RMCG, 2019)[4].

However, the SIR remains attractive for investment in water-use and irrigation development when low long-term costs are factored in, such as transporting goods to market and water delivery losses (Goulburn Regional Partnership, 2020, p. 7)[5]. Since 1990, irrigators have invested $2 billion in farm works (RMCG, 2021)[6] and have increased production[7] while using less water (Figure 2 below). They continue investing and innovating to adapt to reduced water availability and other changes.

Plan incentives for 4456 whole farm plans have translated into large-scale changes, such as laser levelling and installation of 3556 irrigation reuse systems, creating water-use efficiencies across 326,092 hectares (GBCMA, 2021a)[3].

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[1] Keith Ward (GBCMA) email 4 January 2021: *The first use of the Barmah-Millewa EWA was in 1998 where 97GL was delivered to Barmah and Millewa forests (paper appended). Prior to then, small amounts from the Vic Flora & Fauna EWA was delivered to Boals Deadwoods (early 1990s) but I don't have records for those. They would have amounted to only a couple of thousand ML for ibis nesting.*

[2] Keith Ward (GBCMA) email 5 May 2021

[3] Unpublished internal. Some data in annual reports.

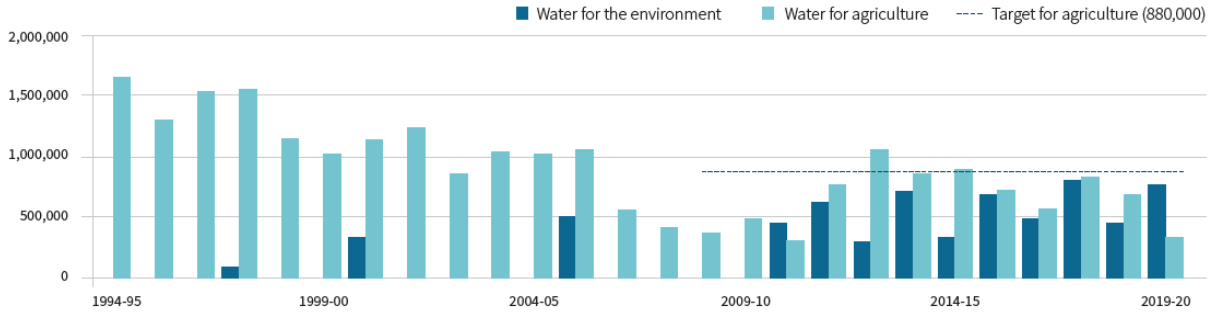
[4] Unpublished internal. Goulburn to Murray trade review interim operating rules sheet is a useful extra reference (DELWP, 2021e).

[5] Greater Shepparton City Council and Regional Development Victoria have documents with these types of data. (Megan McFarlane September 2021)

[6] Unpublished internal.

[7] Unpublished. Reference being confirmed. (Rod McLennan September 2021)

Figure 2. Water delivered for the environment* and agriculture in the SIR, megalitres[3]



**Includes the New South Wales part of the Barmah-Millewa Forest*

Water quality

SIR surface water is naturally of good quality and is generally suitable for various human and environmental uses (GBCMA, 2019a)[8]. Water quality has also improved significantly since 1990 (GBCMA, 2020a, pp. 12-13). The Plan focuses on keeping water quality within defined thresholds for three categories:

- salinity in the River Murray
- nutrient loads
- other water quality issues.

SIR salt loads entering the River Murray from the SIR are minimal compared to contributions by downstream irrigation regions[9]. The SIR also contributes significantly less salt than its allocated limit (DELWP, 2019).

The Plan balances farm salinity and productivity with removal of salt from the landscape for disposal (Goulburn Broken Region Salinity Pilot Program Advisory Council, 1989) (GBCMA, 2016a, p. 15). Saline groundwater and irrigation channel and drain flows are disposed of through tight operational procedures (GMW & GBCMA, 2021)[10].

Counterintuitively though, the reduction in relatively fresh water from the SIR through more efficient use of water impacts on the measured salinity at Morgan in South Australia, increasing the theoretical usage of salinity (EC) credits (DELWP, 2021f).

Since 1990, SIR salt loads have notably declined (Jacobs, 2018)[11]: a drier climate and large-scale water-use efficiency projects have significantly reduced water flows and associated salt in SIR channels and drains that outfall into the River Murray. The Goulburn Broken Water Quality Strategy (Goulburn Broken River Environment and Water Quality Committee, 1997), implemented between 1996 and 2016, reduced nutrient loads and therefore blue-green algae blooms.

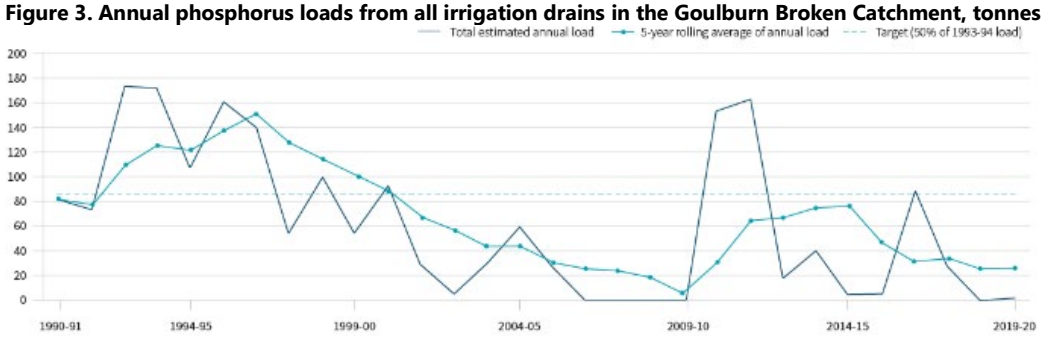
As for salt, nutrient loads have also been reduced by the decline in water volumes outfalling into streams from channels and drains (GMW, 2019)[12]. As well as a drier climate, actions directly implemented under the Plan or influenced by the Plan have been major contributors to nutrient reduction.

Actions include farm reuse dams, diversion storages, improved dairy effluent management, reduced streamside grazing, upgraded water treatment plants, improved drain design, improved streamflow management, and improved streamside native vegetation[13].

The regularly reported five-year rolling average total phosphorus loads from both the overall Goulburn Broken Catchment and from irrigation drains (Figure 3 below) are below the long-term targets. Spikes in phosphorus loads are caused by significant rainfall events. Water quality strategy actions have helped to reduce the frequency and severity of these spikes in loads (GBCMA, 2017)[14].

Waterways are well within the Environment Protection Authority's thresholds for most other water quality issues, and a watching brief is mostly appropriate (mainly for sudden events and negative long-term trends).In the Goulburn River, regional agency partners are managing increasingly frequent blackwater events caused by upstream rainfall (GBCMA, 2018a)[15] (GBCMA, 2014, pp. 29, 55, 82, 91).

Figure 3. Annual phosphorus loads from all irrigation drains in the Goulburn Broken Catchment, tonnes per year



[8] Unpublished internal.

[9] Information is within several 5-year reviews completed by Mallee and North Central CMAs. (James Burkitt September 2021)

[10] Unpublished internal.

[11] Unpublished internal.

[12] Unpublished internal.

[13] Actions are described and listed in several GBCMA strategic plans.

[14] Unpublished internal.

[15] Unpublished internal.

Watertables

Saline watertables that are close to the land surface or that rise rapidly after a rainfall event can cause waterlogging and salinity, threatening agricultural and regional productivity as well as wetlands and streams locally and hundreds of kilometres downstream (Goulburn Broken Region Salinity Pilot Program Advisory Council, 1989) (GBCMA, 2012)[16].

Over the Plan's life, watertable risks have reduced because of lower accessions (less water added to the watertable) and improved management when watertables are high or rising. Watertable accessions have reduced because of:

- water-use efficiencies on farms from major, widely adopted improvements (GBCMA, 2019b) (GMW, 2018) (GMW, 2020)
- water-use efficiencies in the regional irrigation delivery system from a major upgrade (GMW, 2018)
- better surface water drainage systems (GBCMA, NCCMA and GMW, 2015)
- less rainfall directly on wet land (GBCMA, NCCMA and GMW, 2015) due to a drying and changing climate[17]
- less water being available to irrigate Figure 2 p. 13.

Improved management of high or rising watertables includes a stronger focus on protecting the rootzone within the soil profile. This has resulted in greater tailoring of solutions and targeting of areas rather than broadscale, heavily engineered approaches. The solutions are also less costly, adaptive, and integrate better with farm, local and regional needs (AECOM, 2018)[18].

Goulburn Broken CMA and Goulburn-Murray Water jointly manage drainage to support agriculture and the environment. Drainage management is tailored to meet varying risks across the SIR's 460,000 hectares of irrigable land, and it remains a high priority in sub-catchments covering 103,000 hectares (GBCMA, NCCMA and GMW, 2015, p. 6).

Surface drainage and groundwater pumping buffer and manage watertable accessions resulting from intense rainfall events, which tend to be localised, random and increasingly occur in summer[19].

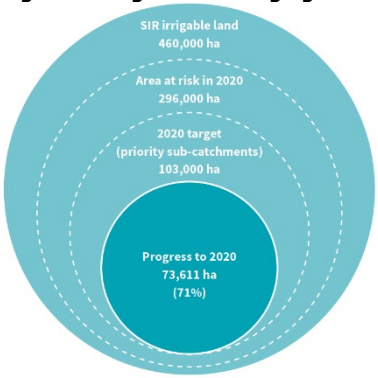
Hybrid drainage systems developed and implemented through the Plan avoid the need for large, excavated drains and involve removal of obstructions within natural flow paths to restore flow patterns (GBCMA, NCCMA and GMW, 2015).

Works achieved through the Plan include: 737 kilometres of drains built, 3567 irrigation reuse systems installed, 356 groundwater pumps installed, and 330,801 hectares of land laser levelled (GBCMA, 2021a)[20].

Drier conditions in 2018 and 2019 resulted in further contraction in land areas with high watertables. In 1988, the SIR had 188,000 hectares (more than one-third) with watertables within two metres of the surface (one indicator of 'high' and being 'at risk') (Northage, 2014, p. 20). In 2020, this area had reduced to just 15,000 hectares, although it is prone to change: rainfall on a wet catchment is now known to cause both rapidly rising shallow watertables and the re-emergence of related threats, as happened in the wetter years of 2011 and 2016 (GMW, 2018)[21].

In 2020, 296,000 hectares of the SIR remain 'at risk' in the long-term from waterlogging and salinity.

Figure 4. Progress in managing SIR salinity impacts



[16] Carl Walters searching for possibility of more recent reference than this version. (Rod McLennan 2021)

[17] Numerous references (such as from Bureau of Meteorology) are available to confirm the climate trend. (James Burkitt September 2021)

[18] Unpublished internal.

[19] Pers. comm. James Burkitt 3 May 2021

[20] Unpublished internal.

[21] Unpublished internal.

Native vegetation extent

The loss of flora and fauna species impacts on the natural environment and our long-term productive capacity and quality of life.

During the twentieth century, the whole SIR system in terms of native vegetation habitat tipped and many species became extinct following widespread clearing for agriculture. More than 97 per cent of plains grassy woodland on private land was cleared (GBCMA, 2003, p. 48)[22].

Remaining native vegetation on private land is largely fragmented and often lacks the shrubs, ground layer, fallen logs and other habitat elements for hosting diverse flora and fauna[23].

Fortunately, the SIR has significant public land reserves with native vegetation, including:

- the river red gum-dominated, Ramsar-listed, 28,521-hectare (GBCMA, 2012) Barmah National Park (Abel, et al., 2006)
- corridors along waterways such as the Broken-Boosey State Park and the 9310-hectare (MDBA, 2015) Lower Goulburn National Park
- corridors along roadsides.

Since 1990, native vegetation in these reserves has benefited from a general decline in grazing pressure thanks to initiatives such as private-public boundary land fencing programs and changed Crown frontage licence conditions.

Significant habitat benefits have also been gained on public and private land since 1990 by integrating native vegetation into complementary Plan activities, including:

- drain design (GBCMA, 2018b)[24]
- whole farm plan design (Sinclair Knight Merz, 2003)[25]
- water for the environment flows (GBCMA, 2020a, p. 46), especially for streambank vegetation and specific wetlands (GBCMA, 2021h) (GBCMA, 2018c).

Through the Plan, management plans have been developed and implemented for many significant wetlands, such as Reedy, Doctors, Brays and Black Swamps, and for smaller reserves with native vegetation.

There are many examples of increased native vegetation extent along roadsides, waterways and on private land (GBCMA, 2015a) (GBCMA, 2015b).

However, despite achieving high levels of stock management, revegetation and other native vegetation improvements through the Plan and other means (GBCMA, 2015d)[26], the scale of change is not enough to ensure long-term survival of all native species (Radford, Bennett, & MacRaid, 2004).

Many species are at very high risk now (GBCMA, 2020b) (DELWP, 2021d) and the system is at very high risk of tipping into a further undesired state.

Clearing (particularly of paddock trees), invasive plants and animals, fire management and climate change continue to degrade native vegetation. Grazing, recreation and inappropriate watering regimes are also impacting on native vegetation quality on both public and private land (GBCMA, 2020b)[27].

'Focus landscapes' are small habitat sub-systems within the SIR with the most potential for significant habitat to be protected, restored, and connected. Targeting works in these landscapes increases native vegetation extent, improves connectivity and provides many species with a bridge to the future.

Native vegetation extent increased by 332 hectares across the nine focus landscapes of the SIR in 2021-22, which is 15.8 per cent of the 2100-hectare cumulative target by 2021-22. This brings the total native vegetation extent increase to 1053 hectares in the SIR since 2014-15. This is 23.4 per cent of the 2030 target of 4,500 hectares, placing us well behind schedule Figure 5 (GBCMA, 2022a, p. 80).

[22] Data can vary depending on methodology, although all results indicate a similar amount of clearing. (Rod McLennan September 2021)

[23] Data is available and can be sourced if needed. (Rebecca Caldwell September 2021)

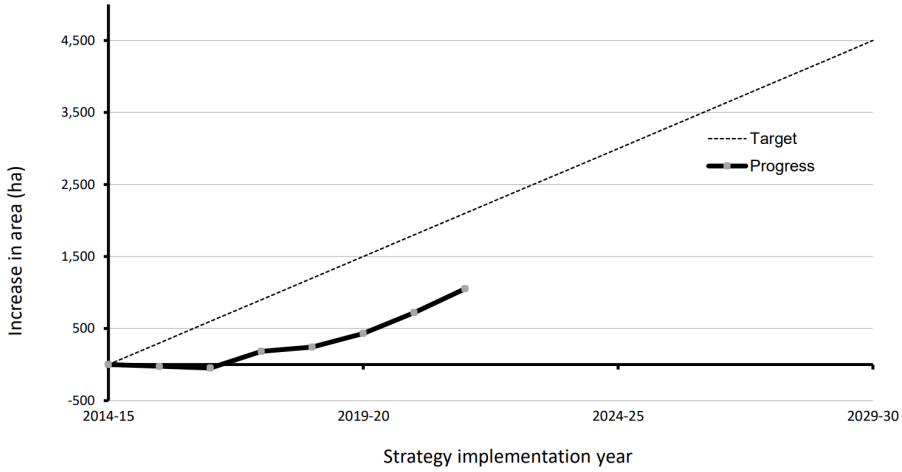
[24] c. 1992 guidelines were prepared by Nick Pangalo (RWC now GMW) and extension-style sheet by Rod McLennan (DELWP's predecessor) (Rod McLennan October 2021)

[25] Extension sheet for including environmental features in whole farm plans was prepared in early-mid 1990s (Rod McLennan October 2021)

[26] GBCMA annual reports have tables and internal Excel workbook record data ((GBCMA, 2021i). (Rod McLennan September 2021)

[27] Also Environment Programs section of CMA website (GBCMA, 2021g) and (GBCMA, 2016a) (Rebecca Caldwell September 2021)

Figure 5. Change in native vegetation extent across nine focus landscapes in SIR, hectares[i]



i. This graph illustrates the SIR data, a subset of the Catchment-wide biodiversity data. (GBCMA, 2022a)

Farm and regional viability

Since 1990, farmers have faced a changing climate, variable domestic and world markets, and increasing costs of land, irrigation water, nutrients, energy and technology.

SIR farmers and irrigation-dependent industries have responded by continually innovating and diversifying

Agricultural production has increased significantly[28] (Murray Dairy, 2021) while using less water Figure 2 p. 13) and impacting less on the landscape[29].

Since the start of Plan implementation, farmers have been supported to upgrade irrigation infrastructure and improve water-use efficiency (GBCMA, 2019b). Between 2008 and 2020, a $2 billion state-of-the-art irrigation delivery system was installed (the Connections Project) (GMW, 2020). It has been complemented by world-class farm infrastructure and management (GMW, 2018).

Demands for advice on energy efficiency and soil moisture monitoring have grown in response to increased energy and water costs. Through Plan support, irrigators have assessed energy needs and have installed soil moisture monitoring equipment to better understand crop water requirements (GBCMA, 2020a, p. 72).

Indigenous participation in agriculture and natural resource management has increased through indigenous ownership of farmland, supported by SIRPPIC's involvement in the Tri-State Alliance (GBCMA, n.d.).

Plan initiatives are helping make the most of the SIR's natural advantages of sunshine, soils and a flat landscape, rainfall, readily available water and proximity to markets.

In 2017-18, the gross value of agricultural production in the Shepparton region was $1.9 billion (13 per cent of Victoria's $15 billion) (ABS 2019) (ABARES, 2021).[30]

As a result of the Plan, people came to realise there were spin-off productivity benefits while protecting the natural resource base.

However, farmers and communities continually grapple with questions around how to adapt and thrive in the face of rapid changes, including a future with even less water. Continued government incentives and extension services are still needed to help farmers and the community know when to persist with current approaches and when to adapt or transform.

As farm systems and irrigation-dependent industries transform, many localities experience uncertainty and stress. This threatens both the social fabric that enables communities to cohesively adapt and the viability of farm enterprises that allows them to invest in change and the environment. Small family farms that dominated the land-ownership mix in 1990 are being increasingly replaced by larger enterprises. (Goulburn Regional Partnership, 2020, p. 7) (LG Valuation Services & HMC Valuers, 2010)[31]. This forces adaptation of approaches in engaging people in the Plan (Goulburn Regional Partnership, 2020, pp. 26-28).

Awareness of the benefits of living in areas like the SIR has grown during the COVID-19 pandemic. This will create significant opportunities and challenges for our agricultural systems, environment and communities.

[28] Production figure trends depend on timeframe covered. (Megan McFarlane October 2021)

[29] The agricultural landscape is becoming more of a mosaic, with significantly more areas of low intensity agriculture, including opportunistic irrigation, while some small areas are becoming more intensive. Farm practices are also generally less impacting. (Carl Walters September 2021)

[30] Figures had been updated to 2018-19 after printing of 30 years done! and 2017-18 figures were not readily available. However, the value again was $1.9 billion in 2018-19, although Shepparton's was now 12 per cent of Victoria's $15.9 billion.

[31] Draft unpublished land and water use mapping will be referenced when available (expected soon). (Rebecca Caldwell September 2021)

Table 2. A snapshot of current condition and trends for the critical attributes of the Agricultural Floodplains

From RCS current condition dropdown link (GBCMA, 2022b)

Critical attribute	Description	Current condition*	Trend**
Water availability	Volume, reliability, and security of regulated supply are key issues. Overland flows are not occurring naturally. Rainfall is critical for the area. There is a highly competitive water market. Reliable and affordable modernised irrigated water supply and systems exist. Environmental water, floodplain health, waterway management and cultural heritage are key issues.	For the environment – good to fair condition. Irrigated agriculture – poor condition. Ability to absorb, respond, recover and renew – poor condition.	Adaptation and transformation phase.
Water quality	Nutrients, salinity, blue green algae and hypoxia events are key issues. Clean water for consumption is a necessity. Drains, groundwater, rivers, streams, dams, lakes and wetlands are critical assets.	Mature water quality programs – good to fair condition. Ability to absorb, respond, recover and renew – fair condition.	Persistence phase.
Water tables	Shallow ground water aquifers are managed. Deep lead aquifers are managed. Public and private groundwater management infrastructure exists. Without intervention, salinity and waterlogging will be risks on irrigated areas following rainfall.	Mature groundwater management infrastructure – good condition. Ability to absorb, respond, recover and renew – good condition.	Persistence phase.
Native vegetation extent	Native vegetation exists on farms, such as paddock trees, along roadsides, streams and riparian areas. Includes terrestrial, wetlands and waterways vegetation, such as scattered remnants and paddock trees. Management is needed for native vegetation, targeting extent, and associated ecosystems against threatening processes such as direct removal and climate change.	Native vegetation – poor condition. Ability to absorb, respond or recover and renew – limited.	Transformation phase.
Farm and regional viability	Predominantly dairy, horticulture and cropping. Agriculture related food processing, other industries and manufacturing exist. Climate change, land health and associated issues are impacting farm and regional viability.	Comparative advantage of the region – poor condition. Ability to absorb, respond, recover and renew – under significant pressure.	Adaptation and transformation phase.

* Where appropriate, the current condition includes the capacity the attribute has to anticipate, absorb, respond, recover, and renew from short and long-term drivers of change.

** The trend refers to resilience phase and/or type of change the critical attribute is experiencing generally, such as persistence, adaptation or transformation.

Questions for the community

Please consider and perhaps make notes and comments in the sheet provided (p. 5) to prepare for 23 February 2023 workshop:

4 Are critical attributes a useful way to consider the strategic context?

5 Which critical attributes might no longer be seen as critical, but might be considered more like business-as-usual?

6 Which attributes might need to be elevated (or tweaked) and considered critical??

4 Resilience approach overview

There are many ways to gain strategic perspectives to make better decisions. During the 1990s, the Goulburn Broken regional community became widely recognised for using a collaborative systems approach to solve NRM challenges.

With significant philanthropic and academic support, GBCMA continually evolved its approach using a 'resilience lens'. A formal resilience approach was used to guide renewal of the SIRLWMP 2016-2020 (GBCMA, 2016a) and the RCS 2021-27 (GBCMA, 2022b).

Resilience approach concepts

The SIRLWMP renewal in 2023 will again be guided by a resilience approach.

What is resilience?

Derived from RCS webpage (GBCMA, 2022b)

Resilience is the capacity of a system 'to absorb a shock or setback and to flourish in spite of it, maybe even because of it' (Outback, Apr/May 2017). It is the capacity to cope with change and continue to evolve positively.

Consistent systems of people and nature are called **social-ecological systems** and exist at a range of connected scales, from farm to local area to whole-of-catchment.

Applying resilience requires an understanding of how a system's resilience changes over time, what causes change and where and how to intervene to influence future direction.

Resilience concepts listed below are described in detail in Wayfinder (Enfors-Kautsky, Järnberg, Quinlan, & Ryan, 2018), the RCS (GBCMA, 2022b) and its associated resilience fact sheet (GBCMA, n.d.)

Identity and values

A shared understanding of the identity of the SIR social-ecological system, including aspirations and sustainability challenges, has been continually updated over more than 30 years.

The SIRLWMP 2016-2020 described these (pp 6-13) under the headings:
– The region's natural advantage
– Challenges, changes and progress
– The 2020 Vision.

The RCS has also described the Agricultural Floodplains under four themes (Key features dropdown) of Biodiversity, Community, Land, and Water.

Drivers of change

The resilience approach recognises the importance of identifying drivers of change and planning how to adapt to risks and opportunities.

Four major drivers of change were identified through community engagement and a socio-economic analysis as part of RCS renewal (Barr, 2018, p. 21): climate change; changing land use; increasing number and extent of pest plants and animals; and diverse and changing community attitudes. The impacts of these drivers on the Agricultural Floodplains (SIR) are described in the RCS (Drivers of change dropdown).

Tipping points

Tipping points of significant change are important to know when making decisions. Tipping points for the SIR's critical attributes are documented (via dropdown link).

Responding to change

How a system, or the components of a system, respond to change (via dropdown link) varies depending on the system's capacity to: persist, adapt, adapt while preparing to transform, and transform.
A summary of the condition of critical attributes and trends (in terms of the above responses) are included in this context document (Table 2 p19).

Multiple future pathways

There are multiple future pathways (dropdown link). Which one plays out depends on future drivers and our management actions. The important thing is for the future pathway to not cross critical tipping points if they breach unsafe planetary boundaries or undermine human rights.

Resilience principles

Eight resilience principles (details in dropdown link) describe the characteristics of systems that demonstrate resilience. They must underpin any interventions taken to build resilience within a system:

1 Develop a 'complexity' view of the world
2 Plan for change
3 Foster cohesion, self-organisation and local responsibility
4 Design for flexibility
5 Manage connectivity
6 Value, retain and build diversity
7 Focus on slow variables, leverage points and tipping points, and
8 Learn for change.

Community visions and outcomes

From SIRLWMP (GBCMA, 2016a, p. 2).

Vision and purpose

The Shepparton Irrigation Region community leads Australia in producing food in harmony with the environment.

The purpose of the plan is to support and grow the natural base that is vital for agriculture, biodiversity and people to jointly flourish. The purpose will be achieved by realising long-term goals for five critical regional attributes: water availability, water quality, watertables, native vegetation extent, and farm and food processor viability.

Goulburn Broken RCS Agricultural Floodplains

From RCS (dropdown link).

Vision

The Agricultural Floodplains community leads Australia in producing food in harmony with the environment.

Outcomes

1 Agriculture is adapting to change, ensuring farm and regional viability, water and native vegetation critical attributes remain below tipping points.
2 Shallow water tables are managed so at-risk soil zones are not salinised or waterlogged.
3 Water is available to match the needs of the environment, agriculture and social consumption.
4 Water quality is maintained or improved for a range of beneficial uses.
5 The extent and health of native vegetation is increased.
6 The community is cohesive, connected and collaborative.

Goulburn Murray Resilience Strategy

From Goulburn Murray Resilience Strategy (dropdown link) (Goulburn Regional Partnership, 2020, p. 4).

Vision

Thriving in the face of change.

Regardless of future change, communities across the Goulburn Murray region wish to live in a place with the following characteristics:
Together: A region that has pride, wellbeing, cohesion and a spirit of resilience and ingenuity.

Attractive: A region with desirable places to live, work and invest. With protected and healthy biodiversity, waterways and landscapes.

Prosperous: A region with diverse industry, where agriculture continues to be an important part of the economy, supporting a range of primary, secondary and tertiary operations diverse in size, type and ownership.

Water is Life

From Water is Life fact sheet (DELWP, 2022)

Consistent with the principle of self-determination, each proposed action does not mandate specific pathways for every Traditional Owner and will enable each Traditional Owner group to determine whether and how to participate in each process.

Time horizons and pathway actions

There are three decision-making timeframes when developing and implementing the SIRLWMP:

From RCS (evaluation and adaptation)

Timeframe	Focus
Long (20+ years)	Vision Scope Long-term outcomes
Medium (6 years)	Medium-term outcomes Strategic directions Priority actions
Short (annual)	Strategic directions Priority actions Emergence of changes in drivers or trends. Continuous improvement.

Priority actions

Priority actions (dropdown link) (GBCMA, 2022b) for the Agricultural Floodplains have been identified for each of the six outcomes. They provide ideas and options for the future, rather than fixed work plans. The actions must evolve as the catchment changes and new information becomes available.

Priority actions for the outcomes can be categorised according to the three horizons framework (Petchey, n.d.), which helps people to think and plan for the long term rather than being stuck in the here and now:

Established actions, which are those currently happening that we would like to continue. They include business as usual, recognised and existing practices. These are actions that are widespread and well-understood.

Pathway actions, which are innovations that help shift from the current situation to an ideal future. For example, experiments, bridging or transition actions that take place during the transition from established to transforming actions.

Transforming actions, which are the way things could work in the future. For example, the new normal, visionary ideas and new ways of doing things to create change. There may be pockets of these already happening.

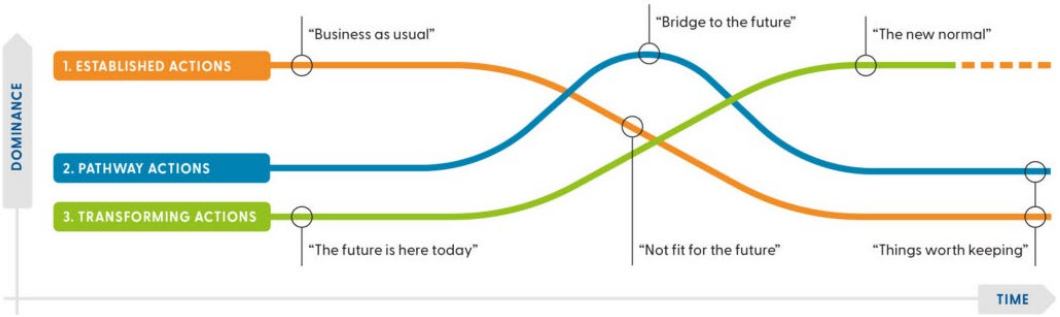


Figure 6. The dominance of different actions over time

Questions for the community

Please consider and perhaps make notes and comments in the sheet provided (p. 5) to prepare for 23 February 2023 workshop:

7 Given the SIRLWMP scope, what needs to be considered in a description of the SIR's identity and values?
8 What broad, high-level drivers of change need to be considered?
9 What potential opportunities for alignment in values from different sectors are there?
10 What potential conflicts in values from different sectors are there? (What strategic dilemmas need to be considered?)
11 What fundamental or transformational changes in approach to managing the SIR are needed?

5 Challenges and what's next

General directions derived from 30 years done! (GBCMA, 2021j, p. 30)

Ongoing changes in climate, water availability, farm production systems, markets, technologies and social structures and expectations force us to grow the region's resilience so that we can continue to thrive. Natural resources are fundamental to this resilience.

We must continue harnessing the power of information technology to increase participation in the development of knowledge. This will expand our collaborative approach and help us create responsive and relevant solutions.

Central to updating the Plan will be to:

- adapt our processes to fully engage our increasingly diverse landowners, which will help reinforce community and partner agency trust and reinvigorate SIRPPIC's role as a fearless and respected community voice
- advocate the benefits of SIRPPIC's role in providing high-level policy advice and in directly influencing government policy and priorities
- recognise what other changes in approach are needed so that we either persist with existing approaches, adapt them, or fundamentally transform them
- identify the new opportunities and design a way of capturing these for our region.

The Sustainable irrigation annual report 2021-22 (GBCMA, 2022a, pp. 86-87) lists more specific directions under the headings:

- Communities and partnerships
- Water availability
- Water tables and water quality
- Native vegetation extent
- Farm and regional viability

Glossary (hyperlinked)

Critical attribute

Resilience

Social-ecological system

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