



Agriculture Industry Snapshot for Planning Murray Sub Region

August 2020

The value of agricultural production in the Murray Sub Region was over \$1,090m (ABS 2015/16) from a range of broadacre cereal crops, beef, sheep (wool, mutton and lambs), milk, pigs, fruit, grapes and nuts. The wider Riverina Murray Region supplies nearly 100% of Australian rice and is the third largest sheep producing region in NSW. Key constraints for agricultural production include access to water (surface and ground), changing climate, and non agricultural land uses on rural zoned lands. Intensive agriculture and value-adding industries may have to deal with some land use conflicts and meeting planning requirements. Despite these challenges, there is potential to grow and support agriculture, important given the expected population growth within both NSW and Victoria and proximity to Melbourne.

Purpose of this profile

To develop effective land use planning policy for agricultural industries it is important to understand their location, the reasons why they exist in that location, the opportunities they take advantage of and the challenges they face. This profile details the key agricultural industries in the Murray and their interactions with suppliers, processing facilities and markets.

Identifying the significance of agriculture allows its recognition and management in land use planning by Councils. By providing the evidence base for strategic planning, agricultural land and local agriculturally-based economies can be protected and supported in planning instruments.

In the Murray, agricultural industries operate in an environment of increasingly global competition and opportunities, external challenges and changing land use. This profile will inform local council strategic planning for these key agricultural industries considering their linkages to infrastructure and secondary industries throughout Southern NSW. Land use planning is guided by the Riverina Murray Regional Plan 2036 (2017). The Regional Plan has clear directions for the need to identify, protect and appropriately capitalise on its agricultural industries, infrastructure and rural land.

Agriculture in the Murray Sub Region

Agriculture is a key industry in the Murray, both economically and for the unique scenic and environmental qualities of the rural lands.

There is a rich diversity of agricultural commodities and highly innovative in the processing and development of food and beverage products. The area is particularly important for broadacre crops, pigs, beef, dairy and wool production.

The Murray is 34,732 km² in area and includes Albury, Berrigan, Edward River, Federation, Greater Hume and Murray River LGAs, and is home to approximately 102,697 people (ABS 2015/16).

The Murray makes a significant contribution to agricultural production in NSW. The following table shows the Gross Value of Production (GVP) and percentage share of agricultural output for the Riverina Murray Region and NSW for each of the top industries. These industries alone account for 87% of all agriculture in the Murray.

Industry	Gross Value of Production (\$)	% share of Murray total	Number of businesses	% share of NSW
Broadacre cropping	\$455m	12	1,048	9
Beef	\$165m	4	856	6
Pigs	\$117m	3	46	55
Dairy	\$86m	2	91	14
Wool	\$81m	2	1,046*	9
All other agriculture	\$186m			7
TOTAL	\$1,090m			8

Source: ABS 2015/16 (Note: some businesses cover multiple industries, * includes wool and sheep meat).

Broadacre cropping of cereals is the dominant industry in terms of GVP, contributing \$455m (ABS 2015/16), being 12% of the wider Riverina Murray total GVP and 9% of NSW GVP.

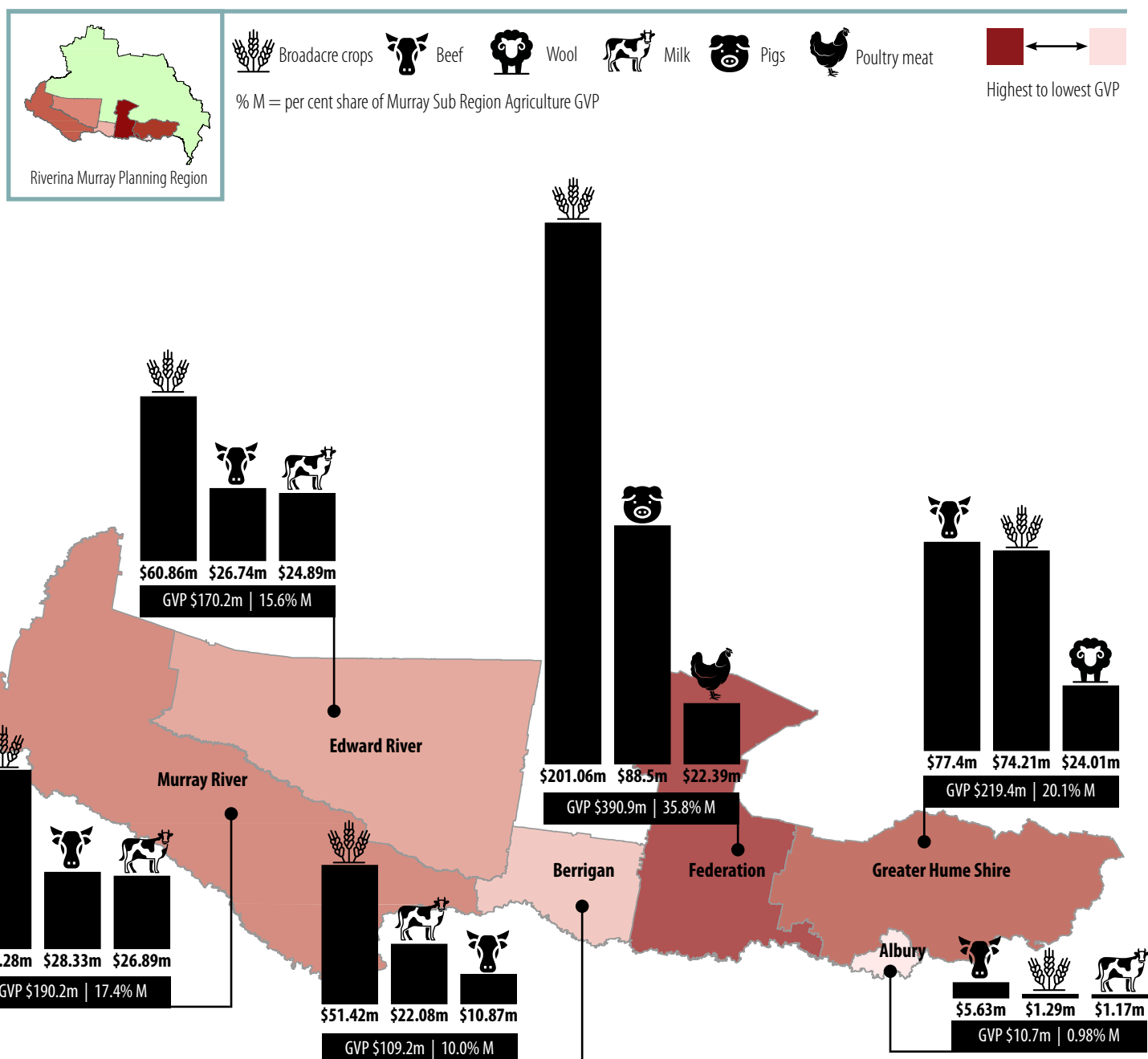
In the Murray, beef production has provided 15% of the Riverina Murray total GVP and 6% of NSW output. Production from pigs 55%, wool 14.9% and dairy 14% contribute significantly to NSW GVP. Irrigated agriculture including rice, horticulture and dairy are based on the Murray and Edwards rivers.

Employment

Agriculture employs over 3,958 people across the Murray (ABS 2015/16). The biggest employer is sheep, beef cattle and grain farming (62%) followed by the dairy (10%) and pork (7%) industries. The LGAs with the highest agriculture employment are the Greater Hume Shire (24%) and Murray River (23%). These are people linked to the primary production of agriculture and do not include the vast employment within the key secondary industries. It does not include employees that are hired on a seasonal base that were not working in the Murray during the ABS census collection time of the year.

Local government distribution

The following map shows the local government areas and agricultural GVP of the three leading industries for each. The biggest individual contribution is Federation Council with \$391m followed by the Greater Hume which contributed \$219m (ABS 2015/16).



Agricultural highlights of the Murray Sub Region

The Murray contains some of the most highly productive agricultural land of the Murray Darling Basin. The irrigation networks based on the Murray and Edward Rivers are fed from Hume Dam above Albury. The variety of landscapes supports a diverse range of agricultural industries that place a high value on the reliable water supplies. Dryland cropping, mixed farming and grazing systems support key agricultural enterprises such as broadacre cropping (cereal, oilseed and pulses), beef and sheep rangeland grazing, intensive pigs and poultry, and irrigation of dairy pastures, nuts, rice and maize. Growth in local irrigated horticulture and related manufacturing sectors is expected in response to growing global demand for more high-value agricultural food produce.

This section highlights the prominent industries in the Murray.



Broadacre crops

Irrigated summer cropping

Irrigated summer cropping, including cotton, rice, sorghum and maize, occurs primarily in irrigation areas, private irrigation districts and where irrigation (surface and groundwater) is available. Rice growing in Australia is concentrated in the Murrumbidgee and Murray valleys of southern New South Wales, due to large areas of flat land, suitable clay-based soils, and availability of water. Associated storage and milling infrastructure has been developed in or near the regional towns (eg Deniliquin). The rice industry has strict regulations in place to ensure the production of high quality rice has minimal impact on the environment. Once rice is harvested, the subsoil moisture remaining in the soil is used to grow other crops such as winter cereals.

Industry requirements

Irrigated cropping systems are based on access to reliable water supply through dedicated infrastructure as well as the physical environment of soil type, topography and climate. Historically the irrigation areas and districts of the Riverina Murray were developed from resumption of large holdings then subdivided into soldier settler blocks. With changes in technology and economies of scale these blocks require amalgamation to ensure future viability. A wide range of secondary industries are required to support the inputs and outputs of irrigated production.

Dryland winter cropping and hay

Dryland winter cropping includes cereals (wheat, barley, oats, triticale), oilseed (canola) and pulses (chickpeas, faba beans, lupins, lentils). Wheat, barley and canola are the major crops by value. Crops are grown in varying rotations depending on site characteristics, seasonal variations, disease control, market demand and production preferences. Hay is produced across all areas associated with the main broad-acre cropping areas.

Industry requirements

Dryland cropping systems have developed based the physical environment of soil type, climate and reliable rainfall. Current technology and economies of scale require large scale operations to remain viable. A wide range of secondary industries are required to support the inputs and outputs of broadacre crop production.



Livestock - meat and wool

Livestock production for red meat (cattle, sheep, lamb) and wool occurs as extensive outdoor grazing systems, with some feedlots for "finishing off". Although there are some large livestock operators, the majority of animals are produced on family farms. Livestock production is also part of mixed-farming enterprises, where the cropping of cereal, pulses and oil-seeds combined with the grazing of cattle and sheep (meat and wool) provide diversification and production flexibility. The intensity of stocking rate on (native) pasture based systems is usually rainfall based, and supplemented by access to water supplies and stock handling facilities. Increased stocking rates are achieved with improved pastures and or irrigation. The Murray is recognised as the 11th highest sheep producing region in Australia, identified as predominantly prime lamb producers (ref 2018).

Industry requirements

Livestock production requires unconstrained land with opportunity for producers to increase scale without risk of land use conflict. Pasture-based cattle and sheep production needs access to suitable land and water supply, and a range of infrastructure for livestock handling, husbandry, fodder production, storage and road access. Typically, livestock are managed in a system of rotational grazing, with paddocks recuperating after grazing. Some producers may operate more intensive lot feeding on farm, which will increase the amount of stock, feed and transport movements. Transporting stock and wool requires a reliable road system and access to Victoria. The Wodonga Northern Victoria Livestock Exchange is the largest Victorian saleyard complex servicing southern NSW, along with Echuca and Swan Hill. As with all farmers, producers manage plant and animal pests with a variety of methods.





Livestock - intensive/housed

Most pigs and poultry are produced under intensive indoor production systems, housed in large sheds. In the Murray there is a combination of ready access to grain supplies, level land at a reasonable price, secure water supply, separation distances from potential conflict interfaces, and good transport networks.

Pork production systems fall into three main categories:

- conventional intensively housed
- outdoor-bred
- free-range.

Approximately 90% of pig production is based on intensive systems. More than 70% of NSW pigs for slaughter are grown out in southern NSW. In the Murray there is a wide band of pig producers from Albury to Swan Hill along the Murray River and in the irrigation areas. Federation LGA has the largest contribution at \$88 million (2015/16). The Rivalea abattoir at Corowa is an export-licences abattoir that slaughters only Rivalea pigs. Rivalea produces approximately 18% of Australia's pork; 30% of which is exported. Other pigs are transported into Victoria for processing, particularly for export market.

In the Murray, poultry (meat/broiler) and egg production facilities can be found from Albury to Swan Hill along the Murray River and in irrigation areas. NSW chicken meat farms must comply with a range of regulations that are designed to protect the environment, including local amenity. Meat production is split into three phases/systems: breeding farms (producing fertile eggs), hatcheries (egg incubation, chick vaccination and grading) and production farms (growing out chicks to harvest).

Industry requirements

Intensive pig and poultry operations require large separation distances from sensitive receptors, reliable feed and water supplies, adequate drainage and manure disposal systems, and quality road access. Usually large areas of unfragmented rural zoned land are required for intensive operations to incorporate buffers to manage biosecurity, amenity, odour and noise. Legitimate agricultural activities may cause external emissions such as noise, dust and lightspill anytime over 24 hours including early mornings and late evenings, depending on the enterprise and should be protected by Right to Farm policies.



Dairy

Some dairy farms remain operating in the Murray Irrigation Area and along the Murray River, supplying dairy processors in Northern Victoria. Until recently these have been pasture-based systems relying on irrigation over the summer period. Dairying has been adversely affected by water allocations in recent times.

Industry requirements

Traditionally dairy operations have been pasture based. However, more controlled feeding arrangements are being developed which require additional shedding and other infrastructure. The industry is highly efficient, and requires transport infrastructure with quality roads and bridges that supports large tankers retrieving milk for processors.



Fruits, nuts and vegetables

There has been widespread establishment of almonds, pistachios and walnut orchards based on irrigation from the Murray River system. A range of fruits and vegetables are also grown in open paddock systems. Potatoes are produced in Murray River (\$5 million) and Berrigan LGAs (\$7 million) making up 5.7% of NSW GVP. There are also small areas of grape growing for wine production.

Industry requirements

Fruit and nut orchards require a reliable water supply for irrigation and good quality well-drained soils. Modern large-scale developments require seasonal workers for picking and, often, on farm processing. Quality, well maintained roads are required to transport the produce and labour. Legitimate horticultural activities are likely to cause noise, odours, dust, spray emissions, smoke, vibration and should be protected by right to farm policies.



Value chains

Primary production in the Murray supports a significant value chain including food processing and manufacturing, transport and logistics, professional services and farm suppliers. The value chain is concentrated in Albury and Deniliquin, although also locally significant in most other smaller population centres. Agribusiness in the Murray offers a comprehensive and diverse supply of support services and infrastructure required by agricultural industries, and specifically, irrigation water delivery companies and equipment suppliers.

Industry requirements

Other industries on the agricultural value chain also require efficient access to water, power and transport infrastructure. The interactions between agricultural industries and their secondary industries should be strategically considered at all levels of land use planning.



Murray Sub Regional assets for agriculture



Supporting industries and infrastructure

The Murray describes land along the Murray River from the South West Slopes to the Riverine Plains, with a variety of local climates and biophysical characteristics.

Agriculture is conducted on a wide range of soil types and under different rainfall regimes, including widespread irrigation from surface and ground water sources.

As an acknowledged premium agricultural area, farmers in the Murray lead the way in agricultural innovation, using advanced technologies to maximise diversification and output. Agriculture here supports a significant supply chain that provides marketing advantage for products trading on the 'clean and green' environment. These include industries involved in rice and grain milling, oil seed processing, animal produce and fibre processing, animal feed manufacturing, packing of raw fruits, nuts, vegetables and meats, and processing of dairy, wine and food products.

There are consistent trends with implications for development of land use plans and promoting investment in agriculture:

- Farms are increasing in size, both in terms of the physical size and value of operations. This is observed across broadacre and more intensive horticultural enterprises.
- Most value of production is generated by the medium to large farm businesses. While more numerous, smaller farm businesses contribute a smaller proportion of overall commodity value.

Agribusiness provides a comprehensive range of support services and infrastructure, including irrigation water, food processing and manufacturing, transport and logistics, professional services and farm supplies. Although concentrated in larger centres of Albury, Corowa and Deniliquin, there are locally significant processing and supply systems in most other towns. Before agricultural produce makes it to market, there are inputs such as fertiliser, fuel, technical support services such as agronomists, vets and mechanics, processing facilities such as packing plants, irrigation water delivery, transport and infrastructure, etc. The interactions of the agricultural industries with their secondary industries is a critical consideration in planning for agricultural land uses.



Climate

In the eastern Murray, the slopes are characterised by rolling hills and plains. The slopes are primarily located in the temperate, hot summer climate class (BoM 2001). Rainfall is in the 500 to 700mm range. Temperatures fall to around 2.0°C in winter and are regularly over 31°C in summer.

In the western Murray the landscape becomes the flatter and semi-arid plains. Correspondingly, the climate of the plains shifts from the temperate, no dry season hot summer in the east to the grassland, warm persistent dry climate class in the west (BoM 2001). This semi-arid zone has rainfall in the 230 to 600mm range. Temperatures fall to around 2.0°C in winter and in summer are regularly over 32°C, often peaking above 45°C for many days (OEH 2016; BoM 2018).



Biophysical characteristics

The Mediterranean climate, reliable high-quality water supplies, mostly flat ground and well-drained soils provide important agricultural lands suitable for cropping, horticulture and grazing. The Slopes incorporate a variety of terrains, including undulating rolling hills, slopes and plains, and scattered ranges. The landscape of the South West Slopes is extensively cleared and developed for cropping and grazing as part of mixed-farm enterprises.

The Riverine Plains landscape is the largest landscape in the Murray. The area is dominated by plains, floodplains of the Edward and Murray Rivers, river channels, wetlands, lakes and lunettes.

Originally much of the plains landscape was semi-arid grass/shrub-land known as 'rangelands'. There is remaining rangelands landscape in the far west of the Murray and it supports grazing systems of low stocking rates over large areas. Now this landscape has been extensively cleared, usually land-formed and highly modified with a focus on irrigated cropping enterprises. In the Murray, river systems have influenced land use and shape the economy, livelihood, identity and history of the communities and the environment.



Water access and irrigation



Locational advantage

Irrigation water supplied by the Hume Dam on the Murray River is directed into the Murray Irrigation Area. There is also licenced access to water entitlements from the regulated streams and groundwater systems, and rainfall runoff captured in farm dams.

Water trading has driven water into higher value irrigated businesses and environmental water recovery has reduced water availability throughout the Murray Darling Basin. The Murray surface water management area falls within the southern-connected interstate trading zone of the Murray Darling Basin. Depending on seasonal water availability, the current water trading rules allow for transfer of irrigation water between river valleys.

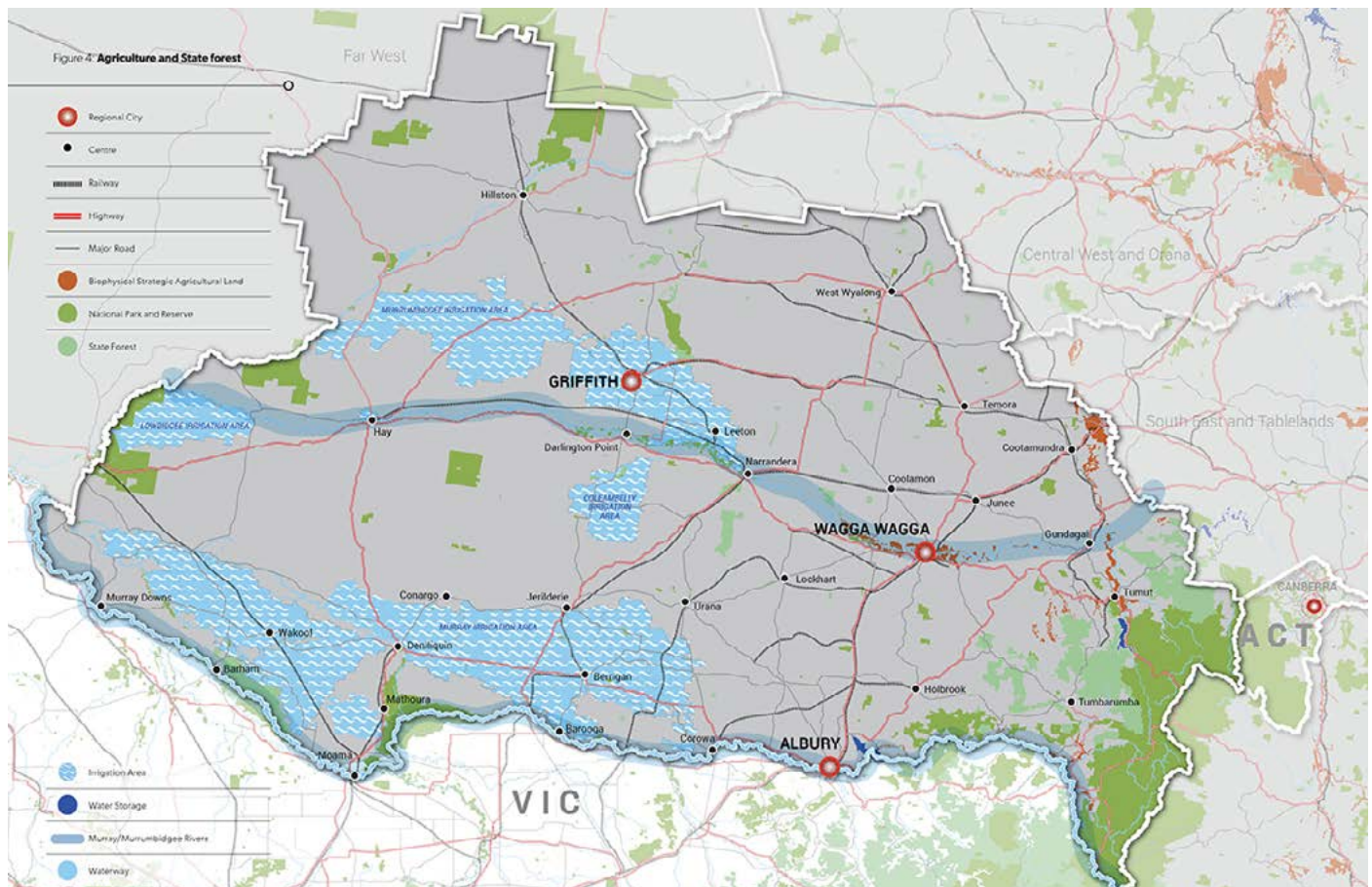
The extensively cleared, usually land-formed and highly modified landscape is focused on irrigated cropping enterprises such as rice, lucerne, maize, millet and sorghum. Winter cereals are often grown in rotation with irrigated summer crops using sub-soil moisture stored from irrigation and as a break crop. The reduction in water availability is resulting in a reduced irrigation footprint and an increasing proportion of the available irrigation water used to diversify into high value commodities. Currently, this includes almonds, walnuts, and cotton and intensive livestock farming of dairy, poultry and pigs taking advantage of the grain and feed grown in the area.

Rising interest in Australian agriculture is linked to awareness of food production systems, reducing 'food miles' and buying locally, as well as demand for fresh (seasonality) and high nutritional quality of food consumed ('clean and green'). It is also recognised that agricultural land provides ecosystem services, food security and other benefits for urbanising communities that warrant its support and preservation through planning instruments, despite inherent difficulties with coexistence with urban sprawl (Brinkley 2012).

In the Murray, the agricultural sector requires seasonal transport of perishable (refrigerated) produce as well as long haulage of bulk and containerised commodities. Produce is transported to other regions in NSW and Victoria, and to export sea ports in Melbourne. The largest exports by commodity flows are wheat, rice, and food products such as dairy. There is also substantial movement of produce supplying grain to intensive animal producers and moving livestock to processing plants.

Agriculture in the Murray will benefit from the Inland Rail via Albury and Special Activation Precinct (SAP) at Wagga Wagga with freight options for exports destined to either Port Botany or Port of Melbourne. The proximity to Melbourne, regional cities of Albury and Wagga Wagga and Murray River towns provide access to extensive restaurant, café and other markets as well as interstate visitors for existing and future agri-tourism and value add enterprises.

Diagram of irrigation areas (DPE 2017)





Challenges for agriculture in the Murray Sub Region and planning solutions

Challenges for agriculture are connected to climate change, commodity prices and in some areas, land use conflict and right to farm. Agricultural land is a finite resource, and even in the Murray land fragmentation and non agricultural land uses have displaced intensive industries such as dairies, piggeries and orchards, and affected broadacre cropping and livestock grazing.

This section highlights some of the challenges faced and planning solutions.



Historic land use planning

Historic planning policy has not strategically valued and protected rural land in many areas, instead regarding it as 'urban land in waiting' (Houston 1993). The absence of dedicated planning policy for agriculture has resulted in Local Environmental Plans (LEPs) that do not support agriculture in practice. Agriculture has spatial, biophysical and production criteria that can be similar to industrial development, especially intensive industries. However, in LEPs industrial zones are in dedicated areas with development controls managing incompatible development. In contrast, rural planning provisions often allow incompatible development and subdivision that affect farm amalgamations, expansion or intensification plans and ultimately restrict a farmer's ability to make a living.

Planning solution

Future land use planning must recognise the importance of agriculture to society and the economy and that the land and resources on which agriculture depend need to be protected and managed to enable continued use of the land for agriculture.

The challenges can lead to the following adverse impacts for agriculture if they continue to occur:

- **Inflated land prices** prevent farm expansion as residential land values are in a different market to agricultural land values.
- **Differing expectations:** Complaints are made to authorities from neighbouring residents about legal farming activities such as traffic movements, dust, noise, odour etc., resulting in adjustments being required to operations.
- **Loss of critical mass:** Urban encroachment gradually results in the loss of farmland and supporting services (a critical mass required for commercial viability), requiring farmers to source further afield.
- **Uncertainty:** land use conflict and the variable impacts on farming makes it difficult to plan for future investment in the industry. Pressures of encroaching development often result in farmers either selling land for non-rural uses or continuing to farm with the issue of land use conflict.



Statutory land use decision making

The time and cost involved in the development approval process can constrain the capacity of agriculture industries to quickly respond to market forces. Intensive agriculture land uses often require extensive site and impact assessments from specialist consultants and state agencies, while perceived environmental impacts on neighbouring properties can raise concerns in a community about the potential impact of intensive agricultural land use.

Planning solution

Clear development controls which specify requirements for intensive agricultural development, and non-agricultural developments near existing agricultural land uses, are integral to minimizing community concerns and avoiding unnecessary cost and delays. Consistent requirements for information to support development applications can also streamline the application process for proponents and assist consent authorities to manage community expectations. It is important for both the agricultural industry and the community that the development approval process results in well managed agricultural land uses in the right location to enable the continued use of the land for agricultural production for the benefit of the wider community.



Land use conflict

Expansion of urban land uses and rural residential housing in rural areas creates potential for this land use to conflict with agricultural land uses. This in turn places pressure on producers to adjust their normal farming practices to minimise impacts which can increase costs and threaten viability.

Planning solution

Planning policy and controls which prevent land uses in rural areas that are incompatible with agriculture can minimize the potential for land use conflict. Planning controls which require adequate buffer distances between land uses can mitigate potential impacts from agricultural land uses. With land use conflict being largely driven by the divergence in knowledge, expectations and activities of rural neighbours, particularly between new residents and traditional rural landholders, collaboration and networking becomes critically important to addressing changing social landscapes (UoN 2019).



Competing land uses

The land use zones that apply to land on which agriculture occurs often permit a wide range of other land uses that are unrelated to agriculture. For example, non agricultural land uses, such as renewable energy generation by solar panel arrays, wind turbines and waste plants, are putting pressure on the farming uses and character of rural land. Competition for rural land on which agriculture can occur can lead to increased land prices and uncertainty for agricultural industries and investors. Increased non agricultural development on rural zoned land results in competition for the land leading to community disharmony and in some cases reduced productivity and or transfer of agriculture to other areas.

Planning solution

Planning controls which limit the range of non-agricultural land uses that are permissible in zones applied to agricultural land can prevent the encroachment of non agricultural land uses on agriculture. Clear and robust strategic planning policy and land use strategies are important to guide future non-agricultural growth to locations where it will not have adverse impacts on agriculture.



Land fragmentation

Rural zoned land for agriculture (Primary Production - RU1, Rural Landscape - RU2 and Rural Small Holdings - RU4 zones) make up approximately 90% of the Murray.

Agricultural land is based on minimum lot sizes of 100ha to 500ha, although analysis of the rural zoned land found that:

- 13% is comprised of lots between 1 and 5 hectares in size
- 18% is between 5 and 20 hectares
- 13% is between 20 and 40 hectares
- 25% is between 40 and 100 hectares
- 31% is greater than 100 hectares in size.

Adverse impacts on agriculture can occur where there is a high degree of land fragmentation from undersized rural lot sizes. Small rural lot sizes limit the ability of most agricultural enterprises to achieve required buffer distances or expand their operations. Expansion of agricultural operations in a fragmented rural landscape often means significant investment to purchase additional land. When additional land is not available for expansion producers usually exit the area or increase productivity via intensification of operations, a process which can increase the potential impacts on nearby non-agricultural land uses or require significant investment to mitigate potential impacts.

Planning solution

Planning policy which sets an appropriate minimum lot size and prevents the further subdivision of rural land, except where there is a demonstrated agricultural need, can prevent the adverse impacts of land fragmentation.



Critical mass

All agricultural industries have a critical level of production which ensures the economic viability of the enterprise. Where secondary industries rely on a minimum volume of agricultural product to remain viable it is imperative for the industry in that region to maintain that critical mass for the benefit of all agricultural industries. This is important for the agricultural industries as well as the related supply chain, including ancillary services, infrastructure, markets, processing facilities and related industries.

Planning solution

When land use planning decisions have the potential to affect one aspect of the agricultural supply chain it has the potential to threaten the entire industry in a region. Land use planning needs to recognise that it is not only agricultural land with excellent biophysical characteristics that needs to be retained for agricultural purposes, but also those key secondary supporting industries which may be located on lower quality agricultural land which are still potentially impacted by encroaching non-agricultural land uses.



Murray Regional Environmental Plan No 2

River front development such as subdivision for lifestyle housing and tourism has historically been in high demand along the Murray River. The Murray Regional Environmental Plan No 2 (MREP2) applies to all riverfront land across the 'River Murray' and tributaries. The MREP2 sets out building and development setbacks from the high bank of the river to allow natural river migration, enhance bank stability and regulate development. The limited range of exempt and complying development types permitted on riverfront land results in numerous, potentially unnecessary DAs and referrals. However, in rural zones, agricultural activities such as livestock grazing, pump sheds and infrastructure are generally permissible within the 100m river setback.

Planning solution

A completed River Murray Riverfront Management Strategy would provide a clear, concise and modern planning framework supported by Commonwealth and state agencies, and local government. The Strategy should provide strategic planning principles for developments along the river and give effect to the current MREP2 principles through a SEPP. This should ensure interfaces between them and rural land uses are managed according to best practice to avoid land use conflict and degradation.



Other challenges

Climate change

Future climate in the Murray is predicted to be:

- Warmer with an increased frequency of very hot days, longer duration hot periods and reduced frequency of frosts.
- Drier, with reduced rainfall, particularly spring rainfall, increased frequency of heavy rainfall events and or severe bushfire weather, and time spent in drought.

The Murray Murrumbidgee Region is expected to experience an increase in all temperature variables (average, maximum and minimum) by 2030. Summer temperatures are projected to increase by 0.7°C in 2030 and 2°C by 2070. Minimum temperatures are projected to increase by 0.6°C by 2030 and 1.9°C by 2070. Changes in cold nights are important in the maintenance of natural ecosystems and agricultural/horticultural industries.

The number of hot days is projected to increase by another 10-20 days by 2030 and 30-40 by 2070; with increases most pronounced in spring and summer. Minimum temperatures are projected to increase with prolonged periods of hot days increase the incidence of illness and death amongst vulnerable people and adversely affect ecosystems.

Severe fire weather is projected to increase further by 2030 mainly in summer and spring (NSW Office of Environment and Heritage, 2014). These changes will have implications for animal and plant agricultural systems, particularly as temperature increases.

The reduced water balance arising from the predicted climate will result in lower and more variable pasture production, with increased sheep grazing while cattle grazing contracts to higher rainfall areas. Reduced pasture production will require enterprises to increase scale to maintain productivity. Feed lotting has been becoming more attractive as there is capacity to reduce heat stress by providing shade and managing feed and water intake.

The impacts of climate change highlight the need to protect land for its future productive capacity and where there is a combination of biophysical assets such as water, topography and soils. The Murray supports high value agriculture now and will be important to sustain production of more specialised agricultural and horticultural enterprises into the future. A critical concern to agriculture is securing water for production in terms of quality, quantity and delivery.

Biosecurity

Rural land and primary industries in the Murray is exposed to pests and diseases that could threaten agriculture, the environment and community safety. Biosecurity hazards are managed by the NSW Government through Murray Local Land Services and local governments. The distribution, abundance and management of insects, pathogens and weeds is also being affected by climate change. The likelihood that tropical or semi-tropical pests will spread southward in Australia, or become established after an incursion, increases with climate warming. Pig farming based in the Murray is particularly vulnerable if/when African Swine Fever enters Australia. Stressed plant systems (crops) may become more vulnerable to insect and disease outbreaks as the efficacy of current control measures are altered.

The combination of urban areas, open rangelands, forested areas and water sources results in serious pests such as foxes, wild dogs, deer, pigs, cats, rabbits and goats. Numerous plant species are already in the landscape and have a large impact on remnant vegetation and rural land.

Social licence

A social licence to operate refers to the perceptions of local stakeholders that an industry that operates in a given area or region is socially acceptable or legitimate.

It is important for agricultural industries to maintain a 'social licence' for their operations. The agriculture industry's right to farm agricultural land and retain access to water needs to be balanced with responsible and ethical land and livestock management and adherence to best practice operations to minimise the potential for adverse environmental impacts. Producers can help to protect their social licence by open communication and education and positive contributions to their communities. Connecting with local markets and demonstrating low food miles and the importance of local food security can assist in maintaining a 'social licence' for agriculture in a region. Further detail can be found in the [NSW Government Right to Farm Policy](#).

Changing markets and economic conditions

Agriculture is vulnerable to changes in markets and economic conditions. Long lead times for crop production and the need for extensive capital and infrastructure investment to change commodity or farming systems means agricultural land uses are not capable of quickly adapting to changing markets and economic conditions. Due to Australia's presence in global agricultural markets, farmers are often 'price takers' which can have significant adverse impacts on smaller operations.

In the Murray agricultural and water reforms have led to removal of compulsory marketing arrangements, regulations and price supports. Farmers are now operating in a more competitive environment for growing and selling their produce. Some farm businesses are undertaking their own marketing through contract selling to processors or major retailers, while others are focused on niche markets for premium produce. Vertical integration of agricultural enterprises across the supply chain is achieving efficiency gains and price competitiveness. Land is required therefore not only for primary production but also for these secondary activities.

These national trends, reduction in the number of farms, increasing farm size and output concentration, are impacting on Murray agricultural industries such as dairy, grains and oil seeds.





Opportunities for agriculture in the Murray Sub Region and planning levers

Agriculture not only provides food and fibre, it is also beneficial to the broader population through providing ecosystem services, scenic values, open 'green space', value-adding and diversification of income, including renewables. It supports supply chains that generates substantial productivity, employment, research and education across local, regional and national scales.

This section identifies practical landuse planning approaches and opportunities for agriculture and some planning considerations to help implement them.



Sustainable farming requirements

Planning for sustainable agriculture requires measures that allow existing and future agricultural industries to operate, adapt, improve and/or expand their current operations and business. Maintaining agriculture requires land use planning that ensures:

- Farms are of a sufficient scale to:
 - support efficient sustainable and profitable operations
 - provide for essential on-farm infrastructure
 - manage environmental impacts (this may include effluent and run-off management, set-backs for streams, native vegetation and existing houses).
- The risks of land use conflicts are managed by avoiding non agricultural development in the vicinity of:
 - established intensive agricultural industries, and any future expansion
 - key infrastructure for agricultural industries such as saleyards, abattoirs, feed mills and major transport routes to markets
 - important natural resources used by a range of industries.
- Land use conflicts are also minimised by developing relevant planning controls and guidelines for primary production areas that recognise good industry practice and educate the community (on rural living and agricultural).

- The agricultural base requires associated transport services and hubs, modern telecommunications and access to skilled workforces, to take the best advantage of markets and consumers.

Planning levers

Land use planning can support sustainable agricultural development and promote improved resource management, through planning controls, in the following ways:

- a. identify lands that are highly suitable for agricultural industries
- b. encourage and support appropriate zoning for agricultural land and appropriate zoning within these areas
- c. encourage compatible development in important agricultural land areas
- d. apply controls that separate incompatible land uses to minimise land use conflict
- e. adopt relevant minimum lot sizes to minimise fragmentation of resource land
- f. strategically plan for urban, residential, rural lifestyle, mining and other incompatible developments in locations away from highly productive important agricultural land
- g. implement right to farm policies for legitimate agricultural uses of land.



Increased scale and intensification

Productivity growth is central to the performance and international competitiveness of Australia's agricultural sector. Producers can increase scale through expanding operations onto additional land and intensification of agricultural operations.

Commercially viable agricultural operations include intensive operations such as horticulture, dairy, poultry, pigs and livestock lot feeding. Improvements in technology and reductions in capital costs mean that intensification is feasible. Some intensive agricultural operations can more closely resemble manufacturing processes as they occur in expansive sheds where climatic conditions are controlled and impacts from noise and odour mitigated.

Some intensive agricultural operations need to establish infrastructure such as sheds, greenhouses, irrigation systems and water storage, netting or vehicle access which requires significant capital investment. To secure this capital and see a return on the investment, businesses need certainty that production will be unencumbered by land use planning changes for approximately 25 years.

Although broadacre cropping and livestock grazing are the highest value enterprises, growth of intensive animal and plant production such as poultry, piggeries and cattle feedlots, is feasible in the Murray. Recent enhancements in the design, management and operation of intensive agricultural enterprises has resulted in productivity improvements and achievement of food safety, animal health, animal welfare and environmental sustainability standards.

Planning levers

- Certainty in strategic planning policy and land use planning controls for intensive agricultural operations and neighbouring land can provide the appropriate investment environment for industry expansion.
- Preparation of a rural land use strategy develops an understanding of the needs of various agricultural industries and investigates opportunities and mechanisms to support intensive agricultural industries through LEP controls.
- LEP zones and provisions should be applied over intensive agricultural precincts; with land use tables structured to permit intensive agriculture and related industries while prohibiting incompatible land uses such as residential accommodation, tourist and visitor accommodation, commercial, heavy industrial and recreational activities etc
- Minimum lot sizes should be large enough to limit fragmentation of agricultural land, incorporate industry requirements, enable expansion of existing agricultural industries and provide for adequate buffers to incompatible land uses.



Food security

Maintaining food security in the face of local and global upheavals relies on the ability to produce fresh and processed foods in Australia. This is also key for the health of the community and the environment by reducing food miles, reducing the cost of the food and making it more available for more people. Murray irrigators consider that food produced in their region should be marketed to differentiate their product in the market. With the increasing population of the State and increased demand for food and fibre products dependent on irrigation, farmers are expecting the community to put a higher value on crops produced in Australia.

Planning levers

Strategic planning for rural land must ensure productive land is identified and protective mechanisms provided through the planning framework to enable provision for expansion of urban farms for intensive production, food security and education purposes.

- Councils should zone agricultural land for primary production and only permit agriculture and a narrow range of supporting land uses in that zone.
- Some forms of horticulture may be a suitable permissible use in a range of zones, with opportunities for associated agri-tourism and roadside stalls.
- Minimum lot sizes should be large enough to limit fragmentation of agricultural land, incorporate industry requirements, enable expansion of existing agricultural industries and provide for adequate buffers to incompatible land uses.

Non-planning levers

- An education program will assist councils in delivery of planning mechanisms to protect agriculture.





Diversification and value-adding

Access to the Inland Rail, links to Sydney and Melbourne and biophysical assets of rangelands, rainfall, irrigation, productive soils and farming infrastructure means that the Murray is well positioned to capitalise on growing community interest in food provenance and agri-tourism. The Riverina Murray Regional Plan and various Regional Economic Development Strategies all identify the need for diversification of agricultural commodities to include agri-tourism, boutique and artisan produce, and value adding.

Value-added manufacturing and food processing already includes: rice and grain milling; oil seed processing; animal produce and fibre processing; animal feed manufacturing; packing of raw fruits, nuts, vegetables and meats; and processing of dairy, wine and food products.

Diversification approaches can range from selling direct to the community to specialised processing facilities, that require significant capital investment and the development of new skills but have the potential to significantly improve the economic viability of agricultural operations.

Currently in the Murray, leasing of farm land to other farmers and to developers for renewable energy projects is considered a means of farm income diversification.

Agri-tourism in the form of low-key farm stays and bed and breakfast establishments can provide an alternative income stream of agricultural producers while also educating the community about the activities that occur on farm. These ancillary land uses should not compromise the agricultural production being undertaken on the land and agricultural production should be the primary land use. NSW's 'clean and green' production can be promoted to the world through the high levels of tourism.

Planning levers

- a. Certainty in strategic planning policy and land use planning controls for value adding operations and neighbouring land provides the appropriate investment environment for industry expansion.
- b. Preparation of a rural land use strategy develops an understanding of the needs of various value adding industries and investigates opportunities and mechanisms through LEP controls.
- c. LEP zones and provisions should be applied over value adding facilities; with land use tables structured to permit industries related to the primary production while prohibiting incompatible land uses such as residential accommodation, tourist and visitor accommodation, commercial and recreational activities etc
- d. Agri-tourism (farm stays, bed and breakfast accommodation) should be associated with and complement the continued agricultural production on the land.
- e. Agri-tourism should be directed away from intensive agricultural operations or precincts.

Non-planning levers for diversification and value adding

- f. Intensive agricultural production precincts and businesses may be used for education of the community and tourists around how food supply chains work.
- g. Roadside stalls, artisan food and drink industries and cellar door premises all offer opportunities to promote NSW's clean green image to the international tourism market.
- h. Farmers markets could prioritise locally grown or made produce to support local growers.



Farming research promotion and education

Various institutions based in the Murray provide research, promotion and education opportunities for the broader agricultural industry. Agricultural research by CSU, the rice industry and NSW DPI provide further opportunities for education of farmers, local governments and communities on sustainable production, innovative farming systems, climate change and the challenges facing agriculture and producers. This education is important for consumers who might not otherwise understand how their food is produced and the intricacies of the food production chain.

Planning levers

- a. Provide agricultural education to local governments and consultants to ensure planning decisions are based on understanding up to date farming practices.
- b. Information and education facilities should be a permissible land use on agricultural land to enable producers to educate the community on how food supply chains work.



Circular economies

A circular economy is one that exchanges the typical cycle of 'make, use, dispose' in favour of maximising re-use and recycling. The longer materials and resources are in use, the more value is extracted from them. The circular economy concept is best, and most often, applied in relation to resource consumption and regeneration.

For the agricultural industry a circular economy presents possibilities for significant efficiencies and input cost reductions through energy generation and smart grid distribution; innovative off-grid energy solutions; recycled water use; and opportunities for renewables and waste solutions.

Planning levers to facilitate circular economies

- a. Primary production zones should permit resource recovery facilities as a means of reusing waste products while also restricting incompatible uses to prevent rural land use conflict.
- b. Minimum lot sizes should account for a potential increase in the need for land area requirements as farming trends towards circular economies. Reuse of effluent and other products on farm to vertically integrate farm inputs and outputs may result in additional and diversified production areas on farm.



Planning toolkit

Best practice land use planning for agriculture includes recognition of the industry as a significant contributor economically, environmentally and culturally, providing recognition and management through all levels of the planning framework. Dedicated land use zones, provisions and minimum lot sizes are available to Councils and can effectively support primary production even in contested areas.

This section highlights the parts of the planning system to facilitate this.



Strategic planning

Local strategic planning statement

A local strategic planning statement (LSPS) identifies the vision and trends for agriculture in an LGA and sets out the direction for agricultural land uses for the next 20 years. It is important that agriculture, the land it depends upon and the infrastructure and other secondary industries which interact with agricultural land uses are considered at this initial strategic planning stage. The LSPS should explain the economic contribution that agriculture makes to the local economy and reflect the community's expectations for the provision of food and fibre locally. Further information can be found in the following DPI guideline [Local Strategic Planning Statements – Agricultural Planning Advice for Councils](#).

Local land use strategy

The Riverina Murray Regional Plan 2036 and LSPSs set out the framework and expectations for preparation of local land use strategies in the Murray. The agricultural component of a land use strategy should identify the agricultural industries in the LGA, land on which they are located and the essential infrastructure and secondary industries. A land use strategy is also an effective tool in communicating to the community the scale and importance of agriculture in the LGA economically, physically and socially. It is an important step in identifying where agricultural land should be protected from incompatible land uses.

A rural land use strategy will identify the linkages primary industries have with secondary industries, infrastructure and other components of the production chain to establish a holistic picture of relationships and dependencies. The strategy will also clarify the relationship of rural land with residential development and specify the circumstances in which additional fragmentation and residential development may or may not be appropriate. The strategy will also assess the policy framework including existing LEP provisions and make recommendations to retire and/or remove redundant provisions concerning rural subdivision and non-strategic residential development.

Agriculturally productive lands contribute to a strong foundation for the agricultural economy and underpins investment for growth. Pre-conditions for increased agricultural production exist on these lands it is important that the land is separated from urban areas and has sufficient space to evolve and expand.

Local environmental plan (LEP)

An LEP allows councils to tailor planning controls to address the issues facing agricultural industries in their LGAs. The LEP is informed by the rural land use strategy. The following are mechanisms that can result in positive outcomes for agriculture:

Land use zones: the RU1 Primary Production or RU4 Primary Production Small Lots zones are the most appropriate zones to apply to land which is currently used for agriculture and/or is suited to future agricultural land uses.

Land use zone objectives and tables: The use of specific zones for agricultural land allows the zone objectives to be specific for agricultural land uses and require other permissible land uses to be compatible with agriculture.

Limiting permissible land uses: LEPs can reduce the potential for land use conflict by restricting the range of permissible land uses where incompatible with agriculture. This is executed by careful construction of land use tables for the rural zones. Councils should review the permissible land uses in rural zones applied to agricultural land or where agricultural industries are located to prevent inappropriate land uses and limit potential for land use conflict. Land use tables for rural zones should be 'closed' to enable more control over the range of specific land uses.

Minimum lot sizes: The minimum lot size specified in an LEP for rural land needs to be of a scale to prevent fragmentation into lots which cannot support the locally typical agricultural land uses. Generally larger minimum lot sizes facilitate the establishment of larger and more appropriate buffer distance between potentially conflicting land uses. Larger lot sizes also enable expansion or diversification of the agricultural activities without the need to purchase additional land which can be an economically prohibitive option for farm expansion. While it can often be difficult to execute, the breaking of the nexus between minimum lot size and dwellings is a way to prevent new settlement on rural land, and a positive advance in promoting agriculture and preventing future rural land use conflict.



Development control plans and other approaches

Development control plans

A development control plan (DCP) for rural zones should include practical guidance for agricultural land uses. A DCP can specify buffer distances to be applied to all land uses, both agricultural and non-agricultural, to ensure that new land uses do not increase the potential for land use conflict with existing neighbouring properties. Guidance on appropriate buffer distances is provided in the Department's [Buffer Zones to Reduce Land Use Conflict with Agriculture - An Interim Guideline](#).

Novel approaches

In some cases Councils may need to apply both planning approaches and non-planning advocacy to achieve positive outcomes for agriculture. For example, under the current legislative framework, councils can:

- Offer financial incentives such as rate reduction for legitimate agricultural enterprises.
- Seek to map localities as state significant agricultural land with restrictions on fragmentation and development for non-agricultural purposes.
- Set up a rural industry liaison committee to establish links between council and farmers and provide a forum for discussion of the issues facing agriculture in the LGA.
- Propose a highly contested area as a special planning precinct with planning provisions to protect from incompatible land uses.

Industry can provide advocacy through active involvement in land use planning decision making and strategic planning to raise the profile of agriculture. The land use planning system is only one mechanism available to reduce the potential for land use conflict.

Agricultural industries can decrease the potential for land use conflict by adopting industry best practice operations which at best eliminate or reduce the impact of their operations on neighbouring land owners.

Similarly, clear communication with neighbouring properties and an education program targeting sensitive neighbours can help increase understanding of the reasons for some agricultural practices and prevent nuisance complaints.



References

- Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) (2019) Irrigated farms in the Murray Darling Basin. <https://www.agriculture.gov.au/abares/research-topics/surveys/irrigation>
- Australian Bureau of Statistics (ABS) (2017) 7121.0 Agricultural Commodities, Australia 2015-16 and 8165.0 Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016.
- Australian Bureau of Statistics (ABS) (2017) "Browse statistics, People: Population & People" statistics (sum of SA within Riverina Murray region). Accessed 2018 from: <http://www.abs.gov.au/websitedbs/D3310114.nsf/Home/Browse+Statistics>
- Australian Bureau of Statistics (ABS) (2018) Value of Agricultural Commodities Produced, Australia-2015-16.
- Australian Farm Institute (2020) Managing farm related land use conflicts in NSW (unpublished), Research Report for NSW DPI.
- Australian Soil Resource Information System (ASRIS) (2013) Physiographic Regions of Australia. CSIRO, ACLEP & Australian Government, Department of Agriculture, Fisheries and Forestry. Accessed 2018: http://www.asris.csiro.au/themes/PhysioRegions.html#PhysioRegions_References.
- Boult C and Chancellor W (2020) Productivity of Australian broadacre and dairy industries, 2018-19, ABARES research report, Canberra.
- Brinkley C (2012) Evaluating the Benefits of Peri-Urban Agriculture, *Journal of Planning Literature*, 2012 Aug; 27(3): 259-269.
- Bureau of Meteorology (BOM) (2001) Map of Climate Zones of Australia, Bureau of Meteorology, Australian Government. Accessed 2018 from: <http://www.bom.gov.au/climate/how/newproducts/images/zones.shtml>
- Bureau of Meteorology (BOM) (2018) Climate Data Online. Bureau of Meteorology, Australian Government. Accessed 2018 from: <http://www.bom.gov.au/climate/data/>
- Department of Planning and Environment (2018) Agribusiness Diversification and Value Added Manufacturing Options Paper – Planning Barriers in Local Plans
- Department of Planning and Environment (2017) Riverina Murray Regional Plan 2036. NSW Government. ISBN 978-1-76039-488-2.
- Department of Primary Industries (NSW DPI) (2019) Local Strategic Planning Statements, https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/849857/dpi-ag-advice-to-assist-councils-to-prepare-local-strategic-planning-statements.pdf
- Department of Primary Industries (NSW DPI) (2018) Value of agricultural production data 2016-17, derived from ABS data 2017. Insight & Industry Development Unit. Department of Industry, NSW Government.
- Department of Primary Industries (NSW DPI) (2018) IAL Mapping spatial data for Riverina Murray. NSW Government.
- Department of Primary Industries (NSW DPI) (2018) Buffer Zones to Reduce Land Use Conflict with Agriculture - An Interim Guideline, Primefact 1624, First edition.
- Department of Primary Industries (NSW DPI) (2108) Mapping important agricultural land in NSW. <http://www.fmansw.org.au/wp-content/uploads/2018/06/IAL-Mapping-flyer.pdf>
- Department of Primary Industries (NSW DPI) (2107) A guideline to identifying important agricultural lands in NSW. <https://www.dpi.nsw.gov.au/agriculture/lup/agriculture-industry-mapping/pub16-323-a-guideline-to-identifying-important-agricultural-lands-in-nsw>
- Department of Primary Industries (NSW DPI) (2015) NSW Right to Farm Policy. <https://www.dpi.nsw.gov.au/agriculture/lup/legislation-and-policy/right-to-farm-policy>
- Department of Primary Industries (NSW DPI) (2015) NSW pork industry overview 2015. NSW Government. ISBN 978-1-74256-779-2. Accessed 2018 from: <https://www.dpi.nsw.gov.au/animals-and-livestock/pigs/pork-industry/overview>
- Department of Primary Industries (NSW DPI) (2012) Best Practice Management for Meat Chicken Production in NSW Manual 1 – Site Selection & Development. NSW Government. ISBN 978 1 74256 249 0. Accessed 2018 from: <https://www.dpi.nsw.gov.au/animals-and-livestock/poultry-and-birds/poultry-planning-and-keeping/planning-for-poultry-development/bpm>
- Department of Primary Industries (NSW DPI) (2011) Policy 0-104: Maintaining land for agricultural industries. http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0008/396458/Policy-O-104-maintaining-land-agricultural-industries.pdf
- Goodall A (2018) Right to Farm- Agricultural Land Use Survey: Final Report, Institute for Public Policy and Governance, University of Technology Sydney, Sydney; prepared for the NSW Department of Primary Industries.
- Office of Environment & Heritage (NSW OEH) (2014a) Integrated Regional Vulnerability Assessment: Riverina Murray, Vol 1. NSW Government. ISBN 978 1 74359 742 2. Accessed 2018 from: <https://climatechange.environment.nsw.gov.au/Adapting-to-climate-change/Regional-vulnerability-and-assessment/Riverina-Murray>
- Office of Environment & Heritage (NSW OEH) (2014b) Murray Murrumbidgee Climate change snapshot. Adapt NSW. NSW Government. ISSN 1837-5650. Accessed 2018 from: <https://climatechange.environment.nsw.gov.au/Climate-projections-for-NSW/Climate-projections-for-your-region/Murray-Murrumbidgee-Climate-Change-Downloads>
- Office of Environment & Heritage (NSW OEH) (2016) Bioregions of NSW: Bioregion overviews. NSW Government. Accessed 2018 from: <https://www.environment.nsw.gov.au/bioregions/BioregionOverviews.htm>
- Regional Development Australia (RDA) (2018) Riverina Regional Profile. Riverina NSW, Regional Development Australia. Accessed 2018 from: <https://rdariverina.org.au/our-region/>
- Productivity Commission (2005) Trends in Australian Agriculture, Research Paper, Canberra. <https://www.pc.gov.au/research/completed/agriculture/agriculture.pdf>
- RMCG Consultants (2015) Riverina Murray Agricultural Industries – Final Report. Prepared for Department of Planning and Environment.
- Wine Australia (2018) Riverina. Australian Government. Accessed 2018 from: <https://www.wineaustralia.com/discover-australian-wine/new-south-wales-wines/riverina>

Broadacre cropping

Broadacre cropping delivers the highest gross value in the Murray of \$455m. Key annual crops include wheat, canola, barley, and rice. Irrigated summer crops include rice, maize and some cotton which occur primarily in the Murray Irrigation Areas with flat land, clay-based soils, and water availability. Rice storage infrastructure has been located in Deniliquin and Finley. The rice industry has strict regulations in place to ensure production has minimal impact on the environment. After harvest, the subsoil moisture remaining in the soil is used to grow other crops such as winter cereals. Cotton ginning facilities are located at Whitton, Hay and Carrathool.

Dryland winter cropping includes cereals (wheat, barley, oats), oilseed (canola) and pulses (chickpeas, faba beans, lupins, lentils). Wheat, barley and canola are the major crops by value. Crops are grown in varying rotations depending on site characteristics, seasonal variations, disease control, market demand and production preferences.

Hay and cereal hay crops are often grown in conjunction with the main broad-acre cropping areas.

Distribution of broadacre cropping producers by local government area

LGA	Gross Value of Production (\$)	% share of Murray broadacre crops	% share of NSW
Albury (C)	\$1.29m	0.3%	0.0%
Berrigan (A)	\$51.42m	11.3%	1.0%
Edward River (A)	\$60.86m	13.4%	1.2%
Federation (A)	\$201.06m	44.2%	4.0%
Greater Hume Shire (A)	\$74.21m	16.3%	1.5%
Murray River (A)	\$66.28m	14.6%	1.3%
Total	\$455.1m	100.0%	9.1%

Trends

Long-term productivity growth in broadacre industries is said to be around 1% per year (Boult and Chancellor 2020). This is also an analysis supported by RMCG Agricultural Expansion Analysis which identifies a plateau in wheat yields. A simplistic comparison between ABS 2010/2011 and the 2015/2016 census data shows a decline in tonnes of many broadacre crops and an increase in Pulse crop production.

Irrigation dependent crops such as rice and cotton rely on annual water allocation announcements. The amount of water available and the timing of its availability all affect the amount of crop grown in any given year.

Locational requirements

Broadacre cropping in the Murray is based on the reliable winter rainfall and irrigation allowing for a wide variety of crops to be grown. The large tracts of land available allow for continued investment in broadacre technology, equipment and plant breeding to ensure competitive and profitable enterprises. This area are usually free of land use conflicts and competing non agricultural land uses.

Secondary industries

Secondary industries include freight services, grain processing, grain storage and handling, and grain trading and marketing, as well as seasonal labour. As well as exports, the cereal grain industry in Murray supports feedlots, piggeries and poultry production.

Challenges

Water availability for irrigation

Within the Murray irrigation water is supplied from the Murray River, directly by licenced river pumpers or diverted into the Murray Irrigation areas and districts. There is also licenced access to water entitlements from groundwater systems, and rainfall runoff captured in farm dams.

Commonwealth and State government water policy reforms has seen the introduction of water trading, the Murray Darling Basin Plan, NSW Water Sharing Plans, Australian Competition and Consumer Commission (ACCC) Water Charge & Trading Rules and ACCC Water Price Determinations. Water trading has driven water into higher value irrigated businesses and environmental water recovery has reduced water availability in every traditional irrigation area throughout the Murray Darling Basin.

The Murray surface water management area falls within the southern-connected interstate trading zone of the Murray Darling Basin. Depending on seasonal water availability, the current water trading rules allow for transfer of irrigation water between river valleys. For example, the millennium drought between 2001 and 2009, resulted in significant reductions in water allocations across the southern Murray Darling Basin and prompted a doubling in water trade. In drought years, water has generally been traded downstream from rice growers in NSW to horticulturalists (permanent plantings) in Sunraysia and South Australia.

The Murray Darling Basin Plan has calculated Sustainable Diversion Limits (SDL) for each catchment within the Basin required to achieve environmental outcomes. In some catchments, achieving the SDL will result in less water available for irrigation. In the NSW Murray and Lower Darling and Murrumbidgee catchments, a reduction of 624 GL/year and 320 GL/year respectively is required to achieve the SDL in each catchment. It is also likely that there will be further contributions to shared reductions in the southern Basin.

This extensively cleared, usually land-formed and highly modified Murray landscape has had a focus on irrigated cropping enterprises such as rice, maize and cotton. Winter cereals are often grown in rotation with irrigated summer crops to utilise the sub-soil moisture stored from irrigation and as a break crop. The reduction in water availability is resulting in a reduced irrigation footprint and an increasing proportion of the available irrigation water used to diversify into high value commodities. Currently, this includes almonds, and cotton and intensive livestock farming of poultry and pigs which take advantage of the grain and feed grown in the area.

Biosecurity

Growers are facing challenges from increasing herbicide resistance and increasing soil-borne pathogens in their farming systems.

Production rates

Declining soil fertility is having an overall effect on production rates even with advances in plant breeding, machinery/technology development, and improved agronomic practices. Agricultural land has the capacity to support a diverse range of crop types of high quality under best practice farming systems.

Opportunities

Export markets

To increase gross value of broad acre crops, opportunities lie in gaining capital investment, accessing global market and improving farm productivity. Farming practices therefore need to focus on opportunities to attract a high price premium from nutrient continent, GM free, organic, environmentally sustainable production, or other value added premium niche.

Planning considerations

LGA planning need to ensure large holding sizes are maintained, fragmentation and land use conflict is minimised and there is continued access to water resources.



Beef

The beef cattle industry contributes \$165m by GVP to agricultural production in the Murray. Stock are sold and processed in other parts of the Riverina Murray and northern Victoria.

Distribution of beef producers by local government area

LGA	Gross Value of Production (\$)	% share of Murray beef	% share of NSW
Albury (C)	\$5.63m	3.4%	0.2%
Berrigan (A)	\$10.87m	6.6%	0.4%
Edward River (A)	\$26.74m	16.2%	1.0%
Federation (A)	\$15.82m	9.6%	0.6%
Greater Hume Shire (A)	\$77.40m	47.0%	3.0%
Murray River (A)	\$28.33m	17.2%	1.1%
Total	\$164.8m	100.0%	6.4%

Trends

The gross value of Australian cattle and calf production (including live cattle exports) in 2017/18 was \$11.4 billion (ABARES Agricultural Commodities June 2018).

In 2017/18, 71% of Australia's beef and veal (1.1 million tonnes) was exported to over 78 countries (ABS DAWR) at a value of \$8 billion. In 2016/17, the Australian red meat and livestock industry directly employed just over 191,800 people (Ernst & Young 2018).

Locational requirements

Critical mass is crucial for the ongoing viability of the industry across a region and within NSW given variations in seasonal conditions across the state. In the Murray, locational advantage is provided by the availability of land, reliable water supply and integration of grazing, feedlotting and processing. Beef production is based on the reliable rainfall and/or irrigation allowing for a wide variety of pastures and hay to be grown. The large tracts of land available allow for continued investment in technology, equipment and breeding to ensure competitive and profitable enterprises. This area is usually free of land use conflicts and competing non agricultural land uses.

Secondary industries

Secondary industries include freight services, grain and hay production, livestock handling and trading facilities, as well as seasonal labour. As well as exports, the beef industry supports local state and national markets.



Challenges

Biosecurity

Noxious weeds are an ongoing challenge for rural landowners, particularly those in the beef industry as they are often the owners of large tracts of land that require ongoing management of weed species. The costs of weed control including product purchase and time, can be substantial and can impact on profitability. This is also a major challenge for producers on smaller holdings located in high lifestyle areas where these neighbouring landowners may be unaware of their biosecurity responsibilities or are 'weekenders' and often absentees. Pest animals, for example feral dogs and foxes, can result in loss of calves and lambs.

Opportunities

Export markets

While the majority of Australian meat production is sold in domestic markets, export markets offer opportunity for diversification and offsetting risks. There is ongoing development of integrated supply chains through joint ventures to supply growing export markets and value-added meat exports based on distinguishing attributes such as grass-fed, organic and provenance attributes

Capital input

Feedlotting operations require significant capital expenditure and need assurances that production will be unencumbered by land use planning changes for approximately 25 years to justify the capital expenditure needed. Similarly the technology required for commercial sensing and objective measurement in processing to improve cost-competitiveness of supply chains need significant capital expenditure.

Planning considerations

The encroachment of urban land uses and resulting increased land use conflict and higher land prices will restrict the opportunity for expansion of the feedlots and meat processors. New land use conflict is likely to result as production mechanisms transition from extensive farming to intensive production mechanisms based on significant infrastructure which may not satisfy the rural character expectations of the community.

Legitimate livestock farming activities are likely to cause noise, odours, dust, spray emissions, smoke, vibration, etc. anytime during 24 hours including early mornings and late evenings and should be protected by right to farm policies.

Pigs



Pigs are a very high value agricultural industry in the Murray contributing \$117m, representing 55% of NSW total pork production by GVP. Rivalea is one of the largest pork producers in Australia with farms and an abattoir near Corowa. The company business model involves providing piglets and most inputs to the grower who provides the husbandry and grow out facilities. The pork is marketed to customers located in Albury, Melbourne, Sydney, Brisbane, Adelaide, Singapore and Tokyo.

Distribution of pork producers by local government area

LGA	Gross Value of Production (\$)	% share of Murray pigs	% share of NSW
Albury (C)	\$0.14m	0.1%	0.1%
Berrigan (A)	\$3.03m	2.6%	1.4%
Edward River (A)	\$9.90m	8.4%	4.7%
Federation (A)	\$88.50m	75.4%	41.7%
Greater Hume Shire (A)	\$6.77m	5.8%	3.2%
Murray River (A)	\$8.99m	7.7%	4.2%
Total	\$117.3m	100.0%	55.3%

Trends

In recent years the industry has seen some rapid growth in processed pig numbers and pork volumes which have put significant pressure on pig prices at the farm gate.

This pressure has unfortunately seen some producers withdraw from the industry as their financial status was severely affected, as well as other producers reduce their level of production in an effort to regain an appropriate balance between supply and demand.

The positive side of the increase in production was an impressive increase also in consumption, in particular of fresh pork domestically.

Demand volume growth is now limited by the reduced supply numbers, still coming through the pork production pipeline.

The key issue impacting on the industry globally is the outbreak of African Swine Fever (ASF) in other parts of the world.

Locational requirements

Farming system

Commercial pork production is predominantly undertaken within sheds. The industry is not reliant on land with favourable biophysical characteristics, however there are specific locational considerations including:

- a trained workforce
- means of disposing of dead animals, manure and other wastes
- access to:
 - grain
 - road access for feed and livestock vehicles
 - reliable supply of suitable quality water
 - electricity
 - processing plant and feed mill
 - labour
- scope for future expansion
- biosecurity issues.



Secondary industries

The pork industry developed in the Murray based on proximity to processing plants and major markets. With the major processing plant located in Corowa production sites are located in surrounding LGAs. The industry is dependent on a cheap and reliable source of feed. Grain is transported from storage facilities locally and across NSW to Corowa.

The industry is supported by industries supplying labour, water, affordable land, and access to utilities like power and gas. The industry requires good transport connections to markets, processing plants and feed suppliers.

Challenges

Land use conflict

Due to land use conflicts and sensitive neighbouring land uses in more built up areas the industry is usually located more remote areas. Suitable land in these remote rural areas can mitigate against land use conflict and allow significant expansion.

Biosecurity

Biosecurity issues can arise if there is a concentration of producers adjacent to each other so farms are located at least one kilometre from each other to ensure that diseases do not spread rapidly.

Opportunities

By product use

The industry provides an organic product which is in high demand for organic farming and soil ameliorant. The industry uses a by-product from the timber industry (sawdust) which is used in the sheds as a bedding material.

Planning considerations

The predominant planning consideration for the industry is mitigation of the impacts land use conflict. The farms and processing facilities in regional areas have improved viability and reduced biosecurity and land use conflict risks.

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Acknowledgments:

Information for this profile was sourced from publicly available statistical and spatial data. This is supported by industry intelligence from NSW DPI staff and industry reports. Compiled by the NSW DPI Agricultural Landuse Planning Team. Special acknowledgement to Elton Consulting for editing and Epiphany-PR for graphic design. The Snapshot will be reviewed once updated ABS data on an LGA level is publicly available.



**Department of
Primary Industries**

For further information please contact us via email: landuse.ag@dpi.nsw.gov.au or visit our website: www.dpi.nsw.gov.au/agriculture/lup