

Growing Pains: Planning for Future Populations

A report for



By James Stacey

2018 Nuffield Scholar

April 2020

Nuffield Australia Project No 1816

Kindly supported by:



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Executive Summary

Australia has a rapidly growing population expected to reach near 30 million people by 2030. Rapid urban expansion will be needed, but without adequate planning this could negatively encroach upon agricultural lands located on the urban fringes of cities and towns across Australia. Given the growth rates, both Federal and State Government's across Australia will have to invest more in infrastructure to provide services, and refocus the trend for low density living, or risk having a negative impact on the many existing agricultural businesses close to population centres. These challenges remain global in scope with many regions around the world have growing populations with an increasing need to provide housing for them.

This study examines the 'Challenges and Opportunities for Agriculture in the Peri-Urban Zones' and shows that agricultural businesses will decline if land is re-zoned for housing or industrial developments. Through an investigation into how different jurisdictions around the world are managing land use and dealing with their growing populations, this study will focus on relevant land use and planning laws in various countries including the United States, Canada, China, and New Zealand. This investigation examines land use planning rules and how some regions have been able to maintain a strong agricultural sector in close proximity to highly built up areas and how other regions are on a fast pace to erode their agricultural production base.

Therefore, this study aims to achieve the following three objectives:

1. To investigate how land use planning legislation impacts on agriculture's ability to maintain agricultural production in the rural landscape internationally.
2. To see how urban and rural planning legislation and government policy shape society and its connection or disconnection from agriculture.
3. To understand the process of successful urban and rural planning legislation and policy and how that has been achieved for the long term.

The aim of this study is to provide important lessons from these international case studies to the Australian context, such that any future planning processes for peri-urban farmland zones in Australia can learn from their successes and failures. This report provides a list of ten recommendations for policy makers and agricultural businesses that will assist them in dealing with the growing pains and future planning for a rapidly expanding urban environment on potentially productive agricultural land. From the case studies presented we can see a number of similarities with the challenges facing the nation of Australia. For example, water is a key component of agriculture and urban demand for that water is increasing and placing a higher value on that water.

How other states manage their planning systems will be strategically important to Australian policy makers and farmers as we go forward into the future, where often the priority is put on urban growth with limited restrictions. Any urban development without regard for future

agricultural and food security needs is an issue relevant to and evident in Australia and beyond. Where some local governments are actively promoting urban sprawl and development and while others are trying to improve planning laws to ensure sustainable development, there will be challenges. This report will examine the Chinese practice of land consolidation as a useful land-management tool and question if this system would work in other countries. Perhaps more relevant is the Canadian case study which demonstrates that population growth can increase without losing agricultural land.

However, Australian planners will have to consider the merits of increasing population density and improving public transportation. Thus, while strong planning laws will offer security of land tenure to encourage farmers to invest in their farm businesses with confidence, these same strong planning laws could also be a disincentive to people purchasing land to speculate on a future land use change. Finally, farmers will need to win the 'social license' to operate their agricultural businesses, as community support is essential for the balancing act between urban growth and productive agricultural land.

Table of Contents

Executive Summary.....	i
Table of Contents.....	iii
Table of Figures.....	iv
Foreword	v
Acknowledgments	vi
Abbreviations	vii
Objectives.....	viii
Introduction - Growing Pains.....	1
Chapter 1 – California Dreaming.....	3
Overview	3
Current tools for managing farmland loss.....	4
Conservation Easements.....	4
Restrictive Covenants or Deeds	5
Fee Title.....	5
Mitigation Banks	5
A local perspective.....	6
Chapter 2 - The Sensible Centre - Oregon.....	8
Overview	8
Land Conservation	8
A local perspective.....	8
Chapter 3 – Meridian, Idaho – A Treasure.....	10
Overview	10
Urban expansion in the desert	10
A local perspective.....	10
Chapter 4 - Close to Home, the New Zealand story	12
Overview.....	12
A local perspective.....	12
Chapter 5 – China: Is Communism the answer?	14
Overview	14
Farmland Preservation Laws	14
A Local Perspective	17
Chapter 6 – Canada: The Utopian Dream	19
Overview.....	19
A Local Perspective	20
Conclusion	22
Recommendations	24
References.....	26
Plain English Compendium Summary.....	30

Table of Figures

Figure 1. Central Valley California – Water is a hot topic (Source: Author)..... 4

Figure 2. Californian Farm Bureau President James D. Johansson (left) with James Stacey, Sacramento California (Source: Author) 7

Figure 3. Jim Johnson (right), Land Use Coordinator Oregon Department of Agriculture, with James Stacey, Salem Oregon (Source: Author) 9

Figure 4. Zac Stacey (L) with a Meridian carrot seed harvest farmer (right) (Source: Author) 11

Figure 5. Irrigated field outside of Meridian being cut up for lifestyle blocks (Source: Author) 11

Figure 6. Chris Claridge (right) CEO Potatoes NZ with James Stacey overlooking Pukekohe housing developments (Source: Author) 13

Figure 7. Kong Cheng old street Anhui China, a rare sight in rural China, a preserved piece of history (Source: Author) 15

Figure 8. New rural village construction reducing the area required for residents (Source: Author) 16

Figure 9 New cities with high rise apartments increasing population density in cities reducing the urban footprint (Source: Author)..... 16

Figure 10 China land consolidation. A rural village in transition - undergoing demolition (Source: Author) 16

Figure 11. Rural consolidation is allowing farmland to be developed – as seen from inside a fast-train (Source: Author) 18

Figure 12. British Columbia - Fraser Valley farmland with urban development on the hills in the background (Source: Author)..... 20

Figure 13. Kent Mullinex KPU (left) Vancouver with James Stacey (Source: Author)..... 21

Foreword

I live on a farm an hour from Adelaide, the capital of South Australia, and a city of 1.39 million people. Here I am a mere 24kms from one of the fastest growing towns in the country, Mount Barker, with a current population of 35,499 people and expected to grow to 56,710 by 2036 (*idcommunity*, 2017). In this region alone the rapid shift from productive farmland over the last ten years has been swift, contentious and a veritable disaster from a planning perspective. In Australia more broadly, rather than having a well organised plan to deal with our growing populations, State and Federal Government's have left it to property developers to drive where and how our cities and towns have grown. In some cases, this has been financially rewarding for farmers operating on the fringes of these zones as they are able to sell land to property speculators, who then lobby to have that land rezoned for residential or industrial development. However, while on one hand, this same growth has impacted the ability for farmers to continue to operate successful businesses, on the other hand, it has also created opportunities for some to continue. I believe that maintaining agricultural production near urban centres has a number of positives for our society. It puts those farm businesses in easy reach of both customers and a willing workforce, ready to both consume and operate a diverse range of businesses, thus maintaining a working landscape.

Over the course of my 2018 Nuffield Scholarship I travelled to 11 countries - The Netherlands, France, Singapore, Philippines, China (including Hong Kong), Germany, United Kingdom, Canada, New Zealand and Thailand, and seven states in the United States (Washington DC, Iowa, Louisiana, California, Nevada, Idaho, Oregon and Washington State). The opportunity to travel to these places around the world to see how their governments are dealing with growing populations, maintaining and growing agriculture as well as seeing how others are dealing with urban growth has been a unique experience. I hope that my experience and this subsequent report will provide policy makers at all levels of government in Australia with further information to be able to adequately deal with the 'growing pains' across urban Australia, and thus plan for future populations.

Acknowledgments

The research and travel opportunities contained in this report would not have been possible without the support of Primary Producers South Australia (PPSA) and Nuffield Australia. I am deeply grateful for the opportunity that this Scholarship enabled.

I would like to acknowledge and thank my family, without whom none of this would have been possible - Rachael, Zac, Tiana and Ashton, and my parents David and Jan, and mother in law Sofia. I would also like to thank Rachael, Mark, Zac and David for keeping the wheels turning on the farm while I was overseas.

I also thank the editors and reviewers who have assisted me in completing this final report.

Abbreviations

ABS	Australian Bureau of Statistics
ALC	Agriculture Land Commission Act
ALR	Agricultural Land Reserve
BC	British Columbia
BEA	Bureau of Economic Analysis
CDFA	California Department of Food and Agriculture
CEQA	California Environmental Quality Act
FVRD	Fraser Valley Regional District
GDP	Gross Domestic Product
Ha	Hectare
LCDC	Land Conservation Development Commission
LUBA	Land Use Board of Appeals
MLRC	Ministry of Land and Resources in China
Mu	unit of area 1/15 ha
NEPA	National Environmental Policy Act
NLCRC	National Land Consolidation and Rehabilitation Centre
PALC	Provincial Agricultural Land Commission
RMA	Resource Management Act
UK	United Kingdom
US	United States

Objectives

This study is an investigation into how different jurisdictions around the world, including United States, Canada, China, and New Zealand, are managing land use and dealing with their growing populations. The focus is on land use planning rules and how some regions have been able to maintain a strong agricultural sector in close proximity to highly built up areas and how other regions are on a fast pace to erode their agricultural production base. Therefore, this study aims to achieve the following three objectives:

1. To investigate how land use planning legislation impacts on agriculture's ability to maintain agricultural production in the rural landscape internationally.
2. To see how urban and rural planning legislation and government policy shape society and its connection or disconnection from agriculture.
3. To understand the process of successful urban and rural planning legislation and policy and how that has been achieved for the long term.

The overall objective of this study is to provide important lessons from these international case studies to the Australian context, such that any future planning processes for peri-urban farmland zones in Australia can learn from their successes and failures.

Introduction - Growing Pains

Australia is a growing nation with a rapidly growing population due to natural increases and immigration resulting in an additional population of 300,000 people per year. Over the last 14 years the population has expanded from approximately 20 to 25 million people, and on current growth estimates, the population will increase up to approximately 30 million people by 2030 and further to 42-49 million by 2066 (Australian Bureau of Statistics [ABS] 2017). These current growth trends indicate that urban expansion will occur, and thus continue to encroach upon agricultural lands located on the urban fringes of cities and towns across Australia.

Putting it into perspective, the current growth rates will require the equivalent of a city the size of Australia's capital city Canberra (with a population of 390,000) to be built every 16 months; or build the equivalent of a city the size of Adelaide, in the state of South Australia (with a population of 1.39 million) every four to five years. Therefore, it is expected that both Federal and State Government's across Australia will have to invest more in infrastructure to provide services for this growing population. However, while such growth may result in increased revenues and higher net employment, catering for this growth will remain a challenge into the future.

Australia is characterised as a dry and arid country and since 1788, settlement has taken place predominantly on the east coast and south east corner of the continent. These areas are the closest to fertile land and water resources considered able to sustain the population. Thus, only a relatively small area of Australia is urbanised. However, with the current and predicted future expansion of the population, combined with the trend for low density living, Australian towns and cities have already begun to sprawl over much of this fertile land. Thus, with this forecast population increase and the future housing requirements, the pressures on agricultural land adjacent to population centres will continue. Therefore, the decisions around planning, land use and community priorities, and how these are managed across the states is important. The policy makers planning for this growth will thus have a direct impact on many existing agricultural businesses close to population centres, and importantly there needs to be strict rules in place to ensure development takes place within legal guidelines (Rollason, 2019).

These challenges are not isolated to Australia. Many regions around the world have growing populations with an increasing need to provide housing for them. Historically, all towns and cities have grown around or near a reliable water source and productive land, used to support agriculture for food production to service the growing populations. However, as the demand for land for this inevitable urban growth increases, it is often the nearby productive agricultural land that is the 'logical' target for that growth. The understanding is that once land moves from agricultural zoning to housing or industrial development, no matter how

successful an agricultural business is, it will struggle to survive the increased costs placed on that land.

This study is an investigation into how different jurisdictions around the world are managing land use and dealing with their growing populations. In particular this study will focus on relevant land use and planning laws in the United States, Canada, China, and New Zealand. In many cases, increasing population density has been a successful strategy to allow the increased population without eroding nearby productive land surrounding expanding cities. This investigation thus focuses on land use planning rules and how some regions have been able to maintain a strong agricultural sector in close proximity to highly built up areas and how other regions are on a fast pace to erode their agricultural production base.

The aim of this study is to provide important lessons from these international case studies to the Australian context, such that any future planning processes for peri-urban farmland zones in Australia can learn from their successes and failures. This study will firstly illustrate how the United States is implementing a number of 'tools' for managing farm loss and providing opportunities for land conservation in the face of urban expansion. The focus is on three states, California, Oregon and Idaho, to demonstrate how challenging the implementation of such policies can be with the competing interests of different stakeholders. Secondly, it reports from New Zealand, describing how this nation is also dealing with similar pressures and the conundrums of urban sprawl on valuable productive land. This report will then thirdly examine the case of China and how this country is dealing with arguably the world's largest population increases and consequent urban sprawl. Finally, this report will look to Canada and analyse its planning policies around land use systems. In each of these nations, and across all of the case studies, this report provides a 'local perspective', where select interviews with local farmers and industry partners provide unique and local examples of the issues and how they are understood. In conclusion, this report will provide a list of recommendations for policy makers and agricultural businesses that will assist them in dealing with the growing pains and future planning in a rapidly expanding urban environment on productive agricultural land.

Chapter 1 – California Dreaming

Overview

California is a powerhouse of the United States' (US) economy, with a population of approximately 39 million and a Gross Domestic Product (GDP) of \$3 trillion (Bureau of Economic Analysis [BEA], 2018). If it was its own country, California would be the fifth largest economy in the world between Germany and the United Kingdom (UK). The Californian agriculture sector generated almost US\$50 billion in cash receipts for 2018 (California Department of Food and Agriculture [CDFA],2018). California grows over one third of the America's vegetables and two thirds of its fruit and nuts totalling US\$20.56 billion, with almonds, dairy products and wine being the largest exports (CDFA,2018).

Overall, California's total land area is approximately 100 million acres, with 43 million acres used for agriculture. The generous Californian agricultural output is however, underpinned by the various irrigation water supplies to around nine million acres of this agricultural land, which allows California's arid environment to produce so much. However, the expansion of residential and industrial areas, and the subsequent road networks have required the acquisition of a further approximately 40,000 acres of this agricultural land per year. For example, between 1990 and 2008, 538,000 acres were developed for urban growth, with 152,000 of these acres taken from what was considered prime agricultural land in irrigated areas (Thompson, 2009).

According to Thompson (2009, p.20) "If current development trends continue, 1.3 million acres of California agricultural land, including 670,000 acres of prime, unique and statewide important farmland, will be developed by 2050". As urban expansion continues into good agricultural land, agriculture is also forced to expand into the fringes, but in less suitable land for agriculture. Thus, irrigation infrastructure for agriculture needs to be extended to supply these more marginal regions. Concurrently, precious irrigation water is also needed to enhance the urban developments, such as providing green spaces (e.g. parks and golf courses), and also for the related industrial developments. Furthermore, as Figure 1 illustrates, 'water' is a contentious issue in this region between residents, drought affected farmers and the developers of a rail network (e.g. Bliss, 2015).



Figure 1. Central Valley California – Water is a hot topic (Source: Author)

Current tools for managing farmland loss

California has several policies to manage the change of land use from agricultural land. The *California Environmental Quality Act* (CEQA) (California Governor’s Office of Planning and Research, 2018) and the *National Environmental Policy Act* (NEPA) (United States Environmental Protection Agency, 1969) both require the consideration of the potential impacts on species and habitat, and farming and/or agricultural lands from development (California Council of Land Trusts, 2014). Furthermore, there are some other structures in place designed to mitigate the loss of farmland. For example, while California has ‘historically’ required one acre of land to be preserved for agriculture for every one acre of land lost to development. However, only some cities and counties have embraced or adopted this policy, thus planning appears to be *ad hoc* (California Council of Land Trusts, 2014). There are other structures in place, and each will be discussed below.

Conservation Easements

Landowners who want to protect their land from change of land use from agriculture well into the future can enter into a ‘conservation easement agreement’ with a land trust, government agency, California Native American tribe or other qualified organisation. Conservation easements offer effective and flexible protection and are one of the most frequently used tools for conserving private land. This voluntary legal agreement protects the land by permanently limiting some uses that would compromise the conservation values or the landowners’ goals for the property. It still allows landowners to own, use, bequeath, or sell their land. Each conservation easement is specifically designed to protect the conservation values of each property and meet the goals of the landowner and easement holder – typically a land trust. As a result, no two conservation easements are alike. Conservation easements offer great flexibility. For example, an easement on a property containing rare wildlife habitat might prohibit any development, while an easement on a farm might allow continued farming and the addition of agricultural structures. The land use must be maintained in the use set out in the easement. Therefore, if its intention is to be used for agriculture that is how the land needs to be used (California Council of Land Trusts, 2014).

Restrictive Covenants or Deeds

In California real property ownership:

includes various rights, along with a wide range of restrictions ... Property owners may restrict the use of a piece of property by subsequent owners through restrictive covenants, which are included with the documents transferring title. Some restrictive covenants include 'run with the land' meaning that they are binding on subsequent owners of the property (Bona Law PC, 2018).

In planned residential developments – enforced by a homeowners' association, restrictive covenants affecting the use of individual properties are included. In relatively rare cases, the grantor of a property may set restrictions on the use of the property, resulting in loss of title by the grantee if they violate those restrictions. If the intended use of the land is agriculture and the future land use plans does not involve facilitate agricultural practices then the title can be lost (California Council of Land Trusts, 2014).

Fee Title

Land trusts, other conservation organisations and government agencies may choose to protect land by acquiring the property they wish to protect. The acquisition of the land (fee title or fee simple) allows the conservation owner to manage the property to preserve and protect its conservation values. The land can be acquired by purchase, donation or a combination of the two. If a land trust acquires the land, the land trust may retain ownership of the property as a permanent preserve or transfer the property to a suitable owner, such as a government agency. In some cases, the land is sold to a private owner, subject to a conservation easement held by the land trust. Proceeds from such a sale could fund the land trust's long-term management of the conservation easement and/or help it to protect even more land. This can ensure that land held by a land trust, can be made available before being leased to a farmer for agricultural use (California Council of Land Trusts, 2014).

Mitigation Banks

Where CEQA and NEPA require the consideration of the potential impacts on species and habitat, and farming and/or agricultural lands from development, 'mitigation' measures can be taken to balance the negative impacts. Mitigation is frequently required when significant impacts are identified by the environmental review process. The California Council of Land Trusts (2014, p. x) defines Mitigation in Section 15370 of the California Code of Regulations (CEQA) Guidelines as:

- (a) Avoiding the impact altogether by not taking a certain action or parts of an action.*
- (b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.*

- (c) Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment. (d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.*
- (e) Compensating for the impact by replacing or providing substitute resources or environments.*

A local perspective

Dr Catherine Brinkley, Assistant Professor Community and Regional Development at the University of California, Davis, indicated that the biggest concern around planning laws in California focussed on the lack of a 'centralised planning' policy for the state. The other major issue of concern was the fact that the Californian State government can override local governments on planning issues. Further to this was the issue around planning in California where there is a major focus on road infrastructure for private vehicles, but a very fragmented plan for public transport. Interestingly, Brinkley was supportive of land trusts having the ability to secure and preserve farmland but was also concerned about the sometimes-fragmented nature of land conservation (Brinkley 2018).

Californian Farm Bureau President James D 'Jamie' Johansson based in Sacramento (Figure 2), stated that the biggest concern to farmers was the growing population and the subsequent urban growth that this brings, and thus impacts on the ability of farm businesses to continue to operate. The expansion of suburbs into farming areas is affecting both intensive livestock businesses, with dairy the most visible, and farm operations, such as in orchards and vineyards (Johansson 2018).

California does have the 'Right to Farm' (see Wacker, Sokolow & Elkins, 2001; and California Civil Code 3482.5 "The Right to Farm Act", 2001) legislation which permits new housing developments to have the 'right to farm ordinances' held over them. This basically prevents new residents from being able to stop any current agricultural practices (such as a dairy) from taking place. Nonetheless, according to Johansson (2018), even with this 'Right to farm' legislation in place, farming does become more difficult as housing developments expand into agricultural areas. For example, as Johansson explained, over 500 Californian dairies had been shut down in the last five years because of the changes in land and water use resulting from the urban encroachment. Furthermore, the anticipated expansion of various nut tree crops was also curtailed due to these pressures (also see Parsons, 2017). From the perspective of the Farm Bureau, represented by Johansson, urban encroachment on agriculture and ongoing issues around water access were the major issue of concern for Californian farmers (Johansson 2018).



Figure 2. Californian Farm Bureau President James D. Johansson (left) with James Stacey, Sacramento California (Source: Author)

California has growing demands for road infrastructure, residential and industrial development, but also has inconsistent planning laws. California-style conservation easements if introduced in Australia could have a positive impact on preserving farmland if they were supported by local planning authorities. Regulations have allowed urban sprawl onto prime agricultural land. Californian water supply is a key component of the agriculture and urban demands and this is placing a higher value on that water. Therefore, California is seeing a shift in irrigated agriculture into higher value crops, with for example, a large expansion into almond and hazelnut production.

Chapter 2 - The Sensible Centre - Oregon

Overview

Oregon is one of the most geographically diverse states in the US. It extends from the Pacific Ocean in the west, through the mountain forests and up to the high elevation desert in the east. The economy of Oregon is based around timber, fishing, agriculture and hydroelectricity. The most highly productive agricultural region is the 100 miles long Willamette Valley, a strip of highly fertile land between the mountains and the ocean. The land here is watered by the rivers from the mountains and used extensively for irrigation.

Land Conservation

Oregon began to grow rapidly in the 1960's. Residents witnessed the chaotic growth of the urban fringe areas and were concerned about this urban sprawl and thus the loss of farmland and forests. Therefore, resulting from this concern, a conference was convened in 1967 - "The Willamette Valley – What is our Future in Land Use" – which aimed to spread awareness about the urban encroachment on agriculture. From this conference the Legislative Committee on Agriculture proposed a bill which became Senate Bill 10 "Oregon's first mandatory planning legislation". This requires every state and county to prepare comprehensive plan in accordance with a set of general state goals while preserving the principal of local responsibility for land use decisions. The legislation was strengthened, and a referendum was held in 1970 with 55 percent of the population supporting the legislation (Oregon Historical Society, 2020).

Oregon then enacted Senate Bill 100 in 1973 which created an institutional structure for state-wide planning. It simultaneously established and defined a broader public interest at the state level. Planning is supervised by the Land Conservation Development Commission (LCDC) which oversees the compliance of local planning with state-wide goals. It is made up of seven members appointed for four-year terms. A requirement exists for periodic reviews of each city and county plan to deal with changing circumstances. There is a Land Use Board of Appeals (LUBA) which can deal with any complex land use law cases (Oregon Historical Society, 2018).

A local perspective

Jim Johnson is the Land Use Coordinator at the Oregon Department of Agriculture, US (Figure 3), and he provided an excellent overview of the planning issues in Oregon. Oregon City plans are reviewed every five to 10 years based on the size of the community and growth pressures. An independent organisation, the Portland State University, prepares the demographic projections for population growth. If growth is predicted, the Department of Agriculture will then identify land that can be made available which has the lowest economic benefit to be retained as agricultural land. The planning rules appear to have strong community support in maintaining a clear definition between rural and urban areas. These planning laws also allow

farmers to have a clear understanding of land use into the future. Property developers also support the policy as there are clear rules around making more land available as required. Government can invest in infrastructure with contributions from developers in a planned fashion. Furthermore, urban renewal is encouraged to support population increases (Johnson 2018).

Johnson (2018) explained that new industries like solar generation on farmland were the subject of some debate as to its suitability for construction on productive farmland. Furthermore, he noted from a local perspective, that there was a general belief in Oregon, that if there was a strong rural sector, there will be a strong urban sector. That is, with concentrated population centres near farms and agricultural production facilities, finding staff was made easier. Also, the large number of nurseries and farm shops selling farm produce direct to the public in very close proximities to urban centres was a positive for agriculture (Johnson 2018).



Figure 3. Jim Johnson (right), Land Use Coordinator Oregon Department of Agriculture, with James Stacey, Salem Oregon (Source: Author)

Oregon has a well-managed planning system, and the community values this in its support for agricultural production. Oregon has a realistic forward planning strategy that manages requirements for land for development. By identifying what is needed for growth through population planning and then directing future development to areas that have low agricultural value, Oregon is well placed to grow its population while maintaining a strong agricultural sector. Farmers are confident to invest in their businesses for the future even within sight of large towns and cities.

Chapter 3 – Meridian, Idaho – A Treasure

Overview

Meridian is the second largest city in Idaho after Boise and is located in the Treasure Valley. The Boise River and the Snake River feed irrigation channels in the region, combined with its hot and dry summer growing conditions, plus an average rainfall of 299mm (*Weather Atlas*, 2020), it is ideal for potatoes, onions, lucerne and many vegetable seed production crops. Indeed, according to Berry (2018), “Treasure Valley is one of five hubs of the global seed industry, producing approximately 50 seed crops in the region and shipping them to 120 countries. In Ada and Canyon counties, it’s a \$550 million industry”. Thus, extensive infrastructure to deliver water through channels and pipelines covers the Treasure Valley floor.

Urban expansion in the desert

With an estimated population of 99,000 Meridian has grown from a population of 75,000 in 2010 (US Census Bureau, 2019). Meridian is thus amongst the fastest growing cities in the US. Despite its relatively low rainfall, the development of Meridian has been enabled by the ingenuity of “The Settlers Irrigation Ditch, [built in] 1892, [which] changed the arid region into a productive farming community” (*Iconic Idaho*, 2020). This included the construction of dams in the Rocky Mountains captures the winter snow melt which is then directed into rivers and channels east of the Rocky Mountains for irrigation and urban use.

However, the estimates of urban expansion in the Treasure Valley to 2100 (see Narducci, *et al.*, 2017) show that this population growth will have a significant impact on this region. Allowing for the lower population growth estimates predicted, of the 350,000 acres of agricultural land in Treasure Valley, 140,000 acres will be lost from agriculture while the ‘urban gain’ will create a footprint over 160,000 acres (Narducci, *et al.*, 2017).

A local perspective

According to a local carrot seed growing farmer (see Figure 4), urban planners encourage development to continue, and thus support this population increase, but in a gradual fashion. However, there is not any protection for preserving farmland in this process. For example, irrigated land with water was trading at between US\$3000-\$6000 per acre, with land suitable for urban development close to Meridian only trading for US\$15,000 per acre. This relatively low cost of land for urban development and affordable housing is driving this rapid growth. This Meridian farmer was particularly concerned about the loss of farmland and the loss of irrigation infrastructure as the urban housing expands (see Figure 5). Nonetheless, he understood why people were moving to this area, with its affordable housing and a warm summer climate, but remained concerned for his long-term future. He indicated that it was noteworthy how many dairy farmers who had actually moved from California to Idaho, to get

away from the urban sprawl there, were now experiencing the same problems and may have face the issue of moving again to more fertile lands (Anon. Meridian Farmer, 2018).



Figure 4. Zac Stacey (L) with a Meridian carrot seed harvest farmer (right) (Source: Author)



Figure 5. Irrigated field outside of Meridian being cut up for lifestyle blocks (Source: Author)

Meridian is an extreme case of urban growth coming at the expense of agricultural land. It's characteristic of regions in Australia where the priority is put on urban growth with limited restrictions. Property developers the world over will choose quality farmland over poor quality land such as rocky outcrops to develop as it is cheaper to build infrastructure and offers faster development. The prioritisation of residential development within the Treasure Valley is resulting in the loss of productive irrigation land from agriculture. Urban development is without regard for future needs and a similar issue is evident in Australia also.

Chapter 4 - Close to Home, the New Zealand story

Overview

New Zealand's planning laws previously operated under the Town and Country Planning Act, 1977, until 1991 when this act was superseded by the New Zealand Resource Management (RMA) Act 1991 (New Zealand Parliamentary Council Office, 1977; 2019). Each local government area operates their own planning rules within the RMA guidelines. It is noteworthy that the superseded Town and Country Act 1977 actually took land classifications into account when planning urban developments, in order to protect high value land. The newer RMA does not take into account land classification in planning decisions (and yet among its few considerations, it lists the importance of "the protection of the habitat of trout and salmon" (introduced fish species) (Wells, 2018; also see Williams, 2000, p. 695). Significant and often swift, land use change in New Zealand is putting increased pressure on food growing hubs to keep up with mounting demand for fruit and vegetables. Between 1996 and 2012 in New Zealand, urban growth saw the size of towns and cities grow by ten percent, while between 2002 to 2016, the areas of land growing vegetables declined by 30 percent (*Deloitte*, 2018).

The Pukekohe region is in the Auckland council area and comes under the Auckland Unitary Plan (Auckland Council 2018). For an area accounting for only 3.8 percent of New Zealand's total hectares of fruit and vegetable production, the Pukekohe hub 'punches far above its weight'. The high value horticulture region is included in urban growth plans and is expected to be under significant pressure from Auckland's growing population in the future. The \$327 million annual revenue generated by the hub's horticulture businesses equates to 26 percent of New Zealand's total domestic value of vegetable production (*Deloitte*, 2018).

A local perspective

Pukekohe farmer Bharat Jivan, from Jivan Produce farms on the fringe of the urban boundary, explained that they had sold some land that is surrounded by housing, and then leased other land further away from this urban growth area. Jivan's business base is located within 500 metres of the current urban boundary. However, the problem is that current water extraction laws only allow water to be used on the block it is extracted from and licensed to, which is limiting their ability to move to land further away from urban growth as they are unable to move their water extraction licences (Jivan, 2018; also see Oxenham, 2017).

Another issue impacting the Jivan Produce farms business is that the farm is also located on the edge of the Pukekohe and Waikato council areas. Land that is not already in horticultural production in the Waikato council area is difficult to convert to horticulture, because nutrient management rules prevent the conversion of dairy and grazing land into horticultural use

(Jivan, 2018). One positive aspect of the location is that the Jivan Produce farm business is currently close to markets and a population base which can be drawn on for staff for the farm and other processing operations (Jivan 2018).

Chris Claridge, CEO of Potatoes NZ (Figure 6) reiterated this conundrum in the industry, stating that as horticultural businesses move further away from urban centres, and operate in more regional areas, they have more difficulty finding suitable staff to operate throughout the year and especially around critical harvest periods (Claridge 2018).



Figure 6. Chris Claridge (right) CEO Potatoes NZ with James Stacey overlooking Pukekohe housing developments (Source: Author)

New Zealand is facing very similar challenges to Australia with some local governments actively promoting urban sprawl and development. Similar to Australia, New Zealand horticultural production can shift to other regions with suitable soils, climate and water but may have challenges in securing labour to manage and harvest. While New Zealand's horticultural production can shift to other regions with suitable soils, climate and water, it may have challenges in securing labour to manage and harvest crops. Another barrier to shifting horticulture is the issue of nitrogen and broader fertiliser management in the environment. Australian farmers need to be conscious of these constraints and regulations as similar regulations may become law in Australia.

Chapter 5 – China: Is Communism the answer?

Overview

The People's Republic of China has various tools in place to reduce the rate of farmland loss and aims to "replenish as much arable land is currently occupied by non-agricultural construction". As reported by the online *Xinhua* news agency, one recent document released from the Chinese government stated that "Efforts must be made to stabilise farmland area[s] and improve its quality to ensure grain self-sufficiency and food security" (*Xinhua*, 2017). As it was reported, "China aims to retain at least 124.33 million hectares of arable land in 2020, and the figure was 133.3 million hectares at the end of 2015. The government has set a warning level of 120 million hectares and reiterated the level must not be breached" (*Xinhua*, 2017).

According to Ding (2004), 60 percent of the population lives on "less than one-third of China's land area ... composed of the (more arable) plains and basins ... There are fewer farms in China per capita than in almost any other country. China's rate of per capita farmland occupation is 0.26–0.30 acre ... less than 43 percent of the world average ... [and yet] China is able to feed 20 percent of the world's population with only seven percent of the world's farmland" (Ding, 2004).

However, the issues facing China are similar to other regions and nations, especially in relation to fast paced "farmland conversion" to urban and industrial developments (Figure 7). While this change in land use is concerning for future food security, it is a consequence of China's rapid economic development. It would seem there is some tension in China between a) the need to provide housing, by necessity on currently used farmland, and b) the need to save this land for farming to maintain food security. As Ding (2004) pointed out this tension between land uses is also being driven by the projected population increases which will see further demands for urban housing, and the associated services and infrastructure needed (Ding, 2004). Preserving agricultural land is not the only challenge, with significant historical and cultural sites, including urban architecture also under threat (Figure 7).

Farmland Preservation Laws

In China there are two farmland preservation laws which aim to prevent the loss of farmland to urban sprawl. The first is the 1994 "Basic Farmland Protection Regulation", which according to Ding (2004) aims to achieve a "so-called zero net loss of farmland". This law thus, requires the designation of basic farmland protection districts at the township level and prohibits any conversion of land in those districts to other uses. It also requires that a quota of farmland preservation should be determined first and then allocated into lower-level governments in

the five-level administrative chains (the state, province, city, county and township) (Ding, 2004).

The second farmland preservation law was enacted in 1999. This is the “New Land Administration Law”, and importantly extends the aims of the first law, and stipulates that “basic farmland shall not be less than 80 percent of the total cultivated land in provinces.” Its intentions, on paper at least, are “to protect environmentally sensitive and agricultural lands, promote market development, encourage citizen involvement in the legislative process, and co-ordinate the planning and development of urban land” (Ding, 2004). According to Ding (2004) these farmland preservation laws aim to prevent the ‘conversion’ of basic farmland, or larger acreage (>173 acres) into urban developments. These laws have potential to work in the Chinese context because they also encourage and support “land development in areas that are considered wasteland or that feature low soil productivity” (Ding 2004).

However, according to Ding (2004), despite these laws, farmland is being lost to urban sprawl in China. Huang, et al. (2011) have noted that in 2008, over half of China’s total construction land was ‘rural settlements’. These amount to the ‘development’ of China’s once cultivated lands, resulting in the substantial increase in the number of people per square metre (between 1996 and 2008 from 193 to 230 people, see Figures 8 and 9).



Figure 7. Kong Cheng old street Anhui China, a rare sight in rural China, a preserved piece of history (Source: Author)



Figure 8. New rural village construction reducing the area required for residents (Source: Author)



Figure 9 New cities with high rise apartments increasing population density in cities reducing the urban footprint (Source: Author)



Figure 10 China land consolidation. A rural village in transition - undergoing demolition (Source: Author)

Land Consolidation

Huang, *et al.* (2011) have argued that the concept of 'land consolidation' may actually increase agricultural production in the long run, by improving "land quality and irrigation system ... and [reducing] land fragmentation" (Figure 10). Land consolidation has also been used by the Chinese government to "cover public demands for access to land and to resolve the resultant land-use conflicts" (Huang, *et al.*, 2011). The structures that were put in place in China in 1997 to enable this land consolidation to occur, required the Ministry of Land and Resources in China (MLRC) to create the National Land Consolidation and Rehabilitation Centre (NLCRC) which was set up in *each province and municipality* and tasked with the following: "initiating the national land consolidation project, offering technical guidance in the implementation of local land consolidation, managing the funds for land consolidation and rehabilitation, and conducting engineering and technology research in land consolidation and rehabilitation fields" (Huang, *et al.*, 2011).

The Ministry decided in 2005 to ensure that there would be a rational pattern for land-use. Thus, urban developments could be no bigger than the size of any decrease in rural settlements, and the latter should all be converted back into cultivated land. This policy was well received by the government because it ensured that 'future economic development' would not be compromised by the lack of 'construction land', and played a crucial role in developing the Chinese countryside. These land consolidation policies in China have seen millions of acres saved or converted back to cultivation, which has increased grain production (Huang, *et al.*, 2011).

A Local Perspective

Paul Niven (2014 Nuffield Scholar and Farm Manager in China) revealed that urban consolidation is highly visible in the rural landscape. Cities close by to these regions have many new high-rise apartment blocks, which have been purpose-built for the village residents, and are often constructed in blocks of eight. The value of the rural land recovered pays for the construction of the new apartments. The demolished older villages are then returned to agricultural production (Niven, 2018).

He stated that as residents of rural villages are being rehomed in new apartments, many villages are collectively leasing their farmland to larger business operators. This consolidation of land is allowing businesses to operate farms on a more significant scale with each village controlling 100-150 hectares. Some villages are also converting corn and wheat irrigated cropping land into stone fruit growing areas (Niven, 2018).

Significant investment in fast rail across China has made the consolidation of farmland and growth of cities an opportunity for people to easily transit from city to city. The fast rail network allows new cities to be developed away from higher quality farmland regions to areas with less productive capacity, but still allows fast transport times between cities (Niven, 2018).

Rural consolidation is allowing farmland to be developed for modern equipment to plant and harvest crops, and ease of access to these areas is enabled by fast rail networks (Figure 11).



Figure 11. Rural consolidation is allowing farmland to be developed – as seen from inside a fast-train (Source: Author)

China has a national plan to maintain land in agricultural production while still encouraging development. This top down government approach is not evident in Australia from the Federal Government. The Chinese land consolidation strategy which involves retaining 85 percent of productive land in agriculture is an excellent tool for promoting a more efficient use of land for primary production while also, improving working and living conditions of people living in rural areas. Implementing a similar policy in democratic societies would be more challenging than what has been done in China. For example – the large shift of people from rural villages to high rise city apartments may be unrealistic in Australia. Farm land preservation laws in China place a government target on the retention of farmland, Australia could also do the same thing to but a baseline of farmland preservation in place that could then help guide planning development for future population increases.

Chapter 6 – Canada: The Utopian Dream

Overview

Vancouver, located on the west coast of Canada in British Columbia (BC), is the eighth largest city with a rapidly growing population. 'In 2020 the population of Greater Vancouver has expanded to 2.5 million, making this region “the most populous in Western Canada” (*World Population Review*, 2020).

The Greater Vancouver region is host to the Fraser Valley which is a highly productive agricultural region (Figure 12). With its mild climate influenced by its coastal location, low frost days, 1700mm rainfall and ability to irrigate from groundwater and rivers, it is a dynamic agricultural production region. Fruit, vegetable, dairy and crop production make up most of the agricultural production. This region generates around two-thirds of 'gross farm receipts' in BC, totalling approximately CA\$2.4 billion. According to the Fraser Valley Regional District [FVRD] (2017),

Gross farm receipts reflect only one aspect of the economic impact of agriculture in the FVRD. Farm operators are significant consumers of goods and services, which are embodied in agriculture's operating expenses. In 2015, total farm operating expenses totalled \$1.2 billion, much of which flowed back into the local economy. The broader agricultural economy, which includes food processors, transporters, wholesalers, retailers and other food services industries, adds yet another level of economic activity.

The protection of farmland has been at the forefront of land usage laws in BC, mainly because “In the late 1960's and early 1970's, nearly 6,000 hectares of prime agricultural land were being lost each year to urban and other uses.” Therefore, by 1973 the *Land Commission Act* was created to help prevent this from occurring (Provincial Agricultural Land Commission, [PALC] 2020). The outcome of this Commission was that it “established a special land-use zone – the Agricultural Land Reserve (ALR) – to protect and preserve - BC's agricultural land and encourage farming in collaboration with other communities of interest” (PALC, 2020). The Fraser Valley is thus a beneficiary of the regional British Columbia government's ALR policy. Essentially, this is a “provincial zone in which agriculture is recognised as the priority use and non-agricultural uses are restricted” (Government of British Columbia, 2020). According to the PALC (2020), “The 4.7 million hectares of the Reserve were identified between 1974 to 1976 through co-operative efforts with regional districts and member municipalities. Local input was gained through a public hearing process. Despite boundary changes over the decades, the Reserve remains approximately the same size (5 percent of the province)”. It is also important to note that, “The ALR boundary is based on biophysical information related to the natural characteristics of the land and its climate. The intention was to set boundaries on objective technical characteristics, rather than on the variables of the market and other socioeconomic conditions”.

As societies developed and conditions changed after 20 years of this policy The Agricultural Land Commission Act was amended. Firstly, in 1994 it was amended to “strengthen the role of local governments and improve administrative procedures [to] guarantee public input before exclusion applications were decided” (PALC, 2020). The policy was reviewed again in 2018, and an ‘agriculture-first’ priority was emphasised. (Minister of Agriculture’s Advisory Committee, B.C., 2018). Increasing population numbers across the region have encouraged the advisory committee to the government to take land usage seriously and have stated that “unless the provincial government raises the profile of agriculture across all provincial ministries/agencies, the erosion of the ALR and the decline of British Columbia’s (B.C.’s) agricultural industry is a certainty” (Minister of Agriculture’s Advisory Committee, B.C., 2018, p. ii).



Figure 12. British Columbia - Fraser Valley farmland with urban development on the hills in the background (Source: Author)

A Local Perspective

Martin Collins, Director of Policy and Planning Agricultural Land Commission, explained the history and issues facing the ALR (Collins, 2018). With such a unique system of maintaining a hard-urban boundary since 1973, many urban planners and others dealing with urban growth (including many from Australia) have come to see how the ALR is managed. Collins stated that it took almost 20 years from when the ALR began for property speculators to give up on having property rezoned and selling or leasing it back to agriculture. The current challenge for land within the ALR is the expansion of extremely large family homes, housing multiple families, and being constructed within the zone on small rural holdings. New rules put in place are limiting the square footage construction allowed to try and curb the impact of these developments (Collins 2018).

Kent Mullinix from the Kwantlen Polytechnic University Institute of Sustainable Food Systems Canada (see Figure 13), stated that although protecting farmland using the ALR is a positive thing to do, government policy needs to be more supportive of agricultural production in the ALR, such that it can be even more successful. As Mullinix pointed out, with the increasing levels of ‘animal activism’ (e.g. Brown, 2019) in the community, and the need to maintain a ‘social licence’ (e.g. Currie, 2017) to farm, farmers must become stewards of food and agricultural production and align themselves with community expectations and their environmental standards (Mullinix 2018).



Figure 13. Kent Mullinix KPU (left) Vancouver with James Stacey (Source: Author)

British Columbia has stringent planning regulations around urban growth planning. These rules have shown that population growth can increase without losing agricultural land. Strong planning laws which offer security of land tenure encourage farmers to invest in their farm businesses with confidence knowing the investment will be valuable long into the future. In addition, strong planning laws are a disincentive to people purchasing land to speculate on a future land use change. If farmers can maintain ‘social license’ to operate their agricultural businesses, community support for the balancing act between urban growth and productive agricultural land will continue to be supported.

Conclusion

From these case studies, a number of similarities are evident with challenges facing the nation of Australia. For example, California has growing demands for road infrastructure, residential and industrial development, and also inconsistent planning laws between local, State and Federal Government, which have allowed urban sprawl across productive agricultural land. In both Australia and the state of California, water is a key component of agriculture and urban demand for that water is increasing and placing a higher value on that water. This lack of protection of agricultural land for production is similar in both Australia and California.

For the same reasons, the case of Oregon is relevant to Australian policy makers, due to its well-managed planning system, and its community support for agricultural production. Oregon has a realistic forward planning strategy that manages requirements for land for development, and these strategies will be of interest to other nations with similar urban and agricultural pressures like Australia.

The case of Meridian in Idaho provides an extreme case of urban growth coming at the expense of agricultural land. Its characteristic of regions in Australia where the priority is put on urban growth with limited restrictions. Property developers will usually prefer quality farmland over rocky outcrops for example, for their developments, due to the associated costs. Thus, any urban development without regard for future agricultural and food security needs is both relevant to and evident in Australia.

Perhaps due to its proximity, the issues and challenges faced by New Zealand are very similar to those facing Australia, with some local governments actively promoting urban sprawl and development and others trying to improve planning laws to ensure sustainable development. Like Australia, New Zealand horticultural production can shift to other regions with suitable soils, climate and water, but may have challenges in securing labour to manage and harvest crops. Australian farmers need to be conscious of these types of constraints and regulations as similar regulations being enacted in New Zealand may become law in Australia.

Does China have the answers? Clearly, the Chinese practice of land consolidation has demonstrated that it can be a useful land-management tool, promoting a more efficient use of land for primary production while also, improving working and living conditions of people living in rural areas. However, these policies require a strong centralised government utilising a 'top down' approach, which is unlikely to occur in Australia's liberal democratic society.

The stringent planning regulations around urban growth planning in Canada's British Columbia could be considered useful in an Australian context. These rules have shown that population growth can increase without losing agricultural land. Australian planners should consider the merits in increasing population density. However, this requires high quality, efficient public transport, which eliminates the high cost of providing infrastructure such as roads and utilities to sprawling new suburbs. In the Australian real estate market, land can be purchased outside

of urban planning boundaries with the intention of lobbying authorities to change its land use from farming to housing or industrial land, and this has often led to productive agricultural sitting unutilized for many years. Thus, strong planning laws will offer security of land tenure to encourage farmers to invest in their farm businesses with confidence. These same strong planning laws could also be a disincentive to people purchasing land to speculate on a future land use change. Finally, if farmers can maintain the 'social license' to operate their agricultural businesses, community support for the balancing act between urban growth and productive agricultural land will continue to be supported.

It was clear that different countries have different strategies to deal with population growth. From a basic planning 'free-for-all' in California, to a highly regulated planning regime as seen in China, the pressure is on to deal with growing populations across the world. This study has shown that once land is rezoned from farmland to residential or industrial land, the subsequent increase in land taxes or rates essentially forces that land out of the grip of any agricultural use, no matter how profitable the farm enterprise may be.

As populations increase, there is the ability to house more people on the same area, but this will rely on the 'social contract' between the people and farmers in general, and an acceptance for high density living. If society wants to maintain a connection to a rural working environment in close proximity to urban centres, the people who are involved in agriculture need to work with policy makers to put a system in place that can both sustain agriculture through suitable land zoning and a growing population. In the case of Australian agriculture, there needs to be an ongoing dialogue with both Federal and State Government to ensure that maintaining and preserving viable farming businesses in the near urban environment are prioritised, and how that fits in with a rapidly growing population.

In the future, society needs to make a choice between maintaining a strong resource base for agricultural production close to urban centres or ensuring that farmers are adequately compensated for their exit from these productive regions. Legislation on urban boundaries and agricultural heritage protection zones are only as strong as the review process around those rules. If the rules are strong and independent people can make long term decisions. If the system can be manipulated by powerbrokers or politicians, it will fail. All levels of government need to be involved in key long-term planning strategy to deal with Australia's growing population, infrastructure for both infill redevelopment and greenfield development needs to be better planned and funded with a longer time frame. If government wants to increase the rural population it will need efficient public transportation that can move people quickly and at an affordable cost. This will need to be a key priority for planners in the future. Communities with a strong physical connection to agriculture appear to be highly supportive and engaged with local agricultural producers. This is critical for future planning in Australia and beyond in terms of balancing the growing pains brought on by increased populations and decreasing agricultural productive lands.

Recommendations

1. Australian primary producers need to lobby both State and Federal Government's how important maintaining and preserving viable farming businesses are in the near urban environment and how they can co-exist with a rapidly growing population. If society makes a choice that maintaining a strong resource base for agricultural production close to urban centres is important, farmers need to be made aware so they can securely plan future farm investment. On the other hand, if urban encroachment becomes a priority, farmers need to get the best return for their exits from agriculture or relocation of their business.
2. When urban growth boundaries and agricultural protected areas are designated, strong legislation is needed to ensure that changes to these boundaries in the future is restrictive. This will enable landowners to make long term decisions without being concerned that a change of government will undermine their long-term farm planning.
3. When land is required for growth, landowners of properties identified for development should be given 10-15 years notice in advance of the land use change. This gives agricultural businesses the ability to continue operations and then receive appropriate financial compensation when the land changes use. This gives those businesses the opportunity to invest and grow with them receiving full value for the land use change, not a land banking property developer.
4. An organisation independent of planning authorities needs to be involved in assessing future population growth trends.
5. When it is identified that land is required for development, the land made available should be on the lowest value agricultural land leaving more productive areas for agriculture.
6. Political donations to State, Federal and Local Government from property developers needs to be outlawed as it already is in some states such as Queensland, to reduce the perceived or actual corruption that may occur regarding planning laws.
7. Legislation on urban boundaries and agricultural heritage protection zones is only as strong as the review process around those rules. That is, if the rules are strong and independent people can make long-term decisions. If the system can be manipulated by politicians, it will fail.
8. When farming in the peri-urban environment, farmers need to be aware of the very public nature of their operation and meet high community expectations of their farming practices. Having public support for the farming systems is better than being subjected to community antagonism.
9. All levels of government need to be involved in key long-term planning strategy to deal with Australia's growing population. Infrastructure for both infill redevelopment and greenfield development needs to be better planned and funded with a longer time frame. If government wants to increase rural populations, efficient public transport

that can move people quickly and at an affordable cost will need to be a key priority for planners in the future.

10. Communities with a strong physical connection to agriculture appear to be highly supportive and engaged with local agricultural producers. By keeping productive agriculture visible and operating close to urban areas agriculture maintains its connectivity to consumers.

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Plain English Compendium Summary

Project Title:	Growing Pains: Planning for Future Populations
Nuffield Australia Project No.:	1816
Scholar:	James Stacey
Organisation:	Bremer River Farms RSD6 Strathalbyn South Australia 5255
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Objectives	<ol style="list-style-type: none">1. Understand how planning rules impact on agriculture in the rural landscape in a number of countries and local regions within those countries.2. To see how planning rules shape society and its connection or disconnection from agriculture.3. To understand the process of successful planning and how that has been achieved for the long term.
Background	Australia has a rapidly growing population. All through history, towns and cities have been placed in close proximity to a water source and productive land which has been used to support agriculture for food production. As demand for land for urban growth increases often agricultural land is targeted. This study is an investigation into how different jurisdictions are managing land use and dealing with a growing population in regards to land use planning laws.
Research	Investigation of planning laws and regulations in the USA, Canada, New Zealand and China.
Outcomes	It is clear different locations have different strategies to deal with growth. Increased population density has been used successfully to increase population without eroding productive land around expanding cities. Once land is rezoned from farmland to residential or industrial land the increase in land tax or rates will force that land out of agricultural production no matter how profitable that farm enterprise is. If society wants to maintain a connection to a rural working environment in close proximity to urban centres, those involved in agriculture need to work with policy makers to put a system in place that can both sustain agriculture through suitable land zoning and a growing population.
Implications	If society makes a choice that maintaining a strong resource base for agricultural production close to urban centres is important farmers need to know that. On the other hand if it's not a priority, farmers need to know to get the best return for exits. Legislation on urban boundaries and agricultural heritage protection zones is only as strong as the review process around those rules. If government wants to increase rural populations efficient public transport at an affordable cost will need to be a key priority. Communities with a strong physical connection to agriculture appear to be highly supportive and engaged with local agricultural producers.
Publications	Nuffield Australia National Conference, September 2019