Chapter 10
The Role of Peri-Urban Land Use Planning in Resilient Urban Agriculture: A Case Study of Melbourne, Australia

Michael Buxton, Rachel Carey, and Kath Phelan

Abstract Peri-urban agricultural production remains important globally and its value will increase as the impacts of climate change, energy costs, rising world population and changing patterns of food consumption are felt. Maintaining the natural resource base for food production around cities will become an increasingly important part of city planning. Yet peri-urban areas continue to undergo radical change over much of the world, displacing traditional agriculture and reducing the capacity of cities to adapt to non-linear change. Urban resilience is best maintained through a regional approach which connects urban and peri-urban systems. Such system relationships are examined in a case study focused on the city of Melbourne in South-East Australia. Peri-urban Melbourne produces a significant proportion of the fruit and vegetables grown in the state of Victoria, but agricultural production on the city's outer fringe is under pressure from rapid urban development. This case study examines three scenarios which relate rural and urban land supply and demand, and explore land use planning techniques for limiting rural land development and transferring demand for rural land to regional settlements. It argues that stronger statutory planning measures are required to stem the loss of peri-urban agricultural land and that these will need to be accompanied in future by a range of other strategies to strengthen the resilience of city food systems.

Keywords Agricultural production • Peri-urban land use planning • Rural land development • Peri-urban agricultural land • Food systems

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10.1 Introduction

One of the enduring legacies of a 'pioneer' nation, such as Australia, is the belief that land will always be available for a range of uses and that technology will continue to increase production. This belief encourages the consumption of large areas of peri-urban agricultural land for urban purposes. Land use planning systems are intricately related to this process, either protecting or facilitating the conversion of agricultural land. The development of complex global food chains reduced the reliance of cities on peri-urban areas for their food supply. However attention is once again turning to peri-urban areas in the context of growing pressures on the global food system, including climate change, loss of agricultural land, water scarcity and rapid urbanisation (Morgan and Sonnino 2010; RTPI 2014; Caldwell et al. 2011; FAO 2011).

Climate change is likely to have a negative impact on global food production, due to increasing temperatures, a decrease in water availability and an increase in extreme weather events, such as drought and flooding. Its effects are expected to include rising food prices and increasing food insecurity, particularly for vulnerable and low income population groups (Porter et al. 2014). Water availability for food production is also under pressure globally from over-allocation of water resources in most major river systems (Molden 2007) and there are growing constraints on the availability of land for food production (Bot et al. 2000). These environmental pressures on food production have emerged at a time when demand for global food production is rising to meet the needs of a growing population.

In response to these emerging constraints on global food supply, as well as the pressures of rapid urbanisation (Morgan and Sonnino 2010; FAO 2011), cities are assuming a more central role in planning for the food needs of urban populations (Morgan 2010; Cockrall-King 2012). Urban and peri-urban food production is increasingly seen as an important element of urban food security. Potential benefits include an increase in the availability of healthy foods, such as fruit and vegetables, for urban consumers (WHO 2001), the provision of employment opportunities, particularly for the urban poor in cities of the global south and an increase in the resilience of urban food systems to disruptions in food supply due to climate change and natural disasters (De Zeeuw and Dubbeling 2009). Urban and peri-urban agriculture helps to strengthen the resilience of city food systems by diversifying food sources, reducing the energy requirements for transporting and cooling perishable food products and by enabling the use of urban wastewater for food production.

This chapter will examine the complex relationships between land use planning and peri-urban agriculture, concentrating on the value of peri-urban agriculture, and the role of planning systems in assisting its retention or encouraging its displacement. The chapter argues that peri-urban food production remains important despite its continuing displacement, and that it provides a vital means of increasing the capacity of urban systems to adapt to fundamental change. The chapter illustrates these system relationships by examining the importance of Australian peri-urban agriculture and through a case study of the relationships between planning systems

and agriculture in the peri-urban area of Melbourne, Australia. The case study examines three scenarios which relate rural and urban land supply and demand and explore land use planning techniques for limiting rural land development and transferring demand for rural land to regional settlements. It argues that regulatory land use tools allow a precautionary approach to be taken by maintaining future options in peri-urban areas.

10.2 Production and Consumption

Peri-urban areas have been "the locus of both consumption and production activities, of both resource-seeking and growth resisting policies, and of contrasting settlement forms" (Bourne et al. 2003:257). Changes in peri-urban areas are often regarded as a progressive shift away from the traditional production based land uses associated with agriculture to places of resource consumption (Sinclair et al. 2003, Hollier et al. 2004; Barr 2003; Argent 2002, Pezzini and Wojan 2001, Pires 2004). Allen and Davila (2002) argue that such a shift involves a change from dominant forms of agriculture to a new multi-functional land use pattern in a mosaic of rural and urban uses where urban uses gradually become dominant. This new pattern is characterised by competing and increasing demands that affect the traditional cultural fabric of such areas. Aesthetic, recreational and biological resource values of this multi-functional landscape often depend on the landscape's authenticity as a food producer (Bills and Gross 2005).

This consumption is by a growing band of people who live in and outside peri-urban areas (Mattingly 1999). The conversion of land uses from production to consumption occurs at a rate far in excess of the need to accommodate the level of population growth. Much of the conversion accommodates the consumption of more intangible experiences sought by urban dwellers who seek a lifestyle experience requiring a much larger area of land than a conventional residential lot (Salt 2004). Resources consumed include agricultural products and commodities needed for nearby urban areas, such as water from catchments, stone and mineral deposits and harder to define factors, such as open space, landscape and recreational value (Willis and Whitby 1985; Johnson and Beale 2002). Some agricultural uses provide a setting to new uses, such as restaurants and convention, accommodation or recreation facilities. Bunce and Walker (1992) argue that the desire for ownership of amenity resources converts countryside into residential areas. Thus the amenity of peri-urban areas is valued and exchanged like any other commodity, driving up the value of land. They argue that exurbanisation is the process of commodification of amenity. Some researchers have used the phrase 'post productionist' to describe the new role and function of peri-urban areas (Argent 2002), implying that these areas have ceased to produce commodities.

Researchers have generally concentrated on the proximity of peri-urban areas to large urban areas, and the presence of environmental features, such as water availability, attractive landscapes, accessibility and coastal landscapes to explain demand

for land in rural areas around large urban centres. The factors of amenity and proximity become the expected features of whether an area is peri-urban or not. This process results in an increased demand for land and in land value exceeding its value for agriculture.

10.3 The Value of Peri-Urban Agriculture

Despite this emphasis on the consumption of peri-urban values, and the use of a 'global hinterland' for much urban food supply (Steel 2008), urban and peri-urban areas remain significant areas of food production. One third of all US farms, for example, are in peri-urban areas (Heimilich and Barbard 1997, cited in Audirac 1999). In many Asian cities, such as Hong Kong, Shanghai, Dakkar and Accra, over 45 % of urban demand for vegetables is met from production in urban and peri-urban areas (De Zeeuw and Dubbeling 2009). Australia is a significant agricultural producer, exporting around 60 % of the food it produces (PMSEIC 2010). The nation is generally regarded as food secure (DAFF 2013), but this masks underlying vulnerabilities in food supply, reinforcing the importance of peri-urban regions. Houston (2005:210) argues that "conventional wisdom about agriculture in Australia's peri-urban regions tends to be dismissive about its economic significance". He estimates that Australia's peri-urban regions comprise less than 3 % of the land used for agriculture, but are responsible for almost 25 % of the gross value of agricultural production in the five mainland states, a figure which "consistently and substantially understates the value of agricultural production in peri-urban regions" by adopting a statistical threshold which ignores smaller and intensive industries situated close to major population centres (Houston 2005:217). Using Houston's defining peri-urban characteristics, the Victorian Department of Sustainability and Environment states that "Victoria's peri-urban region accounts for around one quarter of the State's land area but half of the agricultural production value" (Department of Sustainability and Environment 2006:16).

The South East Queensland region constitutes only 1.3 % of Queensland yet accounts for 14 % of the State's total 'farm gate' turnover (Office of Urban Management 2004). As the hub for Queensland's agricultural manufacturing and processing industries, it generates a turnover of $6.24 billion per annum (Q.DPI and SEQROC 2002). The vegetables of South East Queensland's Lockyer Valley produce a third of Queensland's vegetables (Department of Natural Resources and Mines 2005). New South Wales Agriculture has valued agriculture in the Sydney basin at about $1 billion per year representing 20 % of the total annual NSW vegetable tonnage, with the Sydney region producing 100 % of the state's Chinese cabbages and sprouts, 80 % of fresh mushrooms and 91 % of spring onions and shallots (Gillespie and Mason 2003; Sinclair et al. 2003).

Melbourne's green belt is the second highest producer of agricultural products in the State of Victoria with a gross production value of between $A1.2 and 1.5 billion (Food Alliance 2014), from about 4,000 farms on two thirds of the area, although the true value may be closer to double this figure (Parbery et al. 2008). The output

per hectare of this area is the highest in Victoria, at least three times greater than any other region and four times the state average (PPWCMA 2004).). This green belt produces up to 50 % of the state's vegetables and around 17 % of the fruit, and is highly significant for the production of particular types of fruit and vegetables producing over 90 % of the state's asparagus, cauliflowers and strawberries, and over 70 % of the raspberries and lettuce (Food Alliance 2014). Some areas are significant to the national and state vegetable supply, such as Werribee South, which provides up to 70 % of south eastern Australia's leaf and kale crops, 85 % of Victoria's cauliflower crop and 53 % of the broccoli (Food Alliance 2014), Koo Wee Rup, which produces over 90 % of Australia's asparagus crop (ABS Australian Bureau of Statistics 2014) and Casey-Cardinia with produce valued at $423 million in 2006 (OSISDC 2010). The total area of agricultural land in Melbourne's green belt declined by 18 % between 1986 and 2001 (Parbery et al. 2008). Since then, over 53,000 ha have been excised from this green belt including important intensive agricultural land.

The displacement of agriculture from peri-urban land is a global phenomenon, removing agriculture from large areas in countries experiencing extensive urbanisation or population increases, such as China, India and the United States of America (US). There is a long history to claims that such displacement is not problematic (Versterby and Krupa 1993). Using the US as an example, Fischel (1985) claimed that the loss of farmland nationally in the US was small and the impacts on production minor, and that the loss of farmland could be offset elsewhere by new methods of production. However, between 1949 and 1997, the US lost 20 % of its agricultural land. Nelson (1990) estimated that one fifth of prime agricultural land in the US was located within 50 miles of the 100 largest urban areas, and showed that between 1982 and 1992 nearly 10 million acres of cropland were lost in the US and total sales of farm produce fell by over $42 billion. In peri-urban areas, sales of farm produce fell by $19 billion. Nelson (1990) claimed that most of this reduced production was due to losses of cropland, and estimated that each new household on former farmland cost the nation's agricultural economy $100,000 in lifetime sales. The 12 million new households expected to be added to peri-urban areas between 1990 and 2040 may reduce national sales of farm produce by up to $100 billion annually. Exurbanisation threatens much of the cropland located within about 100 miles of US cities. As Nelson (1999:147, 137) points out, "it is not difficult to see that if recent trends continue, much of exurbia's cropland will be taken out of inventory within the next generation…at a cost to the American economy of perhaps trillions of dollars in farm sales…[and]…much of the contiguous 48 states may no longer be distinguishable as either urban or rural, being instead characterised mostly as low density, exurban development". Goodenough (1978) argued that in many regions, the rate of farmland conversion would mean an end to most agriculture within a generation. Others have reinforced these conclusions. Halsey (1999) pointed out that the greatest conversion of prime farmland to urban use had occurred in 20 major land resource areas representing 7 % of the total US land base including some of the most productive land in the US, such as the Sacramento and San Joaquin Valleys in California.

10.4 Land Use Planning and Agriculture

Land use planning is a powerful independent factor affecting the ways peri-urban areas function and is critical to maintaining a wide range of peri-urban values. Conversion of farming areas to non-farm uses is often regarded as undesirable due to the loss of a land resource, the dilution of farming systems, and consequent urban inefficiencies created by sprawled housing (Alterman 1997). Under this approach, regulation to prevent land fragmentation is an indispensable tool to control property speculation and maintain effective rates of return on agricultural production against the allure of profits from anti-competitive land development. Effective land use planning is a necessary, though often not a sufficient, tool for the maintenance of landscapes and other environmental features, as well as productive activities, employment and agricultural land markets. Contrary perspectives suggest that as farming retreats, new urban employment opportunities emerge and local markets expand for farm produce (Bryant et al. 1982). These perspectives argue that alternative land uses are desirable, or inevitable, regardless of planning preferences (Bryant et al. 1982; Wills 1992; Bowie 1993; Barr 2003). Advocates of market oriented policy criticise the legitimacy of polices aimed at supporting non-productive activities within multi-functional landscapes, such as environmental works, as providing trade and markets distortions (Potter and Burney 2002).

The three most important land use factors which lead to the progressive loss of farm land are the large number of existing rural lots which, if developed, change the character and functioning of the entire region; the potential for future subdivision of larger properties into smaller lots; and the introduction of a wide range of urban uses, such as commercial activities. The impacts of land fragmentation can be reduced if subdivision is prevented or limited, and the right to construct a dwelling on a subdivided lot is removed. Defining the appropriate use of agricultural land is crucial (Auster and Epps 1993). Amalgamating small agricultural land holdings is another strategy but little studied in Australia. Regulatory techniques widely used are controls on subdivision, development and diverse urban related land uses. Commercial, residential and small lot rural uses introduce activities to rural areas which are often incompatible with the continuance of agriculture, add pressures to remaining agricultural uses, and more likely result in the progressive further fragmentation of land.

Despite difficulties in its application, agricultural protection zoning is a well established technique in developed countries to designate agricultural uses, retain larger lot sizes and restrict urban related and other incompatible uses of land by statute (Sinclair et al. 2003; American Farmland Trust 2002). Such zoning can also seek to achieve a range of environmental and social outcomes such as the retention of rural landscapes, biodiversity values, and limitations on high infrastructure costs to small rural lots. Larger lot sizes and use controls also maintain future options, flexibility and the potential for variation and innovation denied by close subdivision.

The effects of land speculation on the price of land have long been recognised. Archer (1973) analysed data from a subdivision developed in the late 1950s near the US city of Lexington. He found that land speculation was an important cause of land price increase and of scattered or "leapfrog" development where land parcels were developed out-of-sequence. Reciprocal relationships between land supply and demand and the rise in land prices caused by land speculation manipulate demand, so that "land speculation also accelerates the rise in land values by the initial increase in speculative demand and the subsequent reduction in the effective supply of land for building" (Archer 1973:367). The phenomenon of "out-of-sequence" development is still characteristic of much development occurring on the fringes of many US metropolitan areas today. In the 1973 Lexington study, this type of development led to the inefficient conversion of rural land to urban uses with landowners who withheld land from the market gaining an increase in value of an average $129 per acre a year but generating social costs, paid by others, of $1,360 per acre per year.

By concentrating on demand, many researchers have understated the role of increased land supply through subdivision and the exercise of development rights in creating a demand for peri-urban land types and on land prices. The liberalisation of subdivision and development controls can lead to a mutually reinforcing process of increased land supply and demand. The use of peri-urban land for development drives up land prices and makes it difficult for farmers to increase the size of their holdings. Higher land prices reduce the comparative rate of return on investment in agricultural enterprises. This reduced return, the desire for profit, and the tendency of large lot holders to regard land as a form of realised capital for retirement encourages landowners to sell in response to development pressure, and itself leads to further development pressure. These factors fuel land speculation, which raises land prices still further. Restricting the supply of smaller rural lots can reinforce the expression in price of the suitability of land for agricultural production, limit land speculation and lower land values. Figure 10.1 demonstrates that the price per hectare of peri-urban land increases as lot size falls.

These issues have been studied in detail only sporadically in Australia. Most Australian state governments have been reluctant over long time frames to protect peri-urban agriculture from a range of development pressures. Peri-urban rural subdivision controls are common but extensive urban expansion, rural residential subdivision and commercial uses continue to affect peri-urban areas and drive up the price of agricultural value. The little ex-urban regional planning which has occurred in Australia has now been generally discarded. Rural land uses usually are determined more by factors such as the structure of the economy, patterns of social change and politics and planning than regulation or the needs of agricultural production. This has produced a focus on a political struggle around rural property rights.

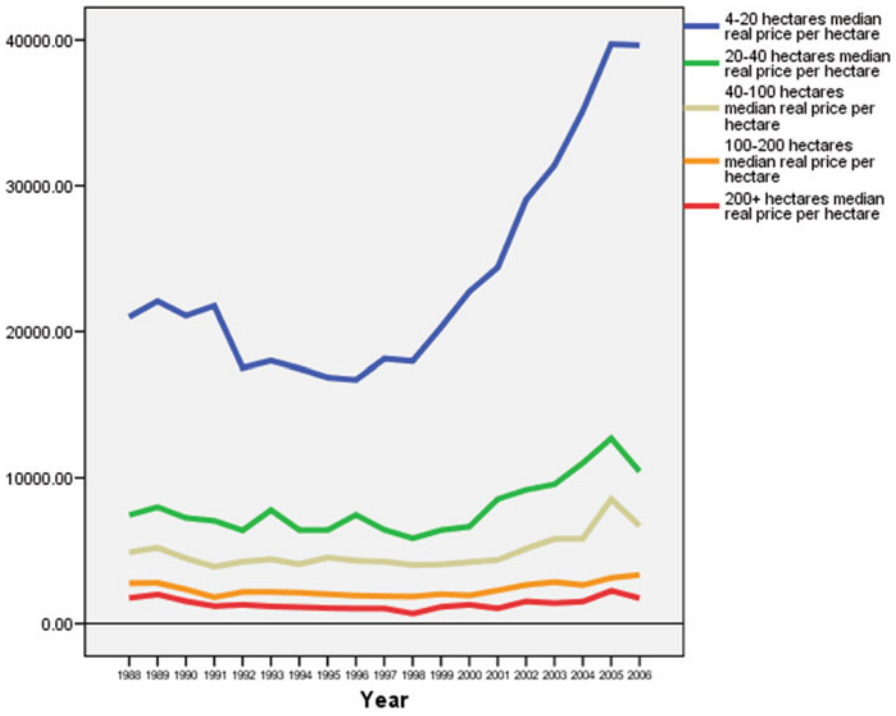

Fig. 10.1 Median price/ha by property size (Victoria $2006) (Source: Barr and McKenzie 2007)

10.5 Peri-Urban Land Use Planning in Melbourne

Despite periodic attempts to provide certainty through long term policy, land use planning for the Melbourne peri-urban area has been subjected to bewildering change. In 1971, the former Melbourne metropolitan planning authority, the Melbourne and Metropolitan Board of Works (MMBW), attempted to integrate the planning of the Melbourne metropolitan area with the city's hinterland. The green belt (incorporating green wedges between growth corridors) comprised 2400 km^2 or about half the total planning area. The MMBW used two methods to reduce both land speculation and pressures for development in the non-urban areas. The first was to reserve sufficient quantities of urban land, and the second was to protect non-urban areas from development through the use of permanent regulatory zones. These zones sought long term certainty for all affected parties through the use of high minimum sub-division sizes up to 80 ha, strong land use controls, the preservation of large metropolitan farms and the introduction of more restrictive uses in environmental zones.

In the mid 1970s, the MMBW commissioned two major studies into issues affecting the non-urban zones, the *Review of Planning Policies for the Non-Urban Zones* (MMBW 1977), and the *Metropolitan Farming Study* (Aberdeen Hogg and

Associates 1977). Both studies made strong recommendations aimed at ensuring the continuation of farming in the non-urban zones. The farming study argued that:

> when a farm is sold it tends to be subdivided to the minimum lot size allowable. This reduces the capacity of the non-urban zones to achieve the desired planning objectives of retaining agricultural production and rural landscape…There is no evidence that controls on use or development have imposed any significant constraint or caused any hardship to metropolitan farmers in the carrying out of their present farming pursuits (Aberdeen, Hogg and Associates Pty. Ltd 1977: 8–9).

The farming study concluded that "it is important to realise that any production that is lost through sub-division or urban incursion may not be capable of being produced elsewhere, or, if it is, it would involve higher prices to the consumer" (Aberdeen, Hogg and Associates Pty. Ltd 1977:1).

The government in 1971 also established regional planning authorities to develop cross-sectoral planning for the environmentally significant inner peri-urban areas of the Dandenong Ranges, Upper Yarra Valley and the Mornington Peninsula. The resultant policies, plans and statutory measures were interventionist, seeking alternative futures to path-dependent trajectories associated with trend analyses. They restrained urban development, controlled rural subdivision and prevented the introduction of urban related uses into rural areas in order to protect rural land uses, including agricultural practice, landscapes and environmental features. Land fragmentation and future development were identified as the main threats to maintain rural landscapes. The Upper Yarra Valley and Dandenong Ranges Authority, for example, severely limited future subdivision and dwelling development on the 62 % of 17,272 rural lots and the 42 % of 43,334 urban lots without dwellings (Loder and Bayly 1980). This removal of development expectations controlled land speculation, protected environmental qualities and increased the capacity of agriculture to persist by maintaining comparative rates of return and the potential to innovate. This kind of regional planning is rare.

More recently, the 2002 plan, *Melbourne 2030*, implemented new regulatory rural planning zones and a legislated urban growth boundary for the Melbourne green belt and developed a strong policy approach aimed at protecting hinterland resources. The State government had previously altered planning policy to control the proliferation of rural-residential subdivision in rural areas in 1992, and in 1996 inserted provisions for the retention of productive agricultural land in the State Planning Policy Framework (SPPF). Further amendments to Ministerial Direction No. 6 in 1997 and 2006 required an application for rural-residential development to be consistent with a range of requirements including the need to locate any such development close to existing towns and urban centres, not to encroach on productive agricultural land or adversely affect environmental resources. Ministerial Direction No. 6 was revoked in May 2012. In 2013, the State government also reduced the level of regulatory controls in most rural zones allowing further subdivision or non-farming related commercial uses to be introduced over much of the peri-urban area. These changes significantly weakened the rural zones by increasing the capacity for dwelling construction on separate lots and allowing a wide range of

commercial uses to be approved on land reserved for agricultural and traditional rural uses.

The 2014 metropolitan plan, *Plan Melbourne*, proposes to investigate an agricultural food overlay to protect high value agricultural land, and to identify, protect and manage strategically significant agricultural land. However, such strategic statements about protecting the values of peri-urban land have been pre-empted by the 2013 planning system changes which make rural zones more permissive. Similarly, an undertaking to introduce a permanent metropolitan urban boundary has been made redundant by successive governments rezoning sufficient rural land on Melbourne's fringes to provide a 30 year supply of residential land at some of the world's lowest densities.

10.6 Case Study Region

This case study explores three rural scenarios for peri-urban land which test the extent to which rural land supply can meet projected rural dwelling demand, limit rural land development and transfer demand for land to urban and regional settlements. The case study focuses on seven peri-urban municipalities extending northwesterly from Melbourne. Melbourne is Australia's second largest city with a population of around 4.35 million. It is the fastest growing state capital in Australia, and its population is projected to overtake that of Sydney by 2053. Many of the areas of Melbourne experiencing the strongest growth are on the city's outer fringe (ABS 2014).

The Melbourne peri-urban region can be defined structurally by its physical structure and form, or functionally, or by a combination of spatial and functional factors (Buxton et al. 2006). Structural characteristics include lower population and building densities compared to urban regions, the heterogeneous nature of land uses and rapid rates of change; while a functional analysis of social and economic processes is both interactionist and system based. The resilience of peri-urban systems therefore is determined by the system components and how they interact, that is by multiple physical and social states. Thus, the relationships between elements determine the system's function and its capacity to respond to change.

Melbourne's peri-urban region consists of two non-urban belts of land round the city and their associated townships extending to about 160 km from the Melbourne central business district. The first, or inner belt, is the Melbourne green belt extending from the metropolitan urban growth boundary to the outer rural boundary of the 17 municipalities which form the green belt. The second, or outer belt, includes eight municipalities in a broader arc extending from the western to the eastern coast line. Beyond this belt, a number of large regional townships form the outer edge to this broad region.

The case study area (Fig. 10.2) examined includes seven peri-urban municipalities. The area is bounded to the south by Melbourne's urban-rural edge, to the west by the transport corridor to the city of Ballarat and to the north by the transport

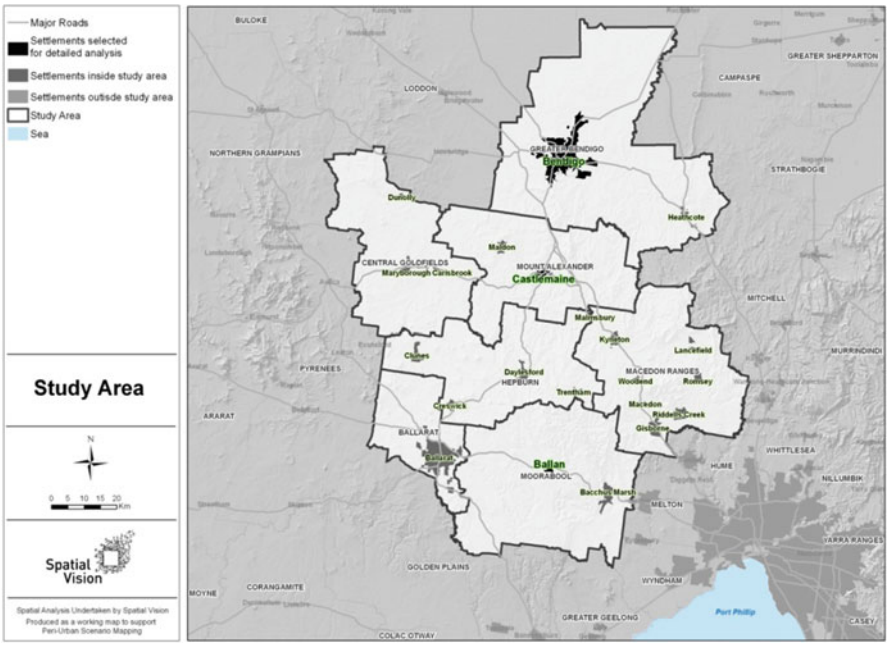

Fig. 10.2 Case study region

corridor to the city of Bendigo. The two largest regional settlements are Ballarat with a population of 95,582 and Bendigo with a population of 86,078. The seven municipalities are Moorabool, Macedon Ranges, Ballarat, Hepburn, Mount Alexander, Central Goldfields and Greater Bendigo, with a total population of 308,558. The study area also includes a number of medium sized towns, such as Bacchus Marsh, and small towns. It contains many historic features and is predominantly rural in appearance with 23 % of the land area zoned for public use, with the remaining rural land zoned for rural production, rural conservation or rural living uses. The region is notable for its landscape quality, biological diversity, rural production and tourism.

10.7 Case Study Methodology

This case study (Buxton et al. 2014) aims to help redress the lack of interest in regional planning and in the integration of metropolitan, rural and township land uses by investigating:

- methods for limiting future development in rural areas through controls on small rural lot development and on rural land subdivision, and
- means for transferring development from rural to township areas.

It is a supply-led approach, which assumes that the existence of lot types such as rural-residential lots will create a demand for dwellings on those lots, and that varying the types of land supply in townships will alter consumer preferences. This approach assumes that land supply influences demand, specifically, that the existence of small rural lots will result in their use for dwellings and that alternative housing type and lots within townships will in turn influence demand in different ways.

The study estimates current and potential land supply, and its adequacy to meet dwelling demand for both rural and urban areas through to 2040. Three rural scenarios test the extent to which rural land supply can meet projected rural dwelling demand. The first is a Business-as-usual (BAU) scenario under which supply is determined by the number of existing and potential new lots under existing planning schemes. The second, the Rural Preservation (RP) scenario, discourages rural development by requiring high minimum lot sizes of 16–40 ha in three rural zones for the construction of one dwelling. This scenario also encourages township development in three future urban zones on township fringes by reducing the minimum lot sizes for dwellings there. The third scenario, Tenement Control (TC), requires the area of multiple lots in the same ownership in rural zones to total 25 ha (TC25) or 40 ha (TC40) for the construction of one dwelling. The latter two scenarios assume an alternative future to be achieved by 2040, defined as a continuation of 2014 existing physical conditions, and are used to limit dwelling growth on rural land.

10.8 Findings

The application of the Rural Preservation and Tenement Control scenarios substantially reduces the potential for dwelling construction in the three rural zones studied by reducing rural development on existing land parcels and restricting rural land subdivision. However, the scenarios increase the development potential in the three urban edge zones by transferring forgone rural demand from rural to urban edge zones and increasing development yields in the urban edge zones. The application of the three scenarios led to the following findings.

10.8.1 Business-as-Usual Scenario

The most noticeable spatial feature of the rural areas is their extensive spatial fragmentation and the large oversupply of rural lots. Vacant rural lots total 71,990, with large numbers of these situated away from population centres in areas where demand is low. Under Business-as-usual projections, demand is unlikely to ever lead to this supply being used for housing. Yet in high amenity locations closest to Melbourne, rural development would substantially alter landscapes. Most vacant rural lots, or 47,759 on 710,686 ha, are situated in the Farming Zone (FZ), so their development

would significantly affect farming. Most lots are small, with almost 75 % being 10 ha or less on 93,994 ha. However over 3500 lots over 40 ha exist on a significant land area of 286,280 ha or about 45 % of the rural land area. These large lots represent much of the study area's future, maintaining options for future agriculture and containing much of the remnant biological diversity. Only 4,455 new lots, or about 12 % of the total subdivision capacity, can be created in the three rural zones.

Yet substantial additional dwelling capacity exists on undeveloped land on the edge of townships in three future urban zones. Only 7085 lots exist in these three edge zones. However, their subdivision capacity accounts for all but 4455 of the 39,436 potential new lots from subdivision in these and the rural zones.

10.8.2 Rural Preservation Scenario

Application of the Rural Preservation scenario reduces the number of lots with rural zoning from 79,075 in the Business-as-usual scenario to 12,726 lots. Development capacity, including lots and subdivision potential, is affected even more strongly. Figure 10.3 shows that this falls in the three rural zones from 48,261 to 5,911 dwellings. The greatest quantitative reduction occurs in the Farming zone where dwelling yield falls from 34,112 in the Business-as-usual scenario to 4,841 in the Rural Preservation scenario, an 86 % reduction. This represents a fall from almost 40 % of total capacity under Business-as-usual to 4 % under the Rural Preservation scenario. Higher percentage reductions occur in the Rural Conservation zone (RCZ) by 90.3 % to only 459 dwellings and in the Rural Living zone (RLZ) by 93.4 % to 611 dwellings. Conversely, application of the Rural Preservation scenario to the three future urban zones on township edges increases their yield considerably from 38,934 to 106,082 dwellings.

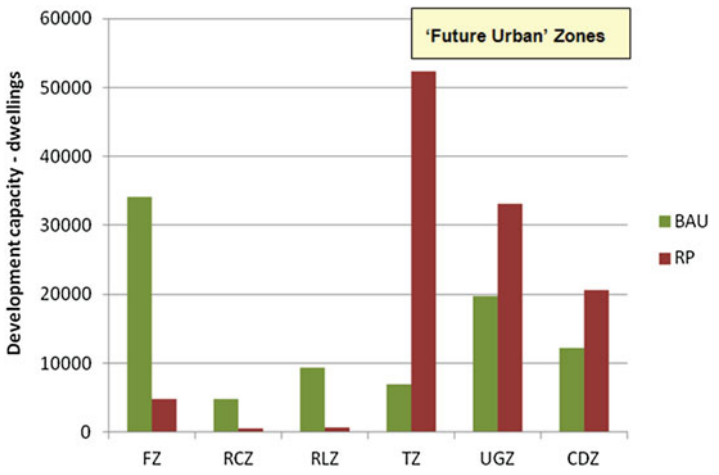

Fig. 10.3 Development capacity by planning zone under BAU and RP scenarios

Under the Rural Preservation scenario, application of a higher minimum lot size will transfer demand for 11,082 dwellings from rural to urban areas increasing urban dwelling demand from 60,651 under the Business-as-usual scenario to 71,733. Under the Rural Preservation scenario, the use of a regulatory control would shift development pressure to far fewer settlements, and significantly reduce the capacity for rural development compared to the Business-as-usual scenario. The use of pressure criteria such as services and infrastructure would tend to concentrate development in regional centres, district towns and townships on rail lines.

10.8.3 Tenement Control Scenarios

There are 32,896 singly owned lots in the six zones (three rural and three urban edge) examined in the study region qualifying for the construction of a dwelling under this scenario, of the 79,075 total lots. Tenement controls were then applied to the 46,179 multiple lots owned by a single landowner or 58 % of the total held in single ownership on the 10,196 properties comprising combinations of lots. Applying tenement controls reduces significantly the development potential of the multiple lots, under a 25 ha control to 14,597, and a 40 ha control to 7,395 dwellings (Fig. 10.4). The greatest impact would apply to the Farming zone where 70 % of lots are held in common ownership although all rural zones and the Township zone (TZ) would also be affected significantly.

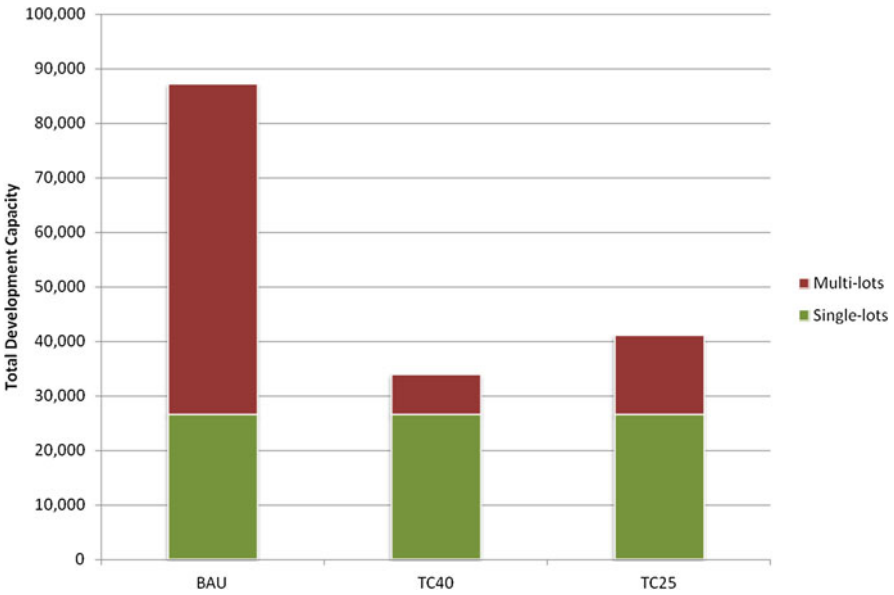

Fig. 10.4 Total development capacity – under BAU and TC scenarios

Transfer of foregone rural demand for development under the 25 ha tenement control would comprise a small component of new urban dwelling demand of 4247.

10.9 Conclusion

Cities which protect their hinterlands are likely to be the most economically prosperous this century. The maintenance of physical attractiveness and natural resources will prove to be essential to continued economic innovation, and will make significant contributions to wealth, health, personal identity and social harmony in both city and region. The retention of peri-urban agricultural areas will also contribute to the development of more resilient urban food systems. The level of successful interaction of these factors will define a liveable and functioning community. Yet governments routinely separate economic, social and environment sectors and fail to use tools within the land use planning system to achieve integration. Governments also separate rural areas from towns, and urban hinterlands from metropolitan areas. Such spatial separation leads to sectoral policies which are as fragmented as the pattern of land ownership.

Climate change, environmental degradation, regional population increases and a range of global, national and regional factors are expected to increase pressures on regional resources. Climate change is likely to reduce the resilience of human and natural systems leading to tolerance thresholds being exceeded and vulnerability increased. It is likely to particularly impact the natural systems that underpin food production. The result could be a greatly increased risk of non-linear change over a short period that is both catastrophic and irreversible. However, institutional and policy fragmentation is hampering the ability of governments at all levels to develop anticipatory policies which can assist the peri-urban region to adapt to rapid and fundamental change.

In times of rapid change with unpredictable outcomes, the resources of peri-urban areas may increase in importance. It would seem prudent to maintain the values of peri-urban areas, at least in the short term, during times of increasing change and threat. Integrated regional planning is essential if reciprocal impacts of sectors are to be considered and such planning requires a strong role for governments. A range of subdivision practices based around commercial or residential uses is increasingly being employed in Australian peri-urban areas. However, a return to regulatory practice will need to consider readoption of planning techniques formerly used, included tenement controls, rural lot restructuring and strong subdivision and use controls.

References

Aberdeen, Hogg and Associates Pty. Ltd (1977) Metropolitan farming study, Report prepared for Melbourne and Metropolitan Board of Works (MMBW), Melbourne

ABS (Australian Bureau of Statistics) (2014) Regional population growth, Australia, 2012–13. Issue 3218.0. Australian Bureau of Statistics, Canberra

Allen A, Davila J (2002) Mind the Gap! bridging the rural-urban divide. Insights 41:231–142

Alterman R (1997) The challenge of farmland preservation: lessons from a six-nation comparison. J Am Plann Assoc 63(2):220–244

American Farmland Trust (2002) Fact sheet: the farmland protection toolbox, farmland information center. Washington DC: American Farmland Trust.

Archer RW (1973) Land speculation and scattered development: failures in the urban-fringe land market. Urban Stud 10:367–372

Argent N (2002) From pillar to post: in search of the post-productivist countryside in Australia. Aust Geogr 33(1):97–114

Audirac I (1999) Unsettled views about the fringe: rural-urban or urban-rural frontiers? In: Furuseth O, Lapping M (eds) Contested countryside: the rural urban fringe in North America. Ashgate, Aldershot, pp 7–32

Auster M, Epps R (1993) Rural land use policy. In: Sorensen T, Epps R (eds) Prospects and policies for rural Australia. Longman Cheshire, Melbourne, pp 77–93

Barr N (2003) Future agricultural landscapes. Aust Plan 40(2):123–127

Barr N, McKenzie F (2007) Tree change in Victoria: Land markets, migration, population, non-resident landowners and farm business. Paper presented at managing tree change conference, La Trobe University, Beechworth, VIC

Bills N, Gross D (2005) Sustaining multifunctional agricultural landscapes: comparing stakeholder perspectives in New York (US) and England (UK). Land Use Policy 22(4):313–321

Bot A, Nachtegaiele F, Young A (2000) Land resource potential constraints at regional and country levels, World soil resources report 90. Food and Agriculture Organization of the United Nations, Rome

Bourne LS, Bunce M, Taylor L, Luka N, Maurer J (2003) Contested ground: the dynamics of peri-urban growth in the Toronto region. Can J Reg Sci 26(2 and 3):251–270

Bowie I (1993) Land lost from agriculture: a dubious basis for rural policy. Urban Policy Res 11:217–229

Bryant CR, Russwurm LH, McLellan AG (1982) The city's countryside: land and its management in the rural-urban fringe. Longman, London

Bunce M, Walker G (1992) The transformation of rural life. In: Bowler IR, Bryant C, Nellis CM (eds) Contemporary rural systems in transition volume 2, economy and society. Redwood Press, Melksham, pp 49–61

Buxton M, Tieman G, Bekessy S, Budge T, Mercer D, Coote M (2006) Change and continuity in peri-urban Australia: state of the peri-urban regions – a review of the literature. Monograph 1 – change and continuity in peri-urban Australia. RMIT University, Melbourne

Buxton M, Phelan K, Fish B, Farrell S, Groenhart L, Butt A, Kennedy M (2014) Scenarios for sustainable regional development in Melbourne's peri-urban region, summary report. RMIT University, Melbourne

Caldwell W, Collett A, Ludlow T, Sinclair I, Whitehead J (2011) Planning and food security within the commonwealth: discussion paper. Commonwealth Association of Planners, Commonwealth Foundation, London

Cockrall-King J (2012) Food and the city: urban agriculture and the new food revolution. Prometheus Books, New York

DAFF (2013) National food plan: our food future. Department of Agriculture, Fisheries and Forestry, Canberra

De Zeeuw H, Dubbeling M (2009) Cities, food and agriculture: challenges and the way forward, RUAF working paper no. 3. RUAF Foundation, Leusden

Department of Natural Resources and Mines (NRM) (2005) Lockyer valley discussion paper - declaration of the whole Lockyer Valley as a subartesian area. Government of Queensland, Brisbane

Department of Sustainability and Environment (DSE) (2006) Regional matters. An atlas of regional Victoria 2005. Victorian Government DSE, Melbourne

FAO (2011) Food for the cities. Food and agriculture organization of the United Nations. FAO, Rome

Fischel WA (1985) The economics of zoning laws: a property rights approach to American land use controls. Johns Hopkins University Press, Baltimore

Food Alliance (2014) Findings of the know your foodbowl research project. www.foodalliance.org.au/knowyourfoodbowl. Accessed 10 Dec 2014

Gillespie P, Mason D (2003) Value of agriculture in the Sydney region. NSW Agriculture, Windsor

Goodenough R (1978) An approach to land-use control: the California Land Conservation Act. Urban Stud 15:289–297

Halsey L (1999) Beyond the rural-urban edge. In: Furuseth O, Lapping M (eds) A contested countryside: the rural fringe in North America. Ashgate, Aldershot/London

Heimlich RE, Barnard CH (1997) Agricultural adaptation to urbanisation? Farm types and agricultural sustainability in US metropolitan areas. In: Audirca I (ed) Rural sustainable development in America. Wiley, New York

Hollier C, Francis J, Reid M (2004) Rural-peri-urban interface and extension, In: National Extension Policy Forum Sydney (Viewed November 6 2005). http://www.dpi.vic.gov.au/dpi/nrenfa.nsf/LinkView

Houston P (2005) Revaluing the fringe: some findings on the value of agricultural production in Australia's peri-urban regions. Geogr Res 43(2):209–223

Johnson K, Beale C (2002) Non-metro recreation counties: their identification and rapid growth. Rural Am 7(4):12–19

Loder and Bayly (1980) Inventory of subdivision and development. Upper Yarra Valley and Dandenong Ranges Authority, Lilydale

Mattingly M (1999) Institutional structures and processes for environmental planning and management of the peri-urban interface strategic environmental planning and management for the peri-urban interface research project. www.ucl.ac.uk/dpu/pui/research/previous/epm/

MMBW (Melbourne and Metropolitan Board of Works) (1977) Metropolitan farming study, report prepared by Aberdeen, Hogg and Associates Pty. Ltd., Melbourne

Molden D (ed) (2007) Water for food, water for life: a comprehensive assessment of water management in agriculture. International Water Management Institute, London

Morgan K (2010) Feeding the city: the challenge of urban food planning. Int Plan Stud 14:341–334

Morgan K, Sonnino R (2010) The urban foodscape: world cities and the new food equation. Camb J Reg Econ Soc 3:209–224
Nelson A (1990) Economic critique of prime farmland preservation policies in the United States. J Rural Stud 6:119–142
Nelson A (1999) The exurban battleground. In: Furuseth OJ, Lapping MB (eds) Contested countryside: the rural urban fringe in North America. Ashgate, Aldershot
Office of Urban Management (2004) Southeast Queensland regional plan. Local Government, Planning, Sport and Recreation (QLD), Brisbane
OSISDC (2010) Inquiry into sustainable development of agribusiness in outer suburban Melbourne, Outer suburban/interface services and development committee. Parliament of Victoria, Melbourne
Parbery P, Wilkinson R, Karunaratne K (2008) Square pegs in green wedges. Landholders and natural resource management in Melbourne's rural hinterland. Department of Primary Industries, Melbourne
Pezzini M, Wojan T (2001) Leveraging amenities for rural development: direction, dialogue, and negotiation. In: Proceedings of the exploring options for a new rural America. Kansas City Federal Reserve Bank, Kansas City, pp 121–138
Pires M (2004) Watershed protection for a world city: the case of New York. Land Use Policy 21:161–175
PMSEIC (2010) Australia and food security in a changing world. The Prime Minister's Science Engineering and Innovation Council, Canberra
Porter JR, Xie L, Challinor AJ, Cochrane K, Howden SM, Iqbal MM, Lobell DB, Travasso MI (2014) Food security and food production systems. In: Climate change 2014: impacts adaptation and vulnerability part A: global and sectoral aspects contribution of working group II to the fifth assessment report of the Intergovernmental Panel on Climate Change. CUP, Cambridge, pp 485–533
Potter C, Burney J (2002) Agricultural multifunctionality in the WTO—legitimate non-trade concern or disguised protectionism? J Rural Stud 18:135–147
PPWCMA (Port Phillip and Westernport Catchment Management Authority) (2004) Port Phillip and Western Port Regional Catchment Strategy 2004–2009. PPWCMA, Frankston
Q. DPI and SEQROC (Queensland Department of Primary Industries and Fisheries and South East Queensland Regional Organisation of Councils) (2002) Rural futures SEQ2021: regional strategy for rural communities and agriculture. Queensland Department of Primary Industries, Brisbane
RTPI (2014) Promoting healthy cities: why planning is critical to a healthy urban future. In: Planning horizons. 3. October 2014. Royal Town Planning Institute, London
Salt B (2004) The big shift, (second). Hardie Grant Books, South Yarra
Sinclair I, Bunker R, Holloway D (2003) From the outside looking in – planning and land management in Sydney's fringe, State of Australian cities national conference 2003, Parramatta, Sydney
Steel C (2008) Hungry city: How food shapes our lives. Vintage Books, London
Versterby M, Krupa KS (1993) Effects of urban land conversion on agriculture. In: Thunberg EM, Reynolds JE (eds) Proceedings of urbanization and development effects on the use of natural resources. Publication No. 169 Southern Rural Development Centre, Bilox
WHO (2001) Urban and peri-urban food and nutrition action plan: elements for community action to promote social cohesion and reduce inequalities through local production for local consumption. World Health Organization Regional Office for Europe, Copenhagen
Willis KG, Whitby MC (1985) The value of greenbelt land. J Rural 1:147–162
Wills A (1992) Do our prime farmlands need saving? Agric Sci 5(4):25–27