

FUNCTIONAL CHANGE AND FARMING IN THE PERI-METROPOLIS: WHAT DOES IT REALLY MEAN FOR AGRICULTURE AND FOOD SYSTEMS?

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Introduction

Australian city-regions have experienced rapid peri-urban growth in the past three decades. Population growth and housing development in the towns and rural landscape of the peri-urban regions around Australia's metropolitan and regional cities has occurred as consequence of the concurrent processes of urbanisation and counter-urbanisation (within regions of urban influence) which can be understood as products of changes in both rural and urban economies and society. These changes have led to modifications in employment, travel times, property markets and household structures, as well as changes in the structure and functions of rural activities and industries. The development of multiple decentralised nodes of economic activity within city regions also offers continued scope for new forms of suburbia and *exurbia* (beyond the urban fringe) to emerge – changing the structure of the city within its built-up areas and beyond into surrounding rural landscapes.

In Australia the emergence of *peri-urban* areas as structurally and functionally differentiated regions – compared to urban or rural places – has challenged agriculture and planning policy. In some instances, peri-urban regions have revealed an inability of policy to effectively produce either desired land use or agricultural outcomes. Similarly, this process has revealed an inadequacy in traditional ideas of an urban–rural dichotomy, which itself has been rendered less relevant in the face of the increasing prevalence of non-agricultural (and urban-related) activities in peri-urban areas. Concurrently, planning policy and practice has, under neo-liberalism become typified by less intervention in land use and spatial allocation, resulting in competing markets for rural land and conflicting values for rural landscapes.

The implications of this change for agricultural activity and for the structure of farming industries present consequences for settlement planning, environmental values and social structures. Many of these issues have been identified in relation to agricultural regions more remote from large cities (Smailes 2002, Vanclay 2003, Mullen 2010). The implications for agricultural production and food systems within the broader city-region are less well understood.

Despite decades of peri-urban development, levels of agricultural production and output within Australia's peri-urban regions do not appear to have experienced dramatic region-wide decline. Examples of local landscape conversion and industry loss can be cited, however net production levels and values, to date, are not declining (Houston 2005, Buxton et al 2009). Importantly however, the *structure* of agricultural industries in peri-urban regions is changing, as are the imitations and threats to a future adaptive capacity for peri-urban agricultural networks and systems. The consequences of this for agricultural systems and food production in the broader city region (which may be considered to include the peri-urban regions) are not therefore clearly evident from overall production data, yet data relating to farm structures reveals long-term risks to industry viability at a regional level from the process of functional change in the regions.

This is patterns is true of case study of peri-urban Melbourne where, despite increased levels of population and housing in rural landscapes, and the restructure and spatial re-patterning of many agricultural activities, overall output and the notional share of agricultural output in the broader region (the state of Victoria) have not declined. Nonetheless, the challenges to agricultural viability and adaptability are considerable. The consequences of these for land use planning as a settlement systems issues are important – but beyond this consideration should also be given to the real and intrinsic meanings of the vulnerability of continuing agricultural systems in the face of the increasing recognition of food localism and regional food systems as a component of community resilience – even at a metropolitan-scale.

This paper explores the nature of industry and enterprise change in the context of Melbourne's broad city-region and surrounding landscapes. It seeks to determine the implications for agriculture of change in peri-urban land use, industry structures and landscapes.

Agriculture in peri-urban regions

As in other rural areas, farming and agricultural production within the peri-urban region of Australian cities has experienced processes of change and structural adjustment over many decades. Some of this change has occurred within the context of the broader structural changes in local and global agriculture, others more specifically relate to expanding urban and urban-generated settlement and housing and consequent land use change. Physical and socio-economic changes interplay in these regions, where an increasingly urban-focused culture (Champion & Hugo 2003), and expectations of *amenity* or landscape *quality* (Moss 2006, McCarthy 2008, Gosnells & Abrams 2009) have served to change perceptions of the roles, values and purposes of these landscapes. Mobility and new land markets have altered these regions.

Many of the social and economic factors that previously distinguished these areas from adjoining urban locations have been reduced, despite their 'rural' physical setting. Similarly, these regions are increasingly differentiated from 'genuine' agricultural regions - those places that do not have a strong urban influence. Whether this is considered as a 'post-productivist' transition (Wilson 2001), or the as a broader 'multi-functional rural transition' (Holmes 2002), the consequences have been to make these places valued for a range of non-productive purposes; leisure, landscapes, residential amenity. The resulting policy (and political) agenda for planning and agriculture exposes tensions between land use objectives, markets and community values in these regions – this has important meaning for agricultural systems and food production.

However, examples of agricultural activity and adaptation remain evident in peri-urban Melbourne, and in other Australian peri-urban regions (Buxton et al 2007, Low Choy et al 2007), both on the immediate metropolitan fringe, and in the extended (and expanding) rural regions that are increasingly influenced by commuting and amenity migration. The forms of agricultural activity and their relative role within local economic structures have altered, yet farming in peri-urban regions remains an important land use, and a significant feature of the physical and cultural landscape. Agricultural activity in the study region (Melbourne's expansive peri-urban region) includes large intensive farming operations, an increasing number of small-scale grazing properties, and emerging industries, many of which benefit from proximity to large urban centres and markets in addition to

Farm structure, viability and land use change

The experiences and processes of economic and landscape transition in Australian agriculture are intertwined, not only with structural change within specific industries, but also with social and market preferences and settlement systems that have origins beyond agricultural values or returns. Within peri-urban areas these processes have been the subject of commentary and policy concern in Australia and elsewhere since at least the 1970s (Hugo & Smailes 1985, McKenzie 1996).

In relation to planning for land use and peri-urban agriculture, the focus of research and policy discussion has considered two broad themes; the various impacts of increased *non-farm housing* in rural landscapes, and the consequences of declining levels of *farm viability* at a regional-system and farm-business scale.

The nature and realities of these processes and the consequent impacts of change are varied geographically and by industry. Wider assumptions regarding landscape and economic transition in peri-urban landscapes and its impact on farm business and production cannot be supposed to characterise all areas. However, some distinct patterns of change are evident, generally associated with the development of multi-functional rural landscapes, where contrasting (often competing) activities demand different social and economic priorities beyond the productivist concerns of traditional agriculture.

Over the present decades, a broader process of restructure in Australian agriculture has occurred. Australia-wide, farm numbers decreased by approximately 10,000 in the decade to 2009 (ABS 2010) and a decline of farm numbers by over 60,000 nationally since 1960. Remaining farm businesses in Australia, as elsewhere in developed economies, have increased in scale to maintain viability in the face of declining terms of trade (ABARE 2007). Comparatively high levels of productivity growth in the agricultural sector in Australia over several decades (Mullen 2010) have been related to local and global industry restructure and new policy environments. The consequences of restructure and consequent vulnerability have also been uneven between industries and regions.

Remaining small-scale farms numbers have increased and production amongst these has been concentrated in a number of key industries, particularly livestock production. Within large-scale operations, variations in farm viability, vulnerability within and between industries (Alexander & Kokic, 2005), and responses to the challenges of scale and declining returns have occurred, such as broader conceptions of

'family' farming enterprises to include a range of multiple property businesses and non-agricultural farm related activities (Pritchard et al 2007).

Kirschenmann et al (2008) describe the phenomenon of a declining 'middle' in a North American agricultural context, linking it to risks in the broader food production and supply system. They contend that the polarisation of farm structure (to large or small) has implications for the diversity of food production and the nature of local processing networks. They describe a dualism of processing and marketing at the large and small (local) scale, with consequent challenges emerging for farms operating between these scales.

Increased off-farm income and linkages to the non-farm economy are also features of the transition for many farm business and farming communities (Gleeson et al 2003). Associated demographic shifts include declining farmer numbers and an ageing profile of farmers across Australia, including in peri-urban areas. Increasing part-time farming and an increase in non-farming land use in the landscape are decisive features of understanding peri-urban regions. Although access to off-farm income offers opportunities to reduce vulnerability to adjustment and cost factors (as described by Nelson et al 2007) the market costs for farm adjustment and restructure through the purchase of local land are increased in these areas. This options is also often related to tourist markets in areas closer to large urban populations.

The processes of agricultural restructure and change has been geographically varied and has differed significantly between industry types. For example, in Victoria since the 1980s, industries such as dairying and horticulture have seen significant growth in production from fewer farms, while beef cattle and viticulture have grown only modestly, with only a small increase in producer numbers (Barr & McKenzie 2007). These latter industries are increasingly components of agricultural activity and land use (including part-time agriculture) in peri-urban landscapes, including in the Melbourne peri-urban region.

Coupled with the increasing presence of non-farm rural land use in many (but particularly peri-urban) areas, restructure has resulted in a dual process of fewer larger farms with an increased agricultural output, and a growing number of small rural landholdings operating at a sub-commercial scale, or with no agricultural output at all.

Victoria's rural landscapes are varied, with continuing areas of high production and increasing scale in the state's west and in northern irrigation areas, and other areas that might be described as *amenity* landscapes (Barr 2005) or shifting *transitional* landscapes where non-farming land use and influence is increasing. Peri-urban landscapes reveal characteristics of the more general trend in agricultural restructure, and some very specific changes are emerging from new land markets and land uses.

Perspectives on peri-urban agricultural change

The peri-urban region surrounding metropolitan Melbourne has almost uniformly experienced growth in lifestyle development and a decline in the number of commercial farm businesses. This landscape-scale shift is connected to broad trends in agriculture, and to pressures for new urban-type and rural lifestyle developments beyond the urban fringe. The role and prospects for peri-urban agriculture can be broadly described within the context of at least four processes of change: *loss*, *transition*, *dilution* and *transference* (Buxton et al 2007). Although these are often competing discourses, examples of each process can be identified at various locations within the study region.

Managing the *loss* of agricultural land (especially 'high-quality' land) and production is historically a focus of planning literature and policy, which considers the process of change as one where a land resource and economy is at risk, and requires protection through policy and regulation. This is of course a contested concept, given current preferences for market-based resource allocation in Australia (see, for example, Bowie 1993, Wills 1992), and the tensions between land use and industry perspectives (Bunce 1998, Houston 2005). This process often reveals the limits of planning in the Australian context, where the risks of the loss of a land resource seem to have rarely influenced long-term planning decisions, despite policy intent.

Alternatively, the notion of the *dilution* of rural landscapes and of agricultural economies corresponds with broader understandings of the drivers of counter-urbanisation into peri-urban areas, and consequent changes in population and settlement (Smailes 2002). Dilution is not simply a matter of farms and farmers being 'squeezed out', but is rather an increasing mix of emerging activities, with agricultural production becoming a less significant component of the landscape and (consequently) the economy and community-life. Consequently, the viability, scale and concentration of farms and farm related businesses and commodity 'clusters' are understood to be threatened by dilution (Brabec & Smith 2002, Daniels 1999). From a policy perspective, this dilution in the (assumed) homogeneity in rural landscapes has resulted in policy approaches that generally seek to problematise non-farming communities and land use in rural areas.

Processes of *transition* between agricultural industry sectors (and commodity types) are also apparent in many peri-urban areas. Farm diversification is a common phenomenon in response to deregulated

commodity markets, climate and water availability, new markets for food and fibre (and potentially fuel), emerging export opportunities, trade policy, and as a mechanism to manage increasing price risks for agriculture. Traditional industries are seen to give way to new farming activities and farm-business types, and the previous 'critical mass' is diminished, as are the non-farm industries that support these locally. Land use and landscape changes (e.g. grazing areas being planted with tree crops) are visible symbols of transition.

The locational *transference* of productive activity and of specific farm businesses is a process most clearly evident in industries such as poultry raising, piggeries and horticulture, where scope to expand these large operations on the urban fringe is limited and land prices offer the potential for substantial reinvestment beyond likely areas of future population expansion. Examples include the movement of sugarcane growing from Sunshine Coast peri-urban regions (Coggan et al 2008) and the movement of large-scale poultry-raising from the fringes of Melbourne since the 1980s and 1990s (Henderson, 2005).

These are not the only explanations of change, but they do offer perspectives on change as it is experienced in peri-urban regions. Examples of each can be identified in Melbourne's peri-urban region, and they provide a means to understand the consequences of change for farm businesses and industries in ongoing agricultural viability at the local level.

Policy and planning for peri-urban agriculture

Policy approaches to agriculture and agricultural adjustment in Australia have broadly mirrored other industry policy regimes since the 1950s. Earlier periods of industry protection have given way to an increasing emphasis on efficiency, competition, self-reliance and risk in the absence of direct government support in favour of a market emphasis. Subsequently, policy support for agricultural activities has become contingent on farm viability and industry sustainability, rather than thinking about agriculture as a nation-building project as was previously prevalent. Concurrently, the previous *productivist* priorities of government have been incorporated within broader rural policy concerns, including community development and environmental management (Argent 2002). In planning policy, the emphasis on protecting farming and farmland has competed with approaches that have sought to meet market preferences for rural lifestyle development.

In peri-urban areas, the emergence of this policy approach has presented challenges to many of the longstanding objectives of land use policy. Industry adjustment that has been a feature of agriculture since the 1970s and has resulted in fewer larger farms in most areas. In Victoria, planning approaches have included objectives of supporting agriculture by preventing property fragmentation, particularly through controls on subdivision and use, and using differentiated zoning, particularly where 'high-quality' agricultural land resources have been identified. Even these approaches have been strongly contested (Bowie 1993, Wills 1992) and identified as being misaligned with the 'free-market' objectives of broader agricultural policy.

Arguments against planning for agricultural protection generally include that:

- agriculture can, if necessary be a land market competitor if and when commodity prices demand such a change
- substitutes for 'high-value' land exist in the form of irrigation and agricultural technologies
- non-urban developments are eventually reversible with the support of favourable market conditions.

Planning policy in peri-urban Australia has also included a number of other objectives, often complementary, such as limiting the landscape and infrastructure impacts of scattered rural (non-farm) housing. Moreover, reduced water supply, increased transport costs and changing climate mean that that previous market decisions were not necessarily undertaken with an appropriate level of market knowledge about current and future value of a land resource.

In addition, the process of land use conversion exhibits external impacts and 'threshold' effects, whereby remaining agricultural activities are affected by adjoining, incompatible land uses, as well as by the dilution of activities in industries (for example, dairying) where a critical level of local production is often necessary to support regional processing activities. Further, the fragmentation and conversion of rural land to non-farm uses, and its sale through effectively non-farm land markets, can render future reversion difficult, even if agricultural viability supports it.

Recent analysis of land sales in Victoria (Barr & McKenzie 2007) suggests a strong divergence in the characteristics and prices between small and larger rural land markets since the 1990s. Sales prices per hectare have doubled for properties under 20 ha, although there has been less significant change in sales prices for larger properties. The zoning and subdivision of land into small lots is an intended intervention in the land market. It artificially raises the price of rural land and reduces the comparative viability of larger agricultural landholdings, by limiting the capacity for property accumulation, lowering the return on

investment in relation to the value of the land asset, and increasing the capital return from development in relation to both the capital value and recurrent incomes from many agricultural enterprises.

There is tension between the planning policy inclination to protect land as a resource from non-farm uses, with the aim of addressing impacts of land use, urban expansion, and the realities of private markets and public preferences. Throughout Australia, while broad objectives for the future of peri-urban areas as rural (and agricultural) places are articulated at a planning policy level, land use realities, along with market preferences and public and private investment (particularly in transport), are often in conflict with the effective implementation of planning objectives. Processes of rural land use dilution and agricultural displacement continue to occur, resulting in larger populations living beyond the urban fringe, with an increasing concentration of this population in areas that are accessible to metropolitan and regional cities.

Does this matter for food systems?

Current food production systems in Australia reflect the process of farm restructure that has been occurring over previous decades. Farms are larger, there has been an expansion of large-scale intensive animal operations and an expanded reliance on large scale (albeit increasingly efficient) irrigation. From a land use perspective, this continues trends of large holdings in productive agricultural regions coupled with long distance transportation and centralised processing. These trends become problematic in the peri-urban region, where land use changes are inconsistent with broader industry change and when the advantages of proximity to markets are minimal.

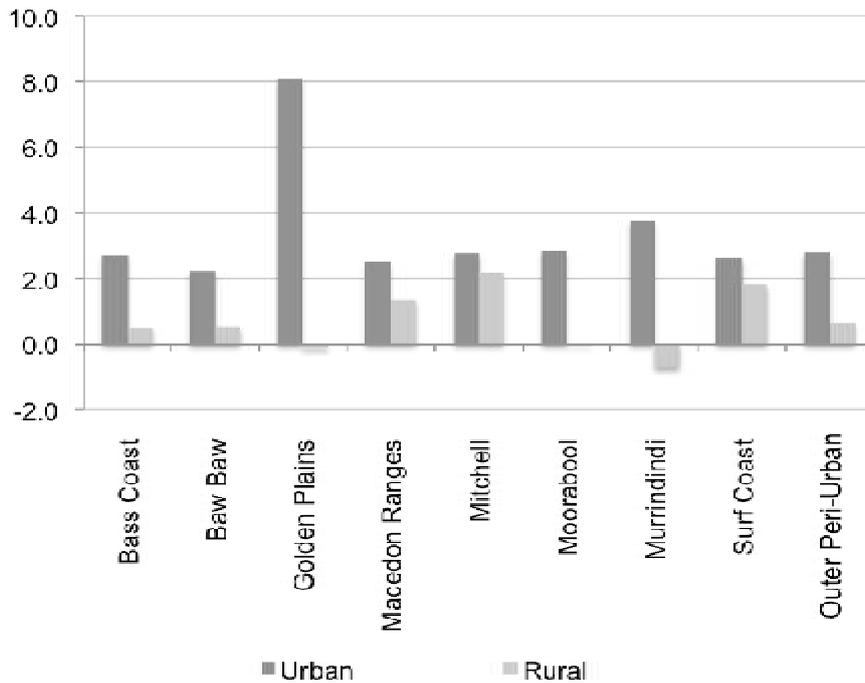
Evidently, present trajectories of food systems may not need to be considered in a spatial context, or as a regional system. However, a growing literature raises concerns at the vulnerabilities of present food systems. This in turn suggests scope to reconceive food systems in cities and their regions. The resilience and vulnerability of food systems to climate change, energy pricing and population growth are recognised as central to resilience in urban settings (Newman et al 2009, Sonnino 2009), including through policy such as the *London Food Strategy* (Reynolds, 2009). Emerging approaches to 'food security' extend beyond notions of availability and affordability to considerations of resilience of food systems within urban systems (Donovan et al, 2011). From these perspectives, planning for peri-urban futures should be undertaken with perspectives on alternative future food systems, and considerations of the risks and vulnerability presented by trends in land use change.

Change in Melbourne's peri-urban region

Growth in population and housing in peri-urban Melbourne has occurred over several decades in both 'greenfield' fringe metropolitan fringe locations, and in (semi) rural locations beyond the fringe. Melbourne's metropolitan population has increased by about 1% per year since the mid 1980s, with accelerating growth since the late 1990s (ABS 2009). Continued projected growth of up to 1.3% per year is anticipated to 2036, to over 5.5 million people (DPCD 2009). While a significant reversal of longer term trends has seen renewed population growth in inner-urban areas, outer metropolitan growth on the fringe dominant development.

Beyond the metropolitan fringe, growth has occurred in and around smaller urban centres and across rural landscapes in the immediate peri-urban region and across an expansive region. Outside of towns, the prominent process of change is the development of housing on small lots in rural areas — the creation of post-agricultural landscapes. This form of housing development has been a significant component of all new housing in many areas of Melbourne's peri-urban region, although urban growth is still important in many of the component local government areas in this region (see Figure 1). Importantly, this form of rural land use change is often incremental in nature.

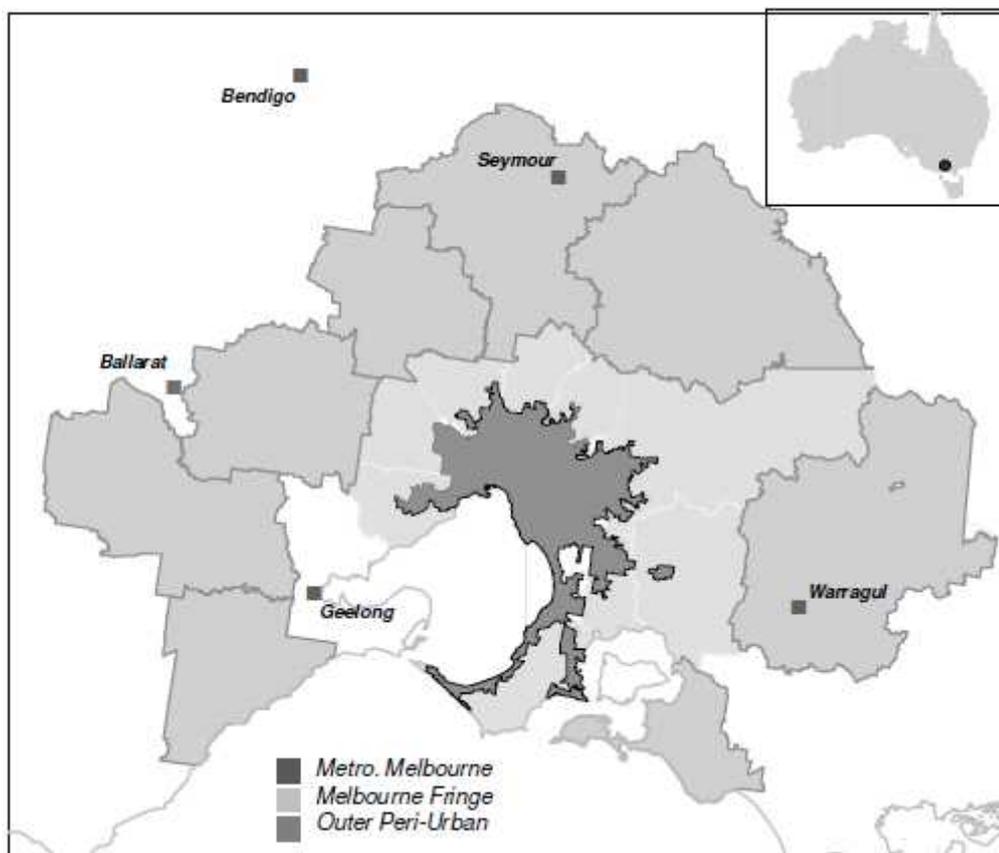
Figure 1: household change urban and rural — outer peri-urban Melbourne 1986–2006



Source: DPCD *Towns in Time*

Rural housing growth has generally resulted in scattered development on small properties. In Melbourne’s outer peri-urban area (see Map 1), more than 5,000 new housing approvals were recorded in rural areas in the decade to 2007; over 75% of these approvals were on properties below the 40-hectare threshold nominated by planning schemes to maintain agricultural holdings and prevent non-agricultural activities in rural areas (Buxton et al 2009). Importantly, the spatial distribution of this housing development appears to have only a limited relationship with proximity to existing urban centres and infrastructure. The scattered nature of development suggests a range of housing markets where land availability and landscape are also drivers of development.

Map 1: Metropolitan Melbourne and the inner/outer peri-urban region



The significance of housing development in rural areas for landscapes and infrastructure has been evident for some decades. This has been reflected in planning policy and objectives, but nevertheless development has continued. Clearly there has been regulatory failure in this regard. There is evidence of specific impacts on individual farm activities, such as the achievement and maintenance of buffer areas, but the evidence of impacts to farming systems are less obvious at a landscape and regional scale.

Industry and structure in Melbourne’s peri-urban regions

As identified by Houston (2005) and Buxton et al (2007, 2008), peri-urban agriculture is a significant source of output and enterprise, despite long-term trends in land use transition, dilution and competition. Melbourne’s inner and outer peri-urban region (Map 1) produced 16% of the value of agricultural output in the state of Victoria in 2006, a slight increase over the preceding decade (ABS 2009).

While the high value production of irrigated agricultural areas along the River Murray and grains production in the state’s far west remain the focus of high-value commodity production, the varied production and enterprise structure of Melbourne’s peri-urban region still maintains a significant share of agricultural output. Overall, the numbers of farm business in the Melbourne Statistical Division and outer peri-urban region have not declined (Figure 2).

Figure 2: Farm businesses 1997–2007*

	1997	2001	2007
Melbourne Statistical Division*	2609	2704	2297
Outer peri-urban	3613	3414	3617
Victoria	35 346	34 283	32 648
Outer Peri-urban (% of Victoria)	10%	10%	11%
Melbourne Statistical Division (% of Victoria)	7%	8%	7%

ABS 2009 (for Melbourne Statistical Division 1997, 2001, 2007)

*The Melbourne Statistical Division includes the metropolitan area and inner peri-urban

From this perspective, the impacts of increased peri-urban populations and landscape change might not be considered to be problematic. However, an analysis of the structure of farm businesses in these regions and changing production patterns suggests that changes within agriculture are leading to a less resilient industry.

The characteristics of Melbourne's peri-urban agriculture differ from most other rural areas in south-eastern Australia in two ways: in the predominance of small-scale farm businesses and in the high levels of extensive grazing activities. Both of these factors typify the region and suggest responses to processes of rural dilution and the consequences of industry transference. The result is a problem in terms of ongoing region-wide output and industry viability, despite the stability apparent in comparative production levels.

Moreover, the immediate Melbourne fringe (inner peri-urban) has diverged from the outer peri-urban region in regard to agricultural trends. In the outer peri-urban region small-scale farms continue to proliferate; in the metropolitan fringe, there has been a contraction to fewer large-scale and high-value industries. For example, on the metropolitan fringe the scale of vegetable growing has increased over the decade to 2009, while the number of broadacre farming businesses (cropping and grazing) has declined. In the outer peri-urban region, there has been growth in broadacre farming businesses.

Over the past decades, the proportion of beef cattle in a state-wide context has increased in the outer peri-urban region, other livestock industries have declined, in both absolute and comparative terms (ABS, various years). The exception is the of poultry meat industry; however, it has experienced a contraction in business numbers and a consequent increase in scale leading to fewer producers and operations with potential land use conflicts relating to land use change.

Agriculture is significant in a few localised peri-urban areas; in some instances, it is a product of transference from the immediate metropolitan fringe. Further dilution of agricultural activities is likely to result from increases in scale of remaining operations, and result to the need for locations where security of surrounding land use is available — generally these locations will be further from the effects of ongoing peri-urban development. For example, an increase in small-scale viticulture in peri-urban regions, has occurred at the same time as a decline in broadacre cropping and other larger scale activities such as potato growing.

In Melbourne's peri-urban regions, the predominance of small farm businesses (turnover less than \$100,000 per year, measuring EVAO - *Estimated Value of Agricultural Output*) is greater than in Victoria overall. Some areas, such as the Macedon Ranges north-west of Melbourne are dominated by these farm businesses in terms of land use and industry structure. Similar land use is apparent in other peri-urban regions in Australia (ABS 2009). Farms at this scale are likely to require off-farm income to support families and farm operators are unlikely to pursue strategies of reinvestment and restructure from within their farm budgets. Of course peri-urban regions are ideally suited for mixed-income arrangements and for more diverse forms of farm income including tourism and farm-gate sales.

Figure 3: Farm scale (EVAO) as % of region's total farms 1997–2007* (%<\$200,000 / %>\$500,000)

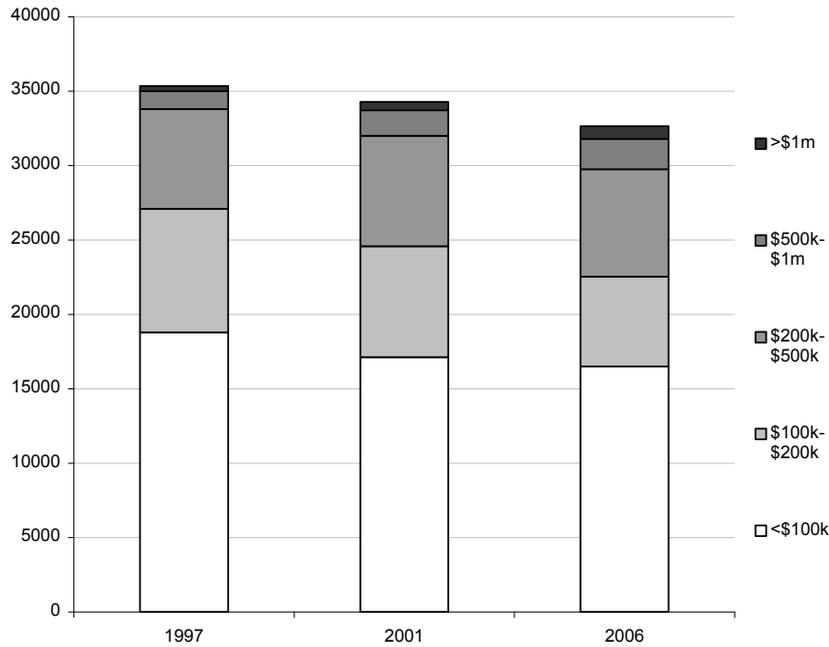
	1997	2001	2007
Melbourne Statistical Division*	88% / 7%	82% / 12%	77% / 16%
Outer Peri-urban	85% / 3%	82% / 4%	81% / 5%
Total Peri-urban	86% / 5%	82% / 8%	79% / 10%
Victoria	77% / 4%	72% / 7%	69% / 9%

ABS 2009 (for Melbourne Statistical Division 1997, 2001, 2007)

*The Melbourne Statistical Division includes the metropolitan area and inner peri-urban

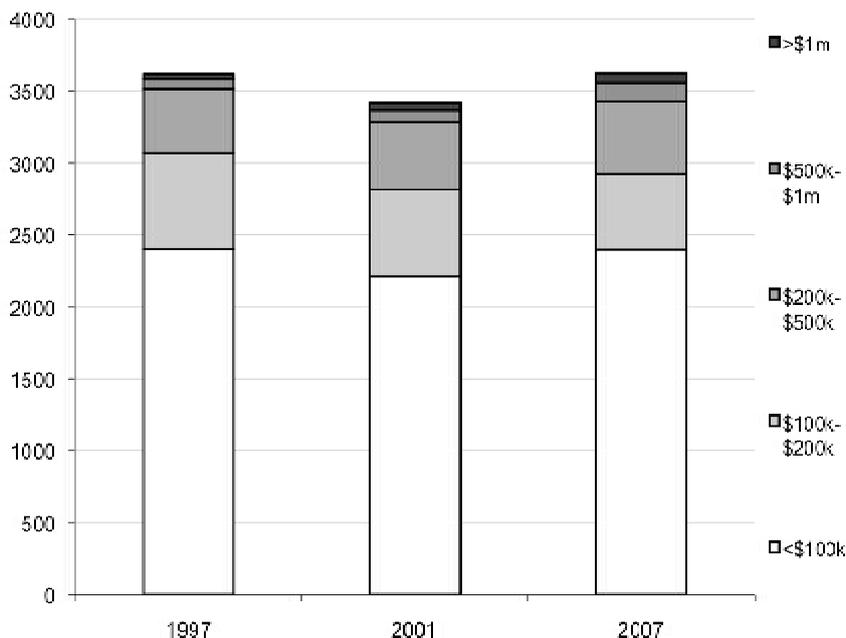
Industries including beef production and viticulture are dominant among small farm businesses in the region. Conversely, large-scale operations such as poultry production and specialised high value activities such as commercial flower-growing dominate the overall regional turnover, albeit from few businesses. Only dairying, particularly in outer peri-urban west Gippsland, offers an example of large numbers of high-turnover farms in a single location. However, it is important in dairying to have clustering of activity and close proximity to processing facilities, and these characteristics contribute to the distinctiveness of regional dairying.

Figure 4: Farm businesses and annual farm turnover (EVAO), Victoria, 1997–2007



Although overall numbers of farm businesses have declined in Victoria since the 1990s, there has been a relative increase in the numbers operating at a larger scale (Figure 3). Conversely in Melbourne’s outer peri-urban region, farm numbers have increased, as has the share of small-scale businesses (Figure 4). The comparative turnover values between regions suggest a commercial vulnerability for many farms in the peri-urban region, however, an alternative reading may indicate a region that is adapting to the advantages of proximity to urban employment and one resisting farm rescaling and a decline in farm numbers.

Figure 5: Farm businesses and annual farm turnover (EVAO), outer peri-urban Melbourne, 1997–2007



Different trends in structure and scale can be observed between areas on the immediate metropolitan fringe and the outer peri-urban region. In the immediate Melbourne fringe area, activity became concentrated between 1997 and 2009 and included an 20% decline in overall farm numbers (including a decline of 16% (or 144) in broadacre farm businesses), a decrease in piggery numbers, but those with output of over \$1 million per annum did not decrease in number, and an increase in poultry meat producers at the large-scale (turnover above \$1m per year).

This contrasts with the trends towards increased low-scale farms in the outer-peri urban region, but more broadly the processes of restructure and change occurring elsewhere in agriculture are different to those occurring in peri-urban agriculture. The growing prevalence of small-scale farm businesses is consistent with the proximity of the region to off-farm income (and alternative on-farm income sources), and more competitive markets for land.

There are few large-scale businesses in the peri-urban region (in industries such as poultry, piggeries and horticulture and to some extent dairying), but based on the 2006 Agricultural Census, they have an average annual output up to ten times the regional average for all farms. On the immediate Melbourne fringe, however, the dynamics of change have seen an overall decline in small-scale operations and a concentration of fewer high-output industries and businesses.

Consequently, in Melbourne's outer peri-urban region close to 80% of all farm business contribute less than 40% of farm output, and a smaller number of businesses are involved in industries of comparatively high value. Concurrently, agriculture in these landscapes is being marginalised by housing development on smaller lots (including on properties where some of this agriculture is occurring). Perhaps surprisingly, low-output agriculture includes both relatively low-investment activities (beef cattle grazing) and relatively high-investment activities (viticulture) that have connections to local and regional processing, tourism and other additional income streams.

In the immediate Melbourne fringe region, the process of change has resulted in fewer, but more concentrated activities, including locally high-impact (and relatively high-output/employment) industries, such as vegetable growing and poultry meat. Dramatic reductions in extensive industries, including dairying, suggest a decline in landscape-scale activities and an increase in output from site-specific and individual intensive activities (both land-resource based such as horticulture and shed-based activities).

Dilution, viability and risk in peri-urban food systems

There are many potential meanings and consequences of the structures and trends in peri-urban agriculture. The continuation of agriculture, even with mostly small-scale activity, is broadly consistent with the planning objectives of maintaining rural land use in the region, but not with the intent of maintaining a viable agricultural system in the context of national and global trends in many farming systems. Moreover, the capacity of small-scale farming to remain viable is enhanced in peri-urban regions, given potential access to urban employment and urban markets for on-farm diversification.

However, perhaps problematically, the fewer remaining large-scale business in peri-urban landscapes are in industry types with potential for conflict at the local level. This includes sites of activities such as shed-based poultry-raising and piggeries, and extensive dairying which acts as an industry cluster and requires scope for further adjustment of farm holdings – difficult in changing peri-urban landscapes.

The future viability of peri-urban agriculture is not only about overall production output and value, but also part of the system of agricultural activity within a structure of industry and business. The emergence of a multi-functional rural landscape in Melbourne's peri-urban region has not, at this stage, resulted in a reduction of net agricultural output; however, a structure has emerged that reveals a dilution of agricultural landscapes, and of opportunities for agricultural adjustment in many industries and locations.

At the fringe, urban expansion and the clear enunciation of boundaries (albeit with too-frequent amendment) appears to have provided an expectation of the retention of specific non-urban spaces, such as the Yarra Ranges, Werribee market-gardening areas and (perhaps more tenuously) poultry meat production in the Mornington Peninsula and south-east. However, with the last two of these, there are risks of future industry displacement, where land and buffers become difficult to retain and restructure. In crucial ways, this contrasts with the trends evident in outer peri-urban areas, where the diffusion of small-scale enterprises within the landscape is a feature of dilution in a multi-functional region, and limits opportunities for industry restructure form within and wholesale industry relocation away from the immediate metropolitan fringe.

Despite long-term processes of landscape change and settlement expansion at and beyond the metropolitan fringe, consistent with previous findings (Houston 2005) a decline in net and comparative agricultural output is not evident in peri-urban Melbourne. However, the structure of agriculture is changing. The implications for production and for the scope for ongoing industry adjustment appear to include the centralisation of production into fewer businesses at the immediate fringe and the dilution of agricultural activity within a multi-functional landscape in the expanding city-region.

Land use planning in the peri-urban region has had limited success in offering certainty for ongoing competitive production. Although agricultural production remains, changing landholdings and activities across the region limit scope for industry relocation within the region. The proliferation of small commercial operations suggests only limited opportunities for production at a larger scale.

Maintaining rural landscapes and rural activities cannot, therefore, be considered as wholly consistent with strategies to maintain a regional agricultural (and food production) economy. Within contemporary agriculture, the flexibility required for effective adjustment and regionally competitive industry structure is fundamental, yet these are limited by the mosaic of small-holdings, non-farming housing development and landscape (amenity) protection.

Policy approaches to this dilemma should include either the retention of agricultural spaces, or the acceptance that opportunities for mixed-use agricultural economy that benefits from proximity to a growing city will have to be a trade-off with future flexibility for large-scale commercial producers. Alternatively, there may be a growing role for networks of small producers with access to off-farm opportunities in peri-urban agricultural production. Regardless of future scenario options for peri-urban regions, the lack of scope for adaptability created by the current diffusion of housing into rural landscapes should be of critical concern for future regional food security.

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